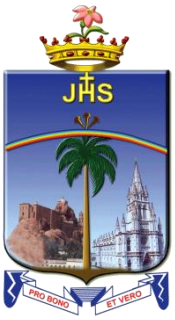
M.Sc. ELECTRONICS

LOCF SYLLABUS – 2022

SCHOOLS OF EXCELLENCE

WITH CHOICE BASED CREDIT SYSTEM (CBCS)



DEPARTMENT OF ELECTRONICS
SCHOOL OF PHYSICAL SCIENCES
ST.JOSEPH'S COLLEGE (AUTONOMOUS)
Special Heritage Status Awarded by UGC
Accredited at A^{++} Grade (IV Cycle) by NAAC
College with Potential for Excellence by UGC
DBT-STAR & DST-FIST Sponsored College
Tiruchirappalli - 620 002, Tamil Nadu, India

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM(CBCS)
UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to maintain and uphold the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014 – 15, to meet and excel the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system enhances the optimal utilization of both human and infrastructural resources. It also enhances academic mobility and enriches employability. The school system preserves the identity, autonomy and uniqueness of every department and reinforces Student centric curriculum designing and skill imparting. These five schools adhere to achieve and accomplish the following objectives.

Optimal utilization of resources both human and material for the academic flexibility leading to excellence.

Students experience or enjoy their choice of courses and credits for their horizontal mobility.

The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice-based credit system.

Human excellence in specialized areas

Thrust in internship and / or projects as a lead towards research and

The multi-discipline nature of the School System caters to the needs of stake-holders, especially the employers.

Credit system:

Weightage to a course is given in relation to the hours assigned for the course. Generally, one hour per week has one credit. For viability and conformity to the guideline's credits are awarded irrespective of the teaching hours. The credits and hours of each course of a programmed is given in the table of Programme Pattern. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For PG courses, a student must earn a minimum of 110 credits as mentioned in the programmed pattern table. The total number of minimum courses offered by the Department is given in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)
LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

OBE is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience, each student should have achieved the goal. There is no single specified style of teaching or assessment in OBE; instead, classes, opportunities and assessments should all help the students achieve the specific outcomes

Outcome Based Education, as the name suggests depends on Outcomes and not Inputs. The outcomes in OBE are expected to be measurable. In fact, each Educational Institute can state its own outcomes. The ultimate goal is to ensure that there is a correlation between education and employability

Outcome –Based Education (OBE): is a student-centric teaching and learning methodology in which the course delivery, assessment is planned to achieve, stated objectives and outcomes. It focuses on measuring student performance i.e., outcomes at different levels.

Some important aspects of the Outcome Based Education

Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally, three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs):
PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Programme Educational Objectives (PEOs): The PEOs of a programme are the statements that describe the expected achievement of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after Graduation.

Some important terminologies repeatedly used in LOCF.

Core Courses (CC)

A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE)

Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

DSE: Four courses are offered, one course each semester.

Note: To offer **one DSE**, a minimum of two courses of equal importance / weightage is a must.

A department with two sections must offer two courses to the students.

One DSE Course in semester two is offered as interdisciplinary/common course among the departments in a School (Common Core Course) at the PG level.

Generic Elective Courses

An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective.

Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Two GE Courses are offered, one each in semesters II and III. The GE course offered in semester II is within the school level and the GE in semester III is Between Schools level

The Ability Enhancement Courses (AEC)

One Main discipline related Ability Enhancement Course for 3 credits is offered for a PG programme by the Department.

Skill Enhancement Courses (SECs)

These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. One SEC is offered in semester II as a compulsory course on Soft Skills, offered by the Department of Human Excellence, common to all the students of PG programme.

Self–paced Learning: It is a course for two credits. It is offered to promote the habit of independent/self-learning of Students. Since it is a two-credit course, syllabus is framed to complete within 45 hours. It is not taught in the regular working hours.

Comprehensive Examinations: A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL and etc.

Course Coding:

The following code system (10 alphanumeric characters) is adopted for Post Graduate courses:

21	PXX	N	XX	NN/NX
Year of Revision	PG Department Code	Semester number.	Part Category	running number/with choice

N: - Numerals X: - Alphabet

Part Category

CC - Core Theory

CP- Core Practical

IS- Internship

SP- Self Paced Learning

CE- Comprehensive Examination

PW- Project Work & viva-voce

Electives Courses

ES – Department Specific Electives

EG- Generic Electives

EC - Additional core Courses for Extra Credits (If any) *

Ability Enhancement Courses

AE – Ability Enhancement Course

SE – Skill Enhancement Course – Soft skills

CW - SHEPHERD & Gender Studies (Outreach)

CIA AND SEMESTER EXAMINATION

Continuous Internal Assessment (CIA):

Distribution of CIA Marks	
Passing Minimum: 50 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
CIA	100

MID-SEM & END – SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective and Descriptive elements; with the existing question pattern PART-A; PART-B; PART-C and PART D.
2. One of the CIA Component II/III for UG & PG will be of 15 marks and compulsorily an online objective multiple choice question type.
3. The online CIA Component must be conducted by the Department / faculty concerned at a suitable computer centre.
4. The 7 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE-CHOICE QUESTIONS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.
6. English Composition once a fortnight will form one of the components for UG general English

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	**Level**	**Parameter**	**Description**
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/ Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS →	**Lower Order Thinking**			**Higher Order Thinking**			**Total %**
	K1	**K2**	**K3**	**K4**	**K5**	**K6**	
SEMESTER EXAMINATIONS	15	20	35	30			**100**
MID / END Semester TESTS	12	20	35	33			**100**

QUESTION PATTERN FOR SEMESTER EXAMINATION	
SECTION	**MARKS**
SECTION–A (No choice, One Mark) THREE questions from each unit **(**15x1 =15)	**15**
SECTION-B (No choice ,2-Marks) TWO questions from each unit(10x2 =20)	**20**
SECTION-C (Either/or type) (7- Marks) ONE question from each unit(5x7 =35)	**35**
SECTION-D (3 out of 5) (10 Marks) **ONE** question from each unit(3x10 =30)	**30**
Total	**100**

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.						**Max Mark: 100**	
K- LEVELS / **SECTIONS**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
SECTION–A (One Mark, No choice) (15x1 =15)	15						**15**
SECTION-B (2-Marks, No choice) (10x2=20)		10					**20**
SECTION-C (7- Marks) (Either/or type) (5x7=35)			5				**35**
SECTION-D (10 Marks) (3 out of 5) (3x10=30) Courses having only**K4** levels				3			**30**
Courses having K**4** and**K5** levels **One K5 level question is compulsory**				2	1		
(Courses having all **the 6** cognitive levels **One K5 and K6 level questions can be compulsory**				1	1	1	
Total	**15**	**20**	**35**	**30**			**100**

Continuous Internal Assessment

QUESTION PATTERN FOR MID/END TEST	
SECTION	**MARKS**
SECTION–A (No choice, One Mark) (7x1 =7)	**7**
SECTION-B (No choice, 2-Marks) (6x2 =12)	**12**
SECTION-C (Either/or type) (7- Marks)(3x7 =21)	**21**
SECTION-D (2 out of 3) (10 Marks)(2x10=20)	**20**
Total	**60**

BLUE PRINT OF QUESTION PAPER FOR MID/END TEST							
DURATION: 2. 00 Hours.						**Max Mark: 60.**	
K- LEVELS→ / **SECTIONS↓**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
SECTION –A (One Mark, No choice) (7 x 1 = 7)	7						**07**
SECTION-B (2-Marks, No choice) (6 x 2 = 12)		6					**12**
SECTION-C (Either/or type) (7- Marks) (3 x 7 =21)			3				**21**
SECTION-D (2 out of 3) (10 Marks)**(**2x10=20) Courses having only **K4** levels				3			**20**
Courses having K**4** and **K5** levels **One K5 level question is compulsory**				2	1		
Courses having all **the 6** cognitive levels **One K6 level question is compulsory**					2	1	

Total Marks	**07**	**12**	**21**	**20**	**60**
Weightage for 100 %	**12**	**20**	**35**	**33**	**100**

Assessment pattern for two credit courses.

S. No.	Course Title	CIA	Semester Examination	Total Marks
1	Self-Paced Learning Course	25 + 25 = 50	50 Marks MCQ (COE)	100
2	Comprehensive Examinations	25 +25 = 50	50 Marks (MCQ) (COE)	100
3	Internship	100	--	100
4	Field Visit	100	--	100
5	Ability Enhancement Course (AEC) for PG (3 credits)	50 (Three Components)	50 (COE) Specific Question Pattern	100
Assessment Pattern for Courses in Part - IV				
6	Value Education Courses and Environmental Studies	50	50 Marks (For 2.00 hours) (COE)	100
7	Skill Enhancement Courses (SECs)	50 marks (by Course in-charge) 50 Marks (by an External member from the Department)		100
8	SEC: SOFT SKILLS (For UG and PG)	100	(Fully Internal)	100

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$	$\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses **Passed** in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

i) The classification of final results shall be based on the CGPA, as indicated in Table-2.
ii) For the purpose of Classification of Final Results, the candidates who earn the CGPA 9.00 and above shall be declared to have qualified for the Degree as 'Outstanding'. Similarly, the candidates who earn the CGPA between 8.00 and 8.99, 7.00 and 7.99, 6.00 and 6.99 and 5.00 and 5.99 shall be declared to have qualified for their Degree in the respective programmes as 'Excellent', 'Very Good', 'Good', and 'Above Average' respectively.
iii) A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.
iv) Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	**10**	**O**
80 and above and below 90	**9**	A+
70 and above and below 80	**8**	**A**
60 and above and below 70	**7**	**B+**
50 and above and below 60	**6**	**B**
Below 50	**0**	**RA**

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	**O**	**Outstanding**
8.00 to 8.99	A+	Excellent
7.00 to 7.99	**A**	**Very Good**
6.00 to 6.99	**B+**	**Good**
5.0 0 to 5.99	**B**	**Above Average**
Below 5.00	**RA**	**Re-appearance**

Credit based weighted Mark System is adopted for the individual semesters and cumulative semesters in the column 'Marks secured' (for 100)

Declaration of Result

Mr./ MS. _____ has successfully completed the Post Graduate in _____programme. The candidate's Cumulative Grade Point Average (CGPA) is _____ and the class secured is _____ by completing the minimum of 110 credits.

The candidate has also acquired _____ (if any) extra by attending MOOC courses.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

The Programme Outcomes (POs)/Programme Specific Outcomes (PSOs) are the qualities that must be imbibed in the graduates by the time of completion of their programme.

At the end of each programme the PO/PSO assessment in done from the CO attainment of all curriculum components. The POs/PSOs are framed based on the guidelines of LOCF. There are five POs UG programme and five POs for PG programme framed by the college. PSOs are framed by the departments and they are five in numbers.

For each Course, there are five Course Outcomes to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs. All course outcomes shall have linkage to POs/PSOs in such a way that the strongest relation has the weight 3 and the weakest is 1. This relation is defined by using the following table.

Mapping	<40%	≥ 40% and < 70%	≥ 70%
Relation	Low Level	Medium Level	High Level
Scale	1	2	3

Mean Scoresof COs= $\frac{\text{Sum of values}}{\text{Total No.of POs \& PSOs}}$		**Mean Overall Score =** $\frac{\text{Sum of Mean Scores}}{\text{Total No.of COs}}$	
Result	**Mean Overall Score**	**< 1.2**	**# Low**
		≥ 1.2 and < 2.2	**# Medium**
		≥ 2.2	**# High**

If the mean overall score is low then the course in charge has to redesign the particular course content so as to achieve high level mean overall score.

DEPARTMENT OF ELECTRONICS
M.Sc., Electronics LOCF Syllabus 2022

Programme Outcomes (POs)

1. Graduates will be able to apply assimilated knowledge to evolve tangible solutions to emerging problems.
2. Graduates will be able to analyze and interpret data to create and design new knowledge.
3. Graduates will be able to engage in innovative and socially relevant research and effectively communicate the findings.
4. Graduates will become ethically committed professionals and entrepreneurs upholding human values.
5. Graduates groomed with ethical values and social concern will be able to understand and appreciate cultural diversity, promote social harmony and ensure sustainable environment.

Programme Specific Objectives (PSOs)

1. Logical & technical skills to model, simulate and analyze electronics components and systems.
2. Integrate the knowledge of embedded system and communication system for the controllability, reliability and sustainability of Electronics Technology.
3. Contribute and apply fundamental knowledge for the development of embedded system and IoT to meet the increasing demand of the society
4. Design or develop solutions for Entrepreneurial and Employability Enhancement core in an industry and organization
5. Analyze and innovate appropriate technologies for implementation of the recent trends in Electronics field

M.Sc. ELECTRONICS

M.Sc., ELECTRONICS					
PROGRAMME STRUCTURE					
Sem.	**Specification**	**No. of Courses**	**No. of Hours**	**Credits**	**Total Credits**
I-IV	Core Courses: Theory	10	46	43	43
I-IV	Core Courses: Practicals	4	32	24	24
II	Self-Paced Learning	1	-	2	02
III	Internship	1	-	2	02
IV	Comprehensive Examination	1	-	2	02
IV	Project work and Viva Voce	1	6	5	05
I-IV	Discipline Specific Elective	4	20	16	16
I	Ability Enhancement Course	1	4	3	03
II	Skill Enhancement Course (Soft Skills)	1	4	3	03
II	Generic Elective IDC (WS)	1	4	3	03
III	Generic Elective IDC (BS)	1	4	3	03
I-IV	Online courses (MOOC)	3	-	(6)	(06)
I-V	Outreach Programme	1	-	4	04
	Total	30	120	110	110(6)

PROGRAMME PATTERN							
Course Title							
Sem	**CODE**	**COURSE TITLE**	**Hrs.**	**Cr**	**CIA**	**SE**	**Final**
I	22PEL1CC01	Design of Analog Circuits	5	4	100	100	100
	22PEL1CC02	Design of Digital Circuits	4	4	100	100	100
	22PEL1CC03	Power Electronics and Solar PV Systems	***4***	***4***	100	100	100
	22PEL1CP01	Electronics Practical - I	***8***	***6***	100	100	100
	22PEL1ES01A	**DSE-1:** Embedded System-I					
	22PEL1ES01B	**DSE-1:** Electromagnetics and Antenna Design	5	4	100	100	100
	22PEL1AE01	**AEC –** Mathematics, Signals and Systems	4	3	50	50	50
		TOTAL	**30**	**25**			
II	22PEL2CC04	Mechatronics and Automotive Electronics	4	4	100	100	100
	22PEL2CC05	Digital Signal Processing	5	5	100	100	100
	22PEL2CP02	Electronics Practical - II	***8***	***6***	100	100	100
	22PEL2ES02A	**DSE-2:** Sensors, Transducers and MEMS					
	22PEL2ES02B	**DSE-2:** Digital Communication Systems	5	4	100	100	100
	22PEL 2SP01A	**SPL:** Programmable Logic Controller					
	22PEL2SP01B	**SPL:** Consumer Electronics	***-***	***2***	***50***	***50***	***50***
	22PEL2SP01C	**SPL:** Medical Electronics					
	21PSS2SE01	**SEC-1: Soft skill**	4	3	100	-	100
	22PEL2EG01	**GE-1(WS) Electronics media**	4	3	100	100	100
		Extra Credit courses (MOOC)-1	-	**(2)**			
		TOTAL	**30**	**27**			
III	22PEL3CC06	Single Board Computers and Python	4	4	100	100	100
	22PEL3CC07	VLSI Design and VERILOG Programming	4	4	100	100	100
	22PEL3CC08	Electronic Instrumentation and Virtual Instrumentation	***5***	***4***	100	100	100
	22PEL3CP03	Electronics Practical - III	***8***	***6***	100	100	100
	22PEL3IS01	Internship		***2***	100	100	100
	22PEL3ES03A	**DSE-3:** Embedded System-II					
	22PEL3ES03B	**DSE-3:** Mobile Computing	5	4	100	100	100
	22PEL3EG02	**GE-2 (BS):** Computer Hardware and Networks	4	3	100	100	100
		Extra Credit courses (MOOC)-2		**(2)**			
		TOTAL	**30**	**27**			
IV	22PEL4CC09	Control System and Industrial Automation	5	5	100	100	100
	22PEL4CC10	Internet of Things and Artificial Intelligence	6	5	100	100	100
	22PEL4CP04	Electronics Practical - IV	***8***	***6***	100	100	100
	22PEL4ES04A	**DSE-4:** Communication Systems					
	22PEL4ES04B	**DSE-4:** Wireless Sensor Networks	5	4	100	100	100
	22PEL4PW01	**Project work** and Viva Voce	6	5	100	100	100
	22PEL4CE01	Comprehensive Exam	-	2	50	50	50
		Extra Credit courses (MOOC)-3	-	**(2)**			
		TOTAL	**30**	**27**			
I-IV	22PCW4OR01	**Outreach program**		**4**			
		Total (Four Semesters)	**120**	**110(6)**			

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1CC01**	**CORE-1: DESIGN OF ANALOG CIRCUITS**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire the design fundamentals of Analog Circuits	**K1**
CO-2	Describe analog circuits of various applications	**K2**
CO-3	Apply the theory to study the performance of Analog Circuits	**K3**
CO-4	Analyze the working of analog circuits	**K4**
CO-5	Decide and synthesize the Analog Circuits for real applications	**K5, K6**

UNIT-I: Review of Passive Components in PCB Layout (15 Hours)

Resistors – surface mount-resistors types – capacitors – inductors-PCB layout issues-approximate inductance of a PCB trace above a ground plane Design case study high-speed semiconductor laser diode driver – review of low and high frequency response analysis of single stage amplifier

UNIT-II: Feedback Control and Operational Amplifiers (15 Hours)

Introduction to feedback control- negative feedback amplifier-control system- stability and routh stability criterion- phase margin and gain margin - relationship between phase margin and damping ratio – Lead and lag networks- feedback loop Photodiode amplifier – MOSFET current source - Ideal V/I source - capacitive load compensation - model to investigate overshoot

Operational amplifier circuits: voltage follower - amplifying Analog signals - current to voltage conversion - instrumentation amplifier - floating current source - amplifier design pitfalls.

UNIT-III: ADC and DAC Design (15 Hours)

Basics of Analog design-key specifications-CMOS SAR topology-delta sigma converters-classes of input signal-Temperature sensor signal chains-using RTD for temperature sensing-signal conditioning circuits of RTD based temperature sensor-piezoresistive pressure sensor-signal conditioning and allied circuits- photo diode and photo sensing signal conditioning path using a SAR ADC. PWM as DAC-changing digital signal to Analog- Low pass filter for PWM –DAC- comparator for conversion- combining comparator with timer-delta sigma ADC implementation- Error analysis- voltage reference and input voltages.

UNIT-IV: Noise: (15 Hours)

Types of Noise – Evaluation of noise in a circuit - device noise – resistor noise-amplifier noise-ADC noise- power supply noise

UNIT-V: Analog Filter Design **(15 Hours)**

Introduction to Analog Filters-Low pass filter- Normalization and denormalization-poles and zeros-Active low pass filter-frequency dependent negative resistance filter - High pass filter-Op-amp requirement for filter design-Gyrator filters- Band pass filter and band reject filter.

Book for Study:

1. Robert A. Pease, *Analog Circuits: world class designs*, 3rd edition, Elsevier's Science & Technology, 2008.

Unit	Book	Chapter	Sections
I	1	5	all
II	1	2,3	Specified sections
III	1	13	Specified sections
IV	1	8	Specified sections
V	1	6,7,10,11	Specified sections

Book for Reference:

1. Peter D. Hiscocks, *Analog Circuit Design*, Second Edition, Peter D. Hiscocks, 2011
2. Jim Williams, *The Art and Science of Analog Circuit Design*, 1st Edition, Butterworth – Heinemann, 1998.
3. Bob Dobkin and Jim Williams, *Analog Circuit Design*, 1st Edition, Elsevier, 2011.

Web References:

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2. https://www.sciencedirect.com/topics/engineering/analog-circuit-design
3. https://hardwarebee.com/step-by-step-guide-analog-design/
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5. https://www.ti.com/lit/an/slyt191/slyt191.pdf?ts=1655207502203&ref_url=https%253A%252F%252Fwww.google.com%252F

Semester	Course Code	Title of the Paper	Hours	Credit
I	**22PEL1CC01**	**DESIGN OF ANALOG CIRCUITS**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	2	3	2	2	3	3	2.5
CO-2	3	2	3	2	2	3	3	2	2	2	2.4
CO-3	3	2	2	2	3	3	3	2	2	2	2.4
CO-4	3	2	2	3	2	3	3	2	2	3	2.5
CO-5	3	2	2	3	2	3	3	2	2	2	2.4
									Mean Overall Score		2.44
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1CC02**	**CORE-2: Design of Digital Circuits**	**4**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Understand the combinational logic circuits and its design principles	**K1**
CO-2	Prepare Sequential and combinational Circuits	**K2**
CO-3	Apply the design concepts of counters and registers	**K3**
CO-4	Analyze Asynchronous sequential logic and LABVIEW environment to design Digital circuits for various application.	**K4**
CO-5	Evaluate the circuits using various models and build up an ecofriendly environment with the help of designing skill sets	**K5, K6**

Unit-I: Combinational Logic Circuits and Design Principles (12Hours)

Introduction to combinational logic circuits: Multi-Level Gate Networks – Other Types of Logic Gates – Design of Two-Level NAND and NOR-Gate Networks - Design of Multi-Level NAND and NOR Gate Networks – Design of Two-Level Multiple Output Networks – Multi -Output NAND and NOR Networks – Multiplexers – Decoders – Design of Networks with Limited Gate Fan -in

Unit-II: Clock-Driven Sequential Circuits (12Hours)

Flip-Flops -Triggering of Flip-Flops – Analysis of clocked Sequential Circuits – Sequential - Circuit Example -State Table- State Diagram -Flip- Flop Input Functions -Analysis with JK and other Flip-Flops -Mealy and Moore Models - State Reduction and Assignment – Flip-Flops Excitation Table – Design Procedure -Design of counters

Unit-III: Registers and Counters (12 Hours)

Introduction - Clock signal - Registers – Shift Registers - Ripple Counters – Synchronous Counters - Timing Sequence – Design of synchronous Counter – RAM - DRAM

Unit-IV: Asynchronous Sequential Logic (12Hours)

Analysis Procedure – Circuits and Latches - Design Procedure – Reduction of state and Flow Tables – Race Free State Assignment – Hazards – Design Example

Unit-V: LABVIEW For Digital Circuits (12Hours)

Lab VIEW basics: The Lab VIEW Environment - Controls Palette - Functions Palette - Tools Palette - Menus and Toolbars – Building the Front Panel – Building the Block Diagram – Loops and Structures: For Loop and While Loop Structures – Controlling Timings – Auto-Indexing Loops – Using Loops to Build Arrays – Shift Registers and the Feedback Node in Loops – Case, Sequence and Event Structures

Book for Study:

1. Charles.H. Roth, Jr, *Fundamentals of Logic Design*, Cengage Learning, 2014.
2. M. Morris Mano, *Digital logic and Computer Design*, PHI, 2010.
3. National Instruments, *Lab VIEW: Lab VIEW Fundamentals*, August 2005.

Unit	Book	Chapter	Sections
I	1	7, 8, 9	7.1, 7.3 -7.7, 8.2, 9,2, 9.4
II	2	6	6.2 – 6.8
III	2	7	7.1 – 7.7
IV	2	9	9.1 – 9.8
V	3	1,3,4,5,8	1.1 – 1.4, 3.1 -3.5, 4,5,8

Book for Reference:

1. Donald P. Leach, Albert Paul Malvino, Goutam Saha, *Digital Principles and Applications*, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Thomas L.Floyd, *Digital Fundamentals*, Pearson Education, 2015.
3. National Instruments, Lab VIEW manual

Web References:

1. https://www.watelectronics.com/sequential-circuits-types-its-applications/
2. https://www.brainkart.com/article/Design-Procedure-of-Asynchronous-Sequential-circuits_6766/
3. http://www.ee.ucl.ac.uk/~ademosth/E757/Topic4.pdf
4. https://www.geeksforgeeks.org/asynchronous-sequential-circuits/
5. http://ece-research.unm.edu/jimp/415/labview/LV_Intro_Six_Hours.pdf

Semester	Course Code	Title of the Paper	Hours	Credit
I	**22PEL1CC02**	**CORE-2: Design of Digital Circuits**	**4**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	3	3	3	2	3	3	2.7
CO-2	3	2	3	2	2	3	2	3	2	3	2.5
CO-3	3	2	2	2	3	3	3	2	3	2	2.5
CO-4	3	3	2	3	3	3	3	2	2	3	2.7
CO-5	3	2	3	3	2	3	2	2	3	3	2.6
									Mean Overall Score		2.6
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1CC03**	**CORE-3: POWER ELECTRONICS AND SOLAR PV SYSTEMS**	**4**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Identify suitable semiconductor devices for power control applications	**K1**
CO-2	Illustrate the working of high-power rectifiers and solar power systems	**K2**
CO-3	Calculate the energy and the system requirements and apply it in solar PV systems.	**K3**
CO-4	analyse different power handling devices	**K4**
CO-5	Evaluate, recommend and synthesize a solar power system for a requirement and become an entrepreneur	**K5, K6**

Unit-I: Power Semiconductor Devices (12Hours)

Introduction – Difference between linear and power devices - Power diodes - types - series connected and parallel connected diodes - BJT - steady state characteristics - switching characteristics - Power MOSFET-characteristics - COOLMOS - SIT - IGBTs, –switching characteristics – Thyristors – control characteristics - Advanced Silicon devices - Silicon HV thyristors, MCT, BRT & EST- SiC devices - diodes, thyristors, JFETs & IGBTs- Gallium nitrate devices - Diodes, MOSFETs.

Unit-II: Rectifiers and Dc-Dc Converters (12 Hours)

Single phase half - wave rectifiers - single phase full - wave rectifiers with RL load- -three phase bridge rectifiers- DC-DC converters- step-down operation- Generation of duty cycle - with RL load - Principle of step-up operation -with resistive load - performance parameters - converter classification - switching mode regulators buck regulators - boost regulators - Buck-boost regulators - comparison of regulators – chopper circuit design

Unit-III: Inverters and Charge Controllers (12 Hours)

Full bridge converter - Square wave inverter - Fourier series analysis -harmonic distortion - amplitude and harmonic control - half bridge inverter -multilevel inverters - PWM inverters - PWM harmonics - three phase inverters- induction motor speed control - PWM charge controller.

Unit-IV: Solar PV Systems and PSIM Programming (12 Hours)

Photovoltaic systems overview - electricity generation with PV cells – Basic of Solar PV systems -blocks of solar PV system - PV modules - solar array (roof top panel connection) -

function of inverter - energy storage – charge controllers - calculation of solar panel – battery – types of battery - MPPT –MPPT algorithm - MPPT charge controller. grids. PSIM-Introduction -programming - power computation - instantaneous power - energy and average power - inductors and capacitors - RMS values of sinusoids -apparent power and power factor - Fourier analysis.

Unit-V: Smart Grids **(12 Hours)**

Definitions and Need for Smart Grid - Smart grid drivers – Functions -opportunities - Challenges and benefits - Difference between conventional& smart Grid - Concept of Resilient &Self-Healing Grid - off grid and on-grid - Introduction to Smart Meters - Advanced Metering infrastructure (AMI) drivers and benefits- Phasor Measurement Unit-(PMU) - Intelligent Electronic Devices (IED) &their application for monitoring & protection.

Book for Study:

1. Muhammad H. Rashid, *Power electronics*, 3rd edition, Pearson, 2009
2. Smets, A.H., Jäger, K., Isabella, O., Swaaij, R.A. and Zeman, M., *Solar Energy: The physics and engineering of photovoltaic conversion, technologies and systems*, UIT Cambridge, 2015.
3. PSIM User Manual, 2017
4. Stuart Borlase, *Smart Grid: Infrastructure, Technology and Solutions*, CRC Press, 2012.

Unit	Book	Chapter	Sections
I	1	1	1.1, 2.1-2.4,2.6, 3.1-3.5, 4.4, 5.2-5.4, 6.1-6.4,6.6,8.1,8.2, 9.8, lecture notes
II	1	11,12,13	11.2, 12.2.4, 13.1-13.5
III	1	15,17	15.2,15.3,15.7, 17.2,17.3
IV	2 3	1, 3, 12,13,15, 17,19, 20 2,4,8	1.3,3, 3, 12.2,13.3, 15.1-15.4, 17.1-17.3, 19.1-19.4, 20.1,20.2 2.1, 4.1.1-4.1.3, 8.1.3, 8.1.4
V	4	2,3	2.1,2.2, 2.4.4,2.4.5, 3.1,3.3.1, 3.10.1-3.10.3, lecture notes

Book for Reference:

1. Ned Mohan, *First Course on Power Electronics and Drives,* 1st edition, MNPERE, 2003.
2. Robert W. Erickson & Dragan Maksimovic, *Fundamentals of Power Electronics*, 2nd edition, Kluwer Academic Publisher, 2004.
3. Parimita Mohanty, Tariq Muneer and Mohan Kolhe, *Solar Photovoltaic System Applications*, Springer International Publishing, Switzerland. 2016.

Web References:

1. https://www.tutorialspoint.com/power_electronics/index.htm
2. https://www.electrical4u.com/concept-of-power-electronics/
3. https://electronicscoach.com/power-electronics.html

4. https://www.energy.gov/eere/solar/solar-photovoltaic-technology-basics
5. http://www.ews-solarpower.co.uk/24-how-does-the-system-work

Semester	Course Code	Title of the Paper	Hours	Credit
I	**22PEL1CC03**	**CORE-3: POWER ELECTRONICS AND SOLAR PV SYSTEMS**	**4**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	3	3	3	3	3	2	2	2.5
CO-2	3	3	2	2	3	2	2	3	2	1	2.3
CO-3	1	2	3	2	3	1	3	3	3	2	2.3
CO-4	3	2	2	2	3	3	2	3	2	3	2.5
CO-5	3	3	3	2	1	3	2	3	2	3	2.5
									Mean Overall Score		2.42
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1CP01**	**Electronics Practical - I**	**8**	**6**

Any 16 Experiments

1. Design of Feedback amplifier
2. Programmable gain amplifier using op amp
3. Wheatstone bridge with instrumentation amplifier for temperature measurement
4. ADC performance parameter study
5. DAC performance parameter study
6. Encoder and decoder study (Gray to binary and binary to gray, DTMF decoder, BCD to seven segment)
7. Design of 4-bit sequential counter
8. Design of 8-bit registers using flip-flop and gate ICs
9. Characteristics of RTD and design of signal conditioning circuit for RTD
10. Waveform generation using SciLAB
11. Sampling of sine wave using SciLAB
12. Coefficient identification in Fourier series using Simulink
13. Stability test using bode plot using Simulink.
14. Design of Instrumentation Amplifier, V to I, I to V (4-20mA) – Op Amp
15. Design of Clipper, Clamper, Comparator and zero crossing detector – Op amp
16. Design of Window detector, Peak detector and Precision rectifier – Op amp
17. Solving simultaneous equation using op-amp.
18. Design of 2/4-bit Successive Approximation ADC
19. Design of Power control rectifier using SCRand UJT
20. Design of ALU
21. Design of decimal to binary Encoder and binary to decimal Decoder
22. Study of Shift register (SISO, SIPO, PISO & PIPO) and Universal shift register IC
23. Applications of multiplexer and de-multiplexer
24. Design of 4-bit Synchronous counter and mod-n counter using flip-flops.
25. Design of 4-bit Asynchronous counter and mod-n counter using flip-flops.
26. Characteristics of photo electric devices.
27. Design of active LP, BP and HP filters.
28. Design of Analog circuits using LabView
29. Design of Digital circuits using LabView
30. Design of inverter using IGBT
31. Design of antennas.
32. Basics of LabView
33. MOSFET and IGBT Characteristics
34. Microwave study
35. Multi-function gates – Verilog
36. Design and study of Sequence Detector
37. Full wave Rectifier and power control [SCR] using PSIM
38. Design of encoder and decoder in Verilog

39. Testbench for multiplexer and demultiplexer in Verilog

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1ES01A**	**DSE – 1: EMBEDDED SYSTEM - I**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	describe the architecture, characteristics of CPU and embedded systems	**K1**
CO-2	Outline and restate the embedded system design	**K2**
CO-3	solve hardware and software issues and apply in embedded system	**K3**
CO-4	analyze the embedded system in various applications	**K4**
CO-5	assess, develop programming skill, design and embedded system	**K5, K6**

Unit-I: EMBEDDED CONCEPTS (15 Hours)

Complex systems – Characteristics of embedded systems – Cyber-physical systems – Challenges – Performance – Design process – VLIW processors – ARM processor – Advanced ARM features

Unit-II: CPUs (15 Hours)

Programming input and output – Interrupts – Supervisor, exception and traps – Memory system – CPU performance – Architecture – CPU bus – Memory devices and systems

Unit-III: PROGRAM DESIGN AND ANALYSIS (15 Hours)

Components for embedded programs – Models of programs – Assembly, linking and loading – Compilation techniques – Program-level performance analysis – Software performance optimization – Analysis and optimization of program size – Program validation and testing

Unit-IV: PROCESSES AND OPERATING SYSTEMS (15 Hours)

Multiple tasks and Multiple processes – Multirate systems – Preemptive real-time operating systems RTOS – Priority-based scheduling – Evaluating operating system performance – Example real-time operating systems

Unit-V: NETWORKS AND MULTIPROCESSORS (15 Hours)

Networks and multiprocessors – Categories of multiprocessors – Distributed embedded systems – CAN and CAN FD bus – I2C and I2S bus – Ethernet – Internet – MPSoCs and shared memory multiprocessors

Book for Study:

1. Marilyn Wolf, *Computers as Components Principles of Embedded Computing System Design*, 3rd edition, Elsevier, 2012.

Unit	Book	Chapter	Sections
I	1	1, 2	1.2, 1.2.2, 1.2.4, 1.2.5, 1.2.6, 1.3-1.3.8, 2.2.3, 2.3-2.3.4
II	1	3, 4	3.2-3.2.4, 3.3-3.3.3, 3.4, 3.5, 3.5.2, 3.6-3.6.2, 4.2.1-4.2.2, 4.3-4.3.3, 4.4, 4.4.1
III	1	5	5.2-5.7, 5.9, 5.10
IV	1	6	6.2, 6.5, 6.7, 6.9
V	1	8	8.2-8.5

Book for Reference:

1.K.C.Wang, *Embedded and Real-Time Operating Systems*, Springer International Publishing AG, 2017.

2. Keith E.Curtis, *Embedded Multitasking*, Elsevier, 2006.

3. PeterMarwedel, *Embedded System Design*, 3rd Edition, Springer, 2006.

Web References:

1. https://resources.pcb.cadence.com/blog/2020-the-steps-for-embedded-systems-design
2. https://www.qt.io/embedded-development-talk/building-an-efficient-embedded-system-design-and-software-development-process
3. https://www.tutorialspoint.com/embedded_systems/es_overview.htm
4. https://www.digi.com/blog/post/examples-of-embedded-systems
5. https://www.javatpoint.com/embedded-system-tutorial

Semester	Course Code	Title of the Paper	Hours	Credit
I	**22PEL1ES01A**	**DSE – 1: EMBEDDED SYSTEM - I**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	3	2	3	3	3	3	2.5
CO-2	2	3	2	3	3	2	2	2	2	3	2.4
CO-3	2	2	3	3	2	2	3	2	2	3	2.4
CO-4	2	2	2	2	3	2	3	2	3	2	2.3
CO-5	2	2	2	3	2	2	2	3	3	3	2.4
									Mean Overall Score		2.4
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1ES01B**	**DSE – 1: ELECTROMAGNETICS AND ANTENNA DESIGN**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire Knowledge on fundamental concepts of Electro-Magnetic waves	**K1**
CO-2	Understand EM waves propagation	**K2**
CO-3	Illustrate EM wave propagating devices and evaluate the modes of operation	**K3**
CO-4	Compare different type of Antennas	**K4**
CO-5	Recommend and synthesis Antennas for various requirements	**K5, K6**

Unit-I: Introduction to Electromagnetic Wave Theory (15Hours)

Static Electric Field-Electro Magnetic waves- Divergence Theorem- Stroke's Theorem-Coulomb's Law- Electric field due to charge distribution- Gauss Law-Equation of continuity-Inconsistency of Ampere Law- Boundary conditions for Electric field- Static magnetic field-Biot-Savart's Law-Magnetic field intensity due to finite and infinite conductor- Boundary conditions for Magnetic field

Unit-II: EM Wave Equations and Transmission Lines (15Hours)

Maxwell's Equations- Electromagnetic wave equation for free space- EM wave equation for conducting medium-Uniform Plane waves-Poynting Theorem- Transmission lines-Types of Transmission lines- Transmission line parameters-Properties of Symmetrical Networks-Current and Voltage along an infinite line – SWR- Applications of the Smith chart.

Unit-III: Waveguides and Antennas (15Hours)

Introduction to Waveguides- Transverse Electric waves- Transverse Magnetic waves-characteristics of TE and TM waves-Transverse Electro-Magnetic waves- velocities of propagation-Introduction to Antenna-Types of Antennas- Radiation Mechanism- Antenna parameters

Unit-IV: Design of Antenna (15Hours)

Design and performance study of finite length Dipole- Halfwave Dipole Antenna- Loop Antenna-Design and study of small Circular Loop Antenna- Folded Dipole Antenna-Broadband Antennas- Design of Frequency dependent Log Periodic Antennas-Antenna Array- Two Element Array- Design Procedure

Unit-V: Advanced Antenna Design (15Hours)

Aperture Antennas- Design considerations- Horn Antennas- Types of Horn Antennas- Microstrip and Mobile Communication Antennas- Reflector Antennas- Smart Antennas- Smart Antenna system design and simulation.

Book for Study:

1. Edward C.Jordan, Keith G. Balmain, *Electromagnetic Waves and Radiating Systems*, 2nd edition. Prentice Hall Of India,15th reprint, 2002
2. U.A.Bakshi, A.V.Bakshi, *Electromagnetic waves and Transmission lines*, second revised edition, Technical Publications,2009
3. Constantine A. Balanis, *Antenna Theory Analysis and Design*, fourth edition, Wiley,2016

Unit	Book	Chapter	Sections
I	1	1,2,3,4	1.01,1.05,2.03,2.05,2.11,3.02,3.03 4.01,4.02, 4.04
II	1 2	4,5,6 11,12	4.03,5.01-5.05,6.01 11.1,11.2,11.3,11.4,11.7, 12.5,12.11
III	2 3	13 1,2,9,10,11	13.1-13.7 1.1-1.3, 2,9.6,10.3,11.4
IV	3	4,5,6	4.5, 4.6, 5.1,5.2,6.1,6.2,6.5
V	3	12,13,14,15,16	12.1,12.7,13.1,13.2,13.3, 14.1-14.4,15.1-15.4,16.1,16.2,16.10,16.11

Book for Reference:

1. Dr. P. Dhananjayan**,** *Electromagnetic Fields***,** Laksmi publications, 2013
2. K.D.Prasad, *Antenna and Wave Propagation*, 2nd Edition, Sathya Prahashan, 2009
3. Akira Ishimaru, *Electromagnetic wave propagation, Radiation and Scattering from fundamentals to Applications*,IEEE press,2017

Web References:

1. https://www.allaboutcircuits.com/textbook/alternating-current/chpt-14/waveguides/
2. https://ocw.mit.edu/courses/8-311-electromagnetic-theory-spring-2004/
3. https://edurev.in/courses/23240_Electromagnetic-Fields-Theory
4. https://examsdaily.in/antenna-pdf-download
5. https://www.sathyabama.ac.in/course-materials/antenna-and-wave-propagation

Semester	Course Code	Title of the Paper	Hours	Credit
I	**22PEL1ES01B**	**DSE – 1: ELECTROMAGNETICS AND ANTENNA DESIGN**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	1	2	1	2	1	1	1.6
CO-2	1	3	2	3	3	2	3	2	2	2	2.3
CO-3	2	3	2	2	2	2	3	2	3	3	2.4
CO-4	2	3	2	3	3	2	3	2	3	3	2.6
CO-5	1	3	2	3	3	2	3	2	3	3	2.5
									Mean Overall Score		2.28
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
I	**22PEL1AE01**	**ABILITY ENHANCEMENT COURSE: MATHEMATICS, SIGNALS AND SYSTEMS**	**4**	**3**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Remember properties of Matrices and Vector Calculus	**K1**
CO-2	Understand Differential Equations for signal and systems	**K2**
CO-3	Apply mathematical concepts for various types of signals and systems	**K3**
CO-4	Analyze Laplace Transform and Fuzzy sets	**K4**
CO-5	study, evaluate and distinguish various types of signals and systems and solve real time problems	**K5, K6**

Unit-I: Matrices, Vector Differential and Integral Calculus (12 Hours)

Matrices and Vectors-Cramer's Rule-Eigenvalues and eigenvectors- Diagonalization of matrices- Double and triple integrals-change of variables-multiple integrals in cylindrical and sphericalcoordinates-Gradient-divergenceandcurl-Lineandsurfaceintegrals- Stroke's Theorem

Unit-II: Ordinary and Partial Differential Equations (12Hours)

Second order Ordinary Differential Equations with variable coefficients- Cauchy-Euler equation- Bessel functions and their properties- Introduction to Partial Differential Equations – solution of first order Partial Differential Equations–Wave and Heat Conduction equations- Method of separation of variables.

Unit-III: Laplace Transform and Fuzzy Logic (12Hours)

Definition of Laplace transform - Solving differential equations using Laplace transform- Inverse Laplace Transform- Introduction to Fuzzy Logic- Classical Sets and Fuzzy sets - Classical Relations and Fuzzy Relations- Membership Function- fuzzification- methods of membership value assignments. -Defuzzification methods.

Unit-IV: Classification and Representation of Signals (12Hours)

Definition of Signals- Classification of Signals- Standard signals- Step, Ramp, Pulse, Impulse, – Continuous time (CT) and Discrete Time (DT) signals-Periodic & Aperiodic signals- Even and Odd signals, Energy & Power signals -Fourier series representation of continuous time periodic signals - Fourier series representation of discrete time periodic signals.

Unit-V: Classification and Analysis of Systems (12Hours)

Definition of Systems- classification of systems and their properties- CT systems and DT systems- – Linear & Nonlinear- Time-variant & Time-invariant- Stable & Unstable- Analysis of LTI System using Laplace transforms- Z transform analysis of DT systems.

Book for Study:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Tenth edition, Wiley Plus,2011
2. John Bird, *Higher Engineering mathematics*, sixth edition, Elsevier,2010
3. Timothy J. Ross, *Fuzzy logic with Engineering applications*- McGraw-Hill, 2011
4. A.V.Oppenheim, A. Willsky, S. Hamid Nawab, *Signals and Systems*, Pearson, 2015

Unit	Book	Chapter	Sections
I	1	7,8,9,10	7.1,7.7, 8.1, 8.4, 9.7,9.8,9.9, 10.1,10.6,10.7, 10.9
II	1 2	2,5 53	2.1,2.2,2.5, 5.4 53.2, 53.3,53.4,53.5
III	2 3	61,63,64 1,2	61.2,61.3,61.4,63.1,63.2,64.2 1.1,2.1,2.3
IV	4	1,3	1.0-1.4, 3.3, 3.6
V	4	1,9,10	1.5, 1.6, 9.7, 10.7

Book for Reference:

1. T. VEERARAJAN et al, *Engineering Mathematics*, Revised Edition 2018, McGraw Hill Education (India) Private Limited
2. Ramesh Babu P, Ananda Natarajan R., *Signals and System*, SciTech publication private limited, 5th Edition, 2017
3. Hwei P. Hsu, *Signals and Systems*, Schaum's outline series, second edition, McGrawHill,2013

Web References:

1. https://mathinsight.org/ordinary_differential_equation_introduction
2. https://www.youtube.com/c/MathTheBeautiful
3. https://engineering-computer-science.wright.edu/research/engineering-mathematics-topics-and-materials
4. https://www.selfstudys.com/gate/electrical-engineering/online/exam/1-signals-systems
5. https://www.youtube.com/hashtag/signalandsystembyneso

Semester	Course Code	Title of the Paper	Hours	Credit
I	**22PEL1AE01**	**ABILITY ENHANCEMENT COURSE: MATHEMATICS, SIGNALS AND SYSTEMS**	**4**	**3**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	2	1	1	1	2	2	2	1.8
CO-2	2	3	2	1	2	2	2	2	2	2	2.0
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	2	2	3	2	1	3	3	3	3	3	2.5
CO-5	2	2	3	2	1	3	3	3	3	3	2.5
									Mean Overall Score		2.28
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2CC04**	**CORE-4: MECHATRONICS AND AUTOMOTIVE ELECTRONICS**	**4**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	understand concepts of Automotive Electronics	**K1**
CO-2	Update next generation Electric Vehicle Technology System	**K2**
CO-3	Apply the Sensors and Actuators in Automotive Electronics Instrumentation	**K3**
CO-4	Analyse Digital Powertrain Control Systems	**K4**
CO-5	Evaluate and explain various protocols for communication networks	**K5, K6**

Unit-I: Basics of Automotive Electronics (12 Hours)

Introduction to Electronic systems in Automotives- Evolution of Automotive Electronics, - The Basics of Electronic Engine Control- Motivation for Electronic Engine Control- Concept of an Electronic Engine Control System- Definition of Engine Performance Terms (Torque, Power, Fuel Consumption, Engine Overall Efficiency, Calibration, Engine Mapping)- Electronic Fuel Control System- Analysis of Intake Manifold Pressure- Idle Speed Control - Electronic Ignition.

Unit-II: Sensors and Actuators (12 Hours)

Automotive Control System Applications of Sensors and Actuators- Throttle Angle Sensor- Temperature Sensors- Typical Coolant Sensor- Sensors for Feedback Control- Knock Sensors- Angular Rate Sensor- LIDAR- Digital Video Camera- Flex-Fuel Sensor- Automotive Engine Control Actuators- Variable Valve Timing- Electric Motor Actuators- Stepper Motors- Ignition System.

Unit-III: Digital Powertrain Control Systems (12 Hours)

Introduction- Digital Engine Control- Digital Engine Control Features- Control Modes for Fuel Control- Discrete Time Idle Speed Control- EGR Control- Turbocharging- Electronic Ignition Control- Integrated Engine Control System- Automatic System Adjustment- System Diagnosis- Summary of Control Modes.

Unit-IV: Vehicle Motion Controls and Automotive Instrumentation (12 Hours)

Cruise Control Electronics-, Stepper Motor-based Actuator Electronics- Antilock Braking System- Electronic Suspension System- Electronic Steering Control- Four-Wheel Steering CAR: Modern Automotive Instrumentation- Input and Output Signal Conversion- Advantages of Computer-Based Instrumentation- Display Devices- Case **study**

(Measurement Examples- Fuel Quantity- Coolant Temperature- Oil Pressure- Vehicle Speed- Trip Information Function of the System)

Unit-V: Motor vehicle Communications **(12 Hours)**

IVN- CAN- Local Interconnect Network (LIN)- FlexRay IVN- MOST IVN- Vehicle to Infrastructure Communication- Vehicle-to-Cellular Infrastructure- Quadrature Phase Shifter and Phase Modulation (QPSR)- Short-Range Wireless Communications- Satellite Vehicle Communication- GPS Navigation- Safety Aspects of Vehicle-to-Infrastructure Communication- Electronic Safety-Related Systems- Airbag Safety Device- Blind Spot Detection- Automatic Collision Avoidance System- Lane Departure Monitor- Automatic Parallel Parking System. Autosar – **Advanced driver-assistance systems** (**ADAS**).

Book for Study:

1. William B. Ribbens, *Understanding Automotive Electronics*, 8th Edition, Butterworth, Heinemann Woburn, 2017.

Unit	Book	Chapter	Sections
I	1	4	all
II	1	5	all
III	1	6	all
IV	1	7, 8	all
V	1	9, 10, 12	all

Book for Reference:

1. James Larminie and John Lowry, *Electric Vehicle Technology Explained, John*, Wiley and Sons, 2003.
2. Robert Bosch, *Automotive Hand Book*, SAE, 5th edition, 2000.
3. Al Santini, *Automotive Electricity and Electronics*, Cengage Learning, 2013.

Web References:

1. https://www.tutorialspoint.com/difference-between-sensors-and-actuators
2. https://www.udemy.com/course/automotive-engineering-digital-powertrain-control-systems/
3. https://www.speedgoat.com/products-services/i-o-connectivity/protocols/can-fd
4. https://www.elprocus.com/automotive-electronics-and-its-innovations/
5. https://www.techtarget.com/iotagenda/definition/vehicle-to-vehicle-communication-V2V-communication

Semester	Course Code	Title of the Paper	Hours	Credit
II	**22PEL2CC04**	**CORE-4: MECHATRONICS AND AUTOMOTIVE ELECTRONICS**	**4**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	2	2	2	3	2	2	3	2.3
CO-2	2	3	2	3	2	2	2	3	2	3	2.4
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	2	2	3	2	1	3	3	3	3	3	2.5
CO-5	2	2	3	2	1	3	3	3	3	3	2.5
									Mean Overall Score		2.46
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2CC05**	**CORE-5: DIGITAL SIGNAL PROCESSING**	**5**	**5**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	acquire the knowledge on basics of continuous and discrete time signals	**K1**
CO-2	understand and acquire the knowledge of filters	**K2**
CO-3	Apply the digital signal processor for different applications	**K3**
CO-4	analyse modern instruments by using the function of audio and speech signal processing.	**K4**
CO-5	Evaluate and Create an ecofriendly environment with help of MATLAB SIGNAL processing programming	**K5, K6**

Unit-I: Discrete Fourier Transform **(15 Hours)**

Introduction to DSP - Frequency analysis of discrete - time signal - Properties of DFT- Problems. IDFT: Definition - Problems. FFT: Definition - Radix-2 FFT algorithm Decimation-in-time -Decimation-in- frequency - Problems - Inverse FFT Problems

Unit-II: Finite and Infinite Impulse Response Filter **(15 Hours)**

Structure of IIR filters- IIR filter design methods- Butterworth Filers, Chebyshev Filters –- Introduction to FIR filters - Magnitude response of digital filters - Design of linear phase FIR filters using windows: rectangular window function - Blackman window function - Hamming window function.

Unit-III: Digital Signal Processors **(15 Hours)**

Introduction-Computer Architecture-Internal Architecture of ADSP 21xx Family-Features of ADSP 21xx Family of Processors-Instruction set of ADSP 21xx Series Processor-Texas Instruments TMS 320 C5X-Comparison of General-Purpose Microprocessor with DSP Processor.

Unit-IV: Digital Audio and Speech Processing **(15 Hours)**

Computers and audio-Digital Audio-Capturing and converting sound- Sampling-Normalisation -Continuous audio processing- Segmentation- Analysis window sizing-speech communication – Quantisation-PCM-Delta modulation-adaptive delta modulation-Parameterisation-Pitch models-MATLAB IMPLEMENTATION.

Unit-V: CCS and MATLAB for DSP **(15 Hours)**

Code Composer Studio development – Code Generation tools – creating a new project – adding files to a project – reviewing the code – building and running the program – changing program options and fixing syntax errors–Experiments using TMS320C5X: Generation of

waveforms (square, triangle, ramp) -Experiments using MATLAB: Speech Processing - basic image handling and processing.

Book for Study:

1. R.A. Barapate, J.S. Katre, *DigitalSignal Processing*, Tech-Max Publications, 2007.
2. Ian Vince McLoughlin, *Speech and Audio signal processing, A MATLAB- based Approach*, Cambridge University Press, 2016.
3. TMS320C6000 Code Composer Studio tutorial

Unit	Book	Chapter	Sections
I	1	6,7	1.1, 1.3
II	1	8,9	1.1 to 1.4 1.1 to 1.6
III	1	12	1.1 to 1.7
IV	2	1, 6	1.1 to 1.4 6.1 to 6.3
V	3	3	3.1 to 3.12

Book for Reference:

1. Salivahanan S, Vallavaraj A, Gnanapriya C, *Digital Signal Processing*, Tata McGraw HillPublishing, 2003.
2. E.S.Gopi, *Digital speech processing using matlab*, Springer, 2014.
3. Jan Erik Solem, *Programming Computer vision with Python*

Web References:

1. https://www.tutorialspoint.com/digital_signal_processing/index.htm
2. https://www.jcbrolabs.org/blank-1
3. https://www.softwaretestinghelp.com/digital-signal-processing-tutorial/
4. https://www.dspguide.com/whatdsp.htm
5. https://www.geeksforgeeks.org/digital-image-processing-basics/

Semester	Course Code	Title of the Paper					Hours	Credit			
II	**22PEL2CC05**	**CORE-5: DIGITAL SIGNAL PROCESSING**					**5**	**5**			
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	2	2	2	3	3	2	3	2	2.5
CO-2	3	3	2	2	2	3	3	2	3	2	2.5
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	3	2	3	3	3	3	2	3	3	3	2.8
CO-5	2	2	2	3	3	2	2	2	3	3	2.4
Mean Overall Score											2.56
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2CP02**	**ELECTRONICS PRACTICAL - II**	**8**	**6**

Any 16 Experiments

1. LM35, RTD, Thermistor, DS18S20 / DS18B20
2. Phototransistor and Opto TRIAC, TSOP 17 photo modules for PCM remote control system
3. MOC3041 zero cross opt isolators and TL173L linear hall effect sensor and KMZ51 magnetic field sensor
4. Pressure, Vibration and A1425 analog speed sensors
5. Sinewave generation using TMS320C6713
6. Acoustic echo cancellation using TMS320C6713
7. PSIM simulation for power computation.
8. Power control using IGBT.
9. Design of buck boost regulator.
10. Study of PWM charge controller for solar.
11. PV system assembling for 12 V load.
12. Design of ASK and FSK generator
13. Design of CAN
14. I2C communication - Application
15. Multitasking algorithm - Application
16. Analysis and code optimization for an embedded system
17. CPU performance analysis
18. Characteristics of Antennas
19. DTFT signal – SCILAB
20. Automotive Sensors characteristics
21. Design of simple cruise control
22. GPS system
23. Design of IIR filter
24. Delta modulation - MATLAB
25. Audio analysis – MATLAB
26. Design of transducer – light, sound and temperature
27. MEMS sensors performances – BP, Heartbeat, ….
28. ASK, FSK and PSK – analysis
29. Process control – SCADA
30. Analysis of Pulse Code Modulation

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2ES02A**	**DSE–2: SENSORS TRANSDUCERS AND MEMS**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	acquire the knowledge on basics of sensors and transducer	**K1**
CO-2	understand the characteristics of sensors and their types.	**K2**
CO-3	Apply various transducer in electronic instruments for applications	**K3**
CO-4	Analyze MEMS for a modern society with professional ethics in electronics.	**K4**
CO-5	Design and create an ecofriendly environment with help of MEMS products	**K5, K6**

Unit-I: introduction **(15 Hours)**

Analogue and digital quantities -Classification of sensing devices -Sensors, transducers and actuators-Types of transducer-Transducer parameters-primary and secondary transducer-classification of electrical transducer- active and passive transducer-analog and digital transducer.

Unit-II: Sensors **(15 Hours)**

Basic Sensor Technology, Sensor Systems, Characteristics of Sensor, System Characteristics, Introduction to temperature sensors, types of temperature sensors, capacitive sensors, inductive sensors, Level sensors, types of level sensors.

Unit-III: Electrical Transducer **(15 Hours)**

Strain gauge- Resistance wire strain gauge-Linear variable Differential Transformer-Advantage of LVDT-Capacitive Transducer- Advantage of Capacitive transducer- Piezo-electric Transducer-optical Encoder-Resistive Digital Encoder-Shaft Encoder.

Unit-IV: Introduction to Microfabrication **(15 Hours)**

Overview of Microfabrication -Essential Overview of Frequently Used Microfabrication Processes –Photolithography-Thin Film Deposition -Thermal Oxidation of Silicon - Wet Etching -Silicon Anisotropic Etching -Plasma Etching and Reactive Ion Etching –Doping-Wafer Dicing -Wafer Bonding -The Microelectronics Fabrication Process Flow -Silicon-Based MEMS Processes -Packaging and Integration -Integration Options- Encapsulation -New Materials and Fabrication Processes -Process Selection and Design -Points of Consideration for Deposition Processes -Points of Consideration for Etching Processes-Ideal Rules for Building a Process Flow-Rules for Building a Robust Process.

Unit-V: Case Studies of Selected MEMS Products **(15 Hours)**

Case Studies: Blood Pressure (BP) Sensor - Background and History -Device Design Considerations -Commercial Case: Nova Sensor BP Sensor-Case Studies: Microphone - Background and History - Design Considerations -Commercial Case: Knowles Microphone - Case Studies: Acceleration Sensors -Background and History-Design Considerations - Commercial Case: Analog Devices and MEMSIC.

Book for Study:

1. M.J.Usher and D. A. Keating, *Sensors and Transducer Characteristics, Applications, Instrumentation, Interfacing*, Second Edition, MACMILLAN PRESS LTD, 1996.
2. Jon S. Wilson, *Sensor Technology Handbook*, Elsevier Inc, 2005.
3. A.K. Sawhney, *A course in Electrical and Electronic Measurement and Instrumentation*, Dhanapat Rai & Sons, fourth edition, 1985
4. Chang Liu, *Foundation of Mems*, Prentice Hall, second edition, 2012.

Unit	Book	Chapter	Sections
I	1	1	1.1 to 1.5
II	2	1, 8	1.1, 1.2, 2.1, 8.2, 8.3, 20.1
III	3	25	25.18, 25.20, 25.27, 25.30, 25.31, 25.35 and 25.36
IV	4	1	1.0 to 1.3
V	4	15	15.1 to 15.3

Book for Reference:

1. Ian R. Sinclair, *Sensors and Transducer*, an imprint of Butterworth-Heinemann publishers, third edition, 2001.
2. Cornelius T. Leondes, *MEMS/NEMS Handbook Techniques and Applications*, Springer, 2006.
3. Stoyan Nihtianov and Antonio Luque, Smart Sensors and MEMS Intelligent Sensing Devices and Microsystems for Industrial Applications,Woodhead Publishing is an imprint of Elsevier, 2018.

Web References:

1. https://www.electronics-tutorials.ws/io/io_9.html
2. https://teachics.org/sensors-and-transducers/
3. https://www.lboro.ac.uk/microsites/mechman/research/ipm-ktn/pdf/Technology_review/an-introduction-to-mems.pdf
4. https://www.geeksforgeeks.org/difference-between-sensor-and-transducer/
5. https://www.rfwireless-world.com/Articles/sensors-and-transducers.html

Semester	Course Code	Title of the Paper	Hours	Credit
II	**22PEL2ES02A**	**DSE–2: SENSORS TRANSDUCERS AND MEMS**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	3	2	2	2	3	3	3	2	2	2.5
CO-3	2	3	3	3	2	3	2	2	3	3	2.6
CO-4	2	2	3	3	3	2	2	2	3	3	2.5
CO-5	2	2	2	3	3	2	2	3	3	3	2.5
									Mean Overall Score		2.5
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2ES02B**	**DSE–2: DIGITAL COMMUNICATION SYSTEMS**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire Knowledge on various Digital Modulation schemes	**K1**
CO-2	Articulate about various types of Passband Modulation techniques	**K2**
CO-3	Mind-Map all modern Digital Communication concepts	**K3**
CO-4	Experiment and Evaluate Digital Communication concepts	**K4**
CO-5	Address and Support Digital Communication needs of Society	**K5, K6**

Unit-I: Pulse Modulation Schemes (15 Hours)

Elements of Digital Communication System- Communication channels and their characteristics- Pulse Modulation Schemes-PAM-Sampling Process-Aliasing-Inter Symbol Interference-Equalization-other forms of Pulse Modulation-Pulse Code Modulation-Differential PCM- Delta Modulation-Adaptive Delta Modulation- Noise trade- off, Bandwidth of all types of Modulation

Unit-II: Passband Communication Techniques (15 Hours)

Passband Data Transmission- Amplitude Shift Keying-Frequency Shift Keying-Phase Shift Keying-Quadrature ASK- Quadrature PSK-M-ary FSK-Minimum Shift Keying- Generation, Detection and Error performance of all types of Modulation

Unit-III: Multiplexing and Multiple Access Techniques (15 Hours)

Multiplexing and Multiple Access- TDM- FDM-TDMA-FDMA-CDMA-SDMA-Multichannel and Multicarrier Systems- OFDM- Modulation and Demodulation in OFDM system- FFT algorithm implementation of an OFDM system-Spectral characteristics of Multicarrier Signals-Bit and Power allocation in Multicarrier Modulation-Multiple Access Algorithms-ALOHA-Types of ALOHA.

Unit-IV: Spread Spectrum Techniques (15 Hours)

Spread Spectrum Techniques overview- Direct Sequence Spread Spectrum systems- Example of Direct Sequence- Generation of PN sequences-Processing Gain and performance-Frequency Hopping Spread Spectrum Systems-Frequency Hopping Example-Robustness-Frequency Hopping with Diversity-Processing Gain-other types of Spread Spectrum Signals-Synchronization of Spread Spectrum systems.

Unit-V: Multiple Antenna Systems (15 Hours)

Channel Model for Multiple Antenna systems- Frequency non selective MIMO Channel-Detection of Data Symbols in MIMO system-Signal transmission through a slow fading MIMO Channel-Capacity of Frequency Nonselective MIMO Channels-MultiCode MIMO

Systems-Coding for MIMI Channels-Bit interleaved Temporal Coding-Space-Time Block codes.

Book for Study:

1. John G. Proakis, Masoud Salehi, *Digital Communications*, Fifth edition, MC-Graw Hill
2. Bernard Sklar, *Digital communications fundamentals and Applications*, second edition, Prentice Hall.
3. Dr. J.S.Chithode, *Digital Communication Techniques*, Technical publications, 2011

Unit	Book	Chapter	Sections
I	1 2 3	1 2,3 1	1.1,1.2, 2.4, 2.6,3.3,3.4 1.3,1.9,1.10,1.11,1.12
II	2 3	4 3	4.2-4.7 3.8,3.9
III	1 2	11 11	11.1, 11.2.1-11.2.7 11.1.1-11.1.6, 11.3.1-11.3.3
IV	2	12	12.1,12.3,12.4,
V	1	15	15.1.1,15.1.2,15.1.3, 15.2.1,15.2.2,15.3.3, 15.4.2,15.4.3

Book for Reference:

1. Simon Haykin, *Digital Communication Systems*, Wiley,2014
2. Leon W. Couch II, *Digital and Analog Communication Systems*, Pearson, Eighth edition,2013
3. MyIA.ne Pischella and Didier Le Ruyet, *Digital Communications 2*,Wiley,2015

Web References:

1. https://www.tutorialspoint.com/digital_communication/digital_communication_techniques.htm
2. https://examsdaily.in/wp-content/uploads/2018/07/Digital-Communication-Techniques.pdf
3. https://ocw.mit.edu/courses/6-02-introduction-to-eecs-ii-digital-communication-systems-fall-2012/
4. https://www.smartzworld.com/notes/digital-communication-pdf-notes-dc/
5. https://youtu.be/pvTJLPwzoFI

Semester	Course Code	Title of the Paper	Hours	Credit
II	**22PEL2ES02B**	**DSE–2: DIGITAL COMMUNICATION SYSTEM**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	3	2	1	2	2	3	2.3
CO-2	2	2	2	2	2	1	2	3	2	2	2.0
CO-3	2	3	3	2	2	2	3	2	3	2	2.4
CO-4	1	3	3	2	2	2	3	2	3	2	2.3
CO-5	3	2	2	3	3	2	2	3	2	3	2.5
									Mean Overall Score		2.3
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2SP01A**	**SELF PACED LEARNING: PROGRAMMABLE LOGIC CONTROLLERS**	**-**	**2**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire knowledge on different types of PLC and basic I/O modules	**K1**
CO-2	Understand and apply programming of basic logics	**K2**
CO-3	Apply basic relay switching circuits in PLC	**K3**
CO-4	Analyse timer and counter based programs for various applications	**K4**
CO-5	Design a network control system with PLC and SCADA	**K5, K6**

Unit-I: PLC Overview

Programmable logic controllers- parts of PLC-principles of operation-modifying the operation-The I/O Section-Discrete I/O modules- Analog I/O modules-I/O specifications-Memory design and types-programming terminal devices-Recording and retrieving data-human machine interfaces

Unit-II: PLC Programming

Number system and codes- Fundamentals of logic- AND, OR, NOT, XOR function-hardwired logic versus programmed logic-Producing the Boolean equation for a given logic circuit-programming word level logic instructions.

PLC programming languages- Bit level logic instructions-instruction and branch instruction-Internal relay instructions- programming examine if closed and examine if open instruction-entering the ladder program-modes of operation-connecting with analog devices.

Unit-III: Developing Fundamental PLC Wiring Diagrams

Electromagnetic control relays-contactors-motor starters-manually operated switches-mechanically operated switch-sensors-output control devices-Seal in circuits-electrical interlocking circuits-latching relays-converting relay schematics into ladder program-writing a ladder program from a narrative description-instrumentation

Unit-IV: Programming Timers, Counters and Other Instructions

Mechanical timing relays-timer instructions-on delay timer-off delay timer-retentive timer-cascading timer-counter instructions-up counter-down counter-cascading counter-incremental encoder-counter application-combining counter and timer-high speed counters. Program control instruction-Master control reset instruction-jump and subroutine instruction-immediate input and output instructions-forcing external I/O addresses-selectable timed interrupt-Temporary End and suspend instruction. Math instructions.

Unit-V: Process Control, Network Systems and Scada

Structure of control systems-on/off control-PID control-motion control-Data Communications-Data Highway-Serial communication-DeviceNet-ControlNet-EtherNet/IP-MODBUS-Fieldbus-PROFIBUS-DP-Supervisory control and data acquisition (SCADA)

Book for Study:

1. Frank D.Petruzella, *Programmable logic controllers,* fifth edition, McGraw Hill Education 2017.

Unit	Book	Chapter	Sections
I	1	1,2	1.1-1.4,2.1-2.11
II	1	3,4,5	Overview of chapter 3,4.2-4.7,5.3-5.11
III	1	6	6.1-6.13,
IV	1	7	7.1-7.6,8.5-8.7,9.1
V	1	14	14.2-14.7

Book for Reference:

1. William Bolton, *Programmable logic controllers,*Sixth edition, newness publications, 2015
2. Pradeeka Seneviratne, *Building Arduino PLCs: The essential techniquesyou need to develop Arduino-based PLCs,*Apress publishers, 2017
3. Daniel Kandray, *Programmable automation technologies: an introduction to CNC, robotics and PLCs,* Industrial press, 2010.

Web References:

1. https://instrumentationtools.com/ladder-diagram-programming/
2. https://control.com/technical-articles/ladder-logic-in-programmable-logic-controllers-plcs/
3. https://www.automation.com/en-us/articles/2018/a-beginners-plc-overview-part-3-of-4-plc-inputs-an
4. https://dipslab.com/plc-input-output-modules-2/
5. https://control.com/textbook/programmable-logic-controllers/inputoutput-io-capabilities/

Semester	Course Code	Title of the Paper	Hours	Credit
II	**22PEL2SP01A**	**SELF PACED LEARNING: PROGRAMMABLE LOGIC CONTROLLERS**	**-**	**2**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	2	3	2	3	3	2	2	2	2.4
CO-2	3	2	3	2	2	3	3	2	2	2	2.4
CO-3	3	2	3	2	3	2	2	2	2	2	2.3
CO-4	2	3	2	3	2	3	2	3	2	2	2.4
CO-5	3	3	2	2	2	2	2	3	2	3	2.4
									Mean Overall Score		2.38
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2SP01B**	**SELF PACED LEARNING: CONSUMER ELECTRONICS**	**-**	**2**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	operate on different types of cameras	**K1**
CO-2	classify various television technologies	**K2**
CO-3	Apply basics knowledge of electronics in home automation devices	**K3**
CO-4	Analyse surveillance devices and various smart gadgets	**K4**
CO-5	Design and develop a consumer electronics device.	**K5, K6**

Unit-I: Cameras

Specifications for Cameras - Digital Camera-(DSLR, Mirror less) – Camcorder – Infra Red Cameras - Discreet CCTVs- drone camera– wireless Cameras- hidden & spy camera –NVR and DVRS standards and operation - MPEG and JPEG Standards, coders and decoders.

Unit-II: Television

Block diagram of monochrome and PAL color TV receivers – standards - LCD – LED TV – Plasma displays – HDTV - Internet TV – HDMI, VGA AND MHL cords - LCD projectors- DTH standards and installation - Set Top Box.

Unit-III: Surveillance Devices

Security measures - CCTV systems –applications and limitations- Baby monitor –Digital safe lockers —Burglar Alarms -Video door phones – Anti-Theft bags -Smart car parking and anti-theft system –GPS trackers -NFC RFID security systems

Unit-IV: Smart Gadgets

Introduction Smart Home Gadgets - applications and limitations -Smart Phones – IPODS – Tablets – Kindles –Touch Screens –resistive and capacitive touch screens - Satellite Radio – Bar Code Reader - ATMs.

Unit-V: Home Automation Devices

Smart home appliances –3D food Printers -Dosa/ Roti makers – Humanoids for home applications– Smart meters – Introduction to IoT in home automation –IoT enabled: Air Conditioner – stabilizer – water heater

Book for Study:

1. Lecture notes prepared by the department.

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	3	All
IV	1	4	All
V	1	5	All

Book for Reference:

1. S.P Bali, *Consumer Electronics*, Pearson Education Asia Pvt., Ltd., 2nd Edition,2017
2. B R Gupta and V Singhal, *Consumer Electronics*, Kataria, 2013
3. Homer L Davidson, *Consumer Electronics*, McGraw-Hill, 1999.

Web References:

1. https://digital-photography-school.com/megapost-learning-how-to-use-your-first-dslr/
2. https://www.rfwireless-world.com/Tutorials/Television-basics-tutorial.html
3. https://www.aucklandsecuritycameras.com/cctv-tutorial.html
4. https://www.safewise.com/blog/home-automation-guide-for-beginners/
5. https://www.sciencedirect.com/topics/engineering/consumer-electronics

Semester	Course Code	Title of the Paper					Hours	Credit			
II	**22PEL2SP01B**	**SELF PACED LEARNING: CONSUMER ELECTRONICS**					**-**	**2**			
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	2	2	2	2	2	2	2.0
CO-2	2	2	2	2	2	2	2	2	2	3	2.1
CO-3	2	2	3	3	3	2	2	3	3	3	2.6
CO-4	2	3	3	3	3	2	2	3	3	3	2.7
CO-5	2	2	2	3	3	3	3	3	3	2	2.6
Mean Overall Score											2.4
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2SP01C**	**SELF PACED LEARNING: MEDICAL ELECTRONICS**	**-**	**2**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Remember the Physiological systems and classify the types of electrodes and transducers	**K1**
CO-2	Interpret various Bio Medical Recorders	**K2**
CO-3	Appraise the performance of Bio Medical Instruments for major organs	**K3**
CO-4	Analyze Blood related Measurements and Techniques	**K4**
CO-5	Assess the need of modern society with professional ethics in Modern Bio Instruments and recommend solutions for the same	**K5, K6**
***** **K1**: - Knowledge/Remembering; **K2**:-Comprehension/Understanding; **K3**: - Application/Applying; **K4**:-Analysis/Analysing **K5**: - Evaluation / Evaluating **K6**:- Synthesis / Creating		

Unit-I: Introduction to Bio-Medical Instrumentation

Physiological Systems of Human body- Resting and Action Potential-Basic Medical Instrumentation System-Half Cell Potential- Silver-Silver Chloride Electrodes- Electrodes for ECG- Electrodes for EEG- Electrodes for EMG- Micro Electrodes-Classification of Transducers-Pressure Transducers- Transducers for body temperature measurement-Biosensors-Smart sensors

Unit-II: Signal Conditioners and Bio-Medical Recording Systems

Signal Conditioners- Preamplifier- Bridge Amplifiers-Signal recovery and data acquisition-Bio signal Analysis- Electro Cardio Graph- Phono Cardio Graph- Electro Encephalo Graph- Electro Myo Graph-other Bio Medical Recorders

Unit-III: Blood –Related Bio-Medical Measurement

Blood Pressure Measurement- Measurement of Heart Rate-Pulse Oximeters- Electromagnetic Blood Flowmeters- Ultrasonic Blood Flowmeters-Spirometry- Blood pH Measurement - Measurement of Blood pCO_2 and BloodpO_2 – Photometers and Colorimeters

Unit-IV: Human Assistive Bio-Medical Devices

Pace Makers- Defibrillators-Cardiac Monitor- Methods of Monitoring Fetal Heart Rate-Heart-Lung Machine-Angiography-Pulmonary Function Analyzers- Ventilators-Lithotripters-Haemon -Dialysis Machine- Surgical Diathermy

Unit-V: Advanced Bio-Medical Applications

Bedside Patient Monitoring Systems- Elements of Bio-Telemetry-Design of Bio-Telemetry System-Computers in Medicine- laser in Medicine- Magnetic Resonance Imaging- Computer Tomography-Microwave Diathermy for Electrotherapy-Nerve Stimulators

Book for Study:

1. Khandpur R.S, *Handbook of Biomedical Instrumentation*, 2nd Edition, Tata McGraw-Hill, New Delhi, 18TH reprint 2011.
2. Dr.M**.** Arumugam, *Biomedical Instrumentation*,2nd Edition, Anuradha Publications, Reprint 2011.

Unit	Book	Chapter	Sections
I	1 2	1,2,3 1	1.2, 2.3-2.6,2.8,3.2,3.5,3.6,3.9,3.10 1.5,1.6
II	1 2	4,5 3	4.2,4.3,5.1,5.3-5.6 3.5,3.9,3.10
III	1 2	6,10,14,15 6,7	6.5,6.7,10.3,14.4,15.2 6.10,6.14,7.5
IV	1 2	6,8,13,31 5,6,7	6.2,8.2,13.5,31.2,31.3 5.2,5.5,5.7,5.8,6.2,6.8,7.12
V	1 2	6,20,22,29 8,10	6.3,20.1-20.3,22.1-22.4,29.3,29.5,29.6 8.2,8.3,10.2,10.3

Book for Reference:

1. Leslie Cromwell, *Biomedical Instrumentation and Measurement*, 2nd Edition, Prentice Hall of India, New Delhi, 2007
2. Myer Kutz, *Standard Handbook of Biomedical Engineering and Design*, 1st Edition, McGraw Hill Publisher, 2003.
3. Joseph J. Carr and John M. Brown, *Introduction to Biomedical Equipment Technology*, 4th Edition, Pearson Education, 2004

Web References:

1. https://www.udemy.com/course/electronics-with-applications-on-biomedical-engineering/
2. https://www.edx.org/course/fundamentals-of-biomedical-imaging-ultrasounds-x-ray
3. https://doi.org/10.1016/B978-0-323-85413-9.00005-0
4. https://link.springer.com/chapter/10.1007/978-3-540-36841-0_154
5. https://youtu.be/iK-6q4nnmtA

Semester	Course Code	Title of the Paper	Hours	Credit
II	**22PEL2SP01C**	**SELF PACED LEARNING: MEDICAL ELECTRONICS**	**-**	**2**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	2	1	2	2	1	1	2	3	3	1.8
CO-2	2	2	2	3	3	1	2	2	3	3	2.3
CO-3	2	3	3	2	3	1	1	2	3	3	2.3
CO-4	2	3	2	3	3	2	2	2	3	3	2.5
CO-5	3	3	2	3	3	2	2	2	3	3	2.6
									Mean Overall Score		2.3
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
II	**22PEL2EG01**	**GENERIC ELECTIVE-1(WS): ELECTRONICS MEDIA**	**4**	**3**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	familiarize the students with the theories of electronics media management	**K1**
CO-2	know the functionality of different electronic media technologies	**K2**
CO-3	Apply the technologies of electronic media for different applications	**K3**
CO-4	Analyze the basics of broadcasting, transmission standards and transmitter systems.	**K4**
CO-5	apply the mobile application and emergent technologies	**K5, K6**

Unit-I: Introduction to Electronic in Media (12 Hours)

An overview of electronic media: management – Skills, roles, and functions-electronic media industries -Evolution of Applied Electronics in Media. Development of broadcasting - Rise of the internet and deployment of broadband services – Leading to dramatic changes in telecommunication industry – Developments and changes in new media – Telephony to radio Mobile radio to visual radio – Geo-stationary satellites – Direct broadcasting satellites, narrowcasting, cable television, DTH - Public addressing system.

Unit-II: Broadcasting Basics (12 Hours)

Analog radio, Digital radio, satellite radio, Audio blogging – RSS – Pod safe music – Analog television – Digital television – Cable television – Working principle of video camera – Consoles, Video hosting / Download services – Internet radio and television – Digital media production – Sound and vision – Image capture techniques – Web-based social interaction.

Unit-III: Transmission Standards and Systems (12 Hours)

NTSC, PAL, SECAM, IPTV, HDTV, ATSC Digital television – Transmission / Reception lines and other equipment – Various modes of receiving systems – FM and TV antenna towers – Translators and repeaters – Transmitter remote controls – Mobile phone media production: SMS, MMS, Mobile phone media delivery – Streaming and video on demand.

Unit-IV: Mobile and Emergent Technologies (12 Hours)

Information technology: Computer storage, Computer networks, Internet streaming, Web Streaming, Audio and video streaming, Flash streaming, MP3 streaming (radio), Peer to Peer distribution – Digital video broadcasting via satellite services to handhelds (DVB-SH) Technology, Geo-spatial technology, Wi-fi and Wi-Max, podcasting, i-Pod, Information superhighways, Interactive portals.

Unit-V: Media Input /Output Systems (12 Hours)

Microphones- types - Mixing console - special effects units – equalizers - compressors - output devices - The Sound Recording Room-Display: LCD, LED, Plasma screens, IPOD, PDAs, Multimedia projectors, -Speakers, Active and passive speakers - Home theater network - connection diagram - types of cables, Dolby, DTS, CUBE. - Mobile devices for e-portfolios - Mobile devices in the classroom

Book for Study:

1. Graham Jones. *A Broadcast Engineering Tutorial for Non-Engineers*, Focal Press, 2005.
2. Study Material prepared by the department

Unit	Book	Chapter	Sections
I	2	1	all
II	1	2, 3	all
III	1	5, 12, 14, 15	all
IV	2	2	all
V	2	3	all

Book for Reference:

1. E.P.J. Tozer. *Broadcasting Engineering Reference Book*, Focal Press, 2004.
2. Borko Furht and Syed A. Ahson. *Handbook of Mobile Broadcasting*, Taylor & Francis, 2008.
3. Brian Winston. *Media Technology and Society: A History from the Telegraph to the Internet*, Rutledge, 2000.

Web References:

1. https://www.docsity.com/en/introduction-to-electronic-media-lecture-notes-jmc-1011/6267953/
2. https://www.tvwithoutborders.com/tutorials/dtv_intro/broadcast-engineering-basics/
3. https://www.eeeguide.com/television-systems-and-standards/
4. https://www.tutorialspoint.com/emerging-technologies-of-2017

Semester	Course Code	Title of the Paper	Hours	Credit
II	**22PEL2EG01**	**GENERIC ELECTIVE-1(WS): ELECTRONICS MEDIA**	**4**	**3**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	3	3	2	2	2	3	3	2.4
CO-2	2	2	2	2	2	2	2	2	2	2	2.0
CO-3	2	2	2	2	2	2	2	2	2	2	2.0
CO-4	2	2	3	3	3	2	2	2	3	3	2.5
CO-5	2	2	3	3	3	2	2	3	3	3	2.6
									Mean Overall Score		2.3
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3CC06**	**CORE-6: SINGLE BOARD COMPUTERS AND PYTHON**	**4**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Identify and understand various single board computer boards	**K1**
CO-2	Associate Python commands for Raspberry Pi	**K2**
CO-3	Apply Python commands for various I/O devices.	**K3**
CO-4	analyse Python commands for various I/O devices.	**K4**
CO-5	Evaluate basic and advanced SBCs for entrepreneurship and design and develop many social relevant applications using Raspberry Pi and Python	**K5, K6**

Unit-I: Introduction to Single Board Computer (12 Hours)

Introduction - history of Single Board Computers - Classification - Comparison - Evolution - Architecture - applications - Overview on Raspberry Pi - GPIO – Comparison of different Raspberry Pi boards-shields - overview of Beagle bone – features-NVIDIA Jetson Nano-Special Features-NVIDIA Jetson Xavier nx - special features.

Unit-II: Getting Started with Raspberry Pi (12 Hours)

Installing and preparing Raspberry Pi - flashing SD Card - Booting up - Configuring Pi - Troubleshooting - Using Command Line interface - root user commands - configuring network connection - remote desktop access using Putty software- Raspberry Pi4 Architecture-Specifications

Unit-III: Hardware Interface with Raspberry Pi (12 Hours)

Installing RPI. GPIO- setting up I2C and SPI- Connecting and controlling LED-Switching a high-power DC device using a Transistor-making a user interface to turn ON and OFF a device-controlling servo motors-controlling the speed of DC motor-using resistive sensors with Raspberry Pi.

Unit-IV: Basics of Python (12 Hours)

Python 3 idle - Programming Basics - handling strings - Numbers and Operators - Variables - basic arithmetic operations - Making decisions - Functions - Classes and Objects - Numerical Programming- Creating modules in python idle - audio and video file handling - configuring webcam – Simple CV: installation - testing - displaying an image - modifying an image - accessing the webcam - Case study: Raspberry Pi based Photobooth.

Unit-V: Applications Using Python **(12 Hours)**

I/O and shell programming: basics of shell programming - installing and testing GPIO in Python - programming LED- reading a button- using devices with I2C bus - reading analog data using an ADC - logging and plotting data - extending Raspberry Pi GPIO with an I/O expander. Web application programming: creating Web server - downloading data from a web server - configuring Raspberry Pi as web server - introduction to flask - flask basics - connecting real world application on Web.

Book for Study:

1.Matt Richardson and Shawn Wallace, *Getting started with Raspberry Pi*, by O'Reilly Media, Inc, First edition, 2012.

2. Simon Monk, *Raspberry Pi cookbook*, O'Reilly Media Inc., 2014

3. John Hunt, *A beginner's guide to Python 3 Programming*, Springer,2019

Unit	Book	Chapter	Sections
I			Material prepared by department
II	1	1,2	1.1,1.2,1.4-1.6,1.7, 2.1-2.6, Material prepared by department
III	2	8,9,10,12	8.3,8.4,8.6, 9.1,9.2, 9.4,9.7, 10.1,10.3, 12.1
IV	3 1	1,3,5,6,7,11,17 9	1.1-1.6,3.4-3.7,5.7,5.8,6.4,6.5,7.2,7.3,11.1-11.5, 17.2,17.4, 9.1-9.6
V	1 2	7,8,10 12	7.1,7.2, 8.1-8.3, 10.1-10.5 12.6,12.7, 12.11,12.12

Book for Reference:

1. Russell Barnes, *The Official Raspberry Pi Projects Book*.
2. Rui Santos and Luís Perestrelo, *Beagle Bonefor Dummies*, John Wiley & Sons Inc., 2015.
3. Tim Cox, *Raspberry Pi Cookbook for Python Programmers*, 2014.

Web References:

1. https://www.futurelearn.com/courses/physical-computing-raspberry-pi-python
2. https://www.tutorialspoint.com/raspberry_pi/index.htm
3. https://projects.raspberrypi.org/en/projects/raspberry-pi-getting-started
4. www.spokentutorial.org
5. https://youtu.be/BpJCAafw2qE

Semester	Course Code	Title of the Paper	Hours	Credit
III	**22PEL3CC06**	**CORE-6: SINGLE BOARD COMPUTERS AND PYTHON**	**4**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	3	2	2	2	2	3	2.4
CO-2	2	2	2	2	2	2	2	3	2	2	2.1
CO-3	2	3	3	2	2	2	3	2	3	2	2.4
CO-4	2	3	3	2	2	2	3	2	3	2	2.4
CO-5	3	2	2	3	3	2	2	3	2	3	2.5
									Mean Overall Score		2.36
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3CC07**	**CORE-7: VLSI DESIGN AND VERILOG PROGRAMMING**	**4**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Understand the basics of low power VLSI technology and Verilog programming	**K1**
CO-2	Compare And Analyze Various Semiconductor Devices Used In VLSI	**K2**
CO-3	apply the basics Concepts of FPGA for different applications	**K3**
CO-4	Analyse Scaling Factors and Testing Supply Voltage Scaling for Low Power.	**K4**
CO-5	Acquire knowledge on circuit design and simulation using Xilinx IDE and test various digital circuits using Verilog AMS	**K5, K6**

Unit-I: Low Power VLSI Technology (12 Hours)

Introduction - Low-Power Design Methodologies - MOS Fabrication Technology - Basic Fabrication Processes - NMOS Fabrication Steps- CMOS Fabrication Steps- Latch-Up Problem and Its Prevention- Short-Channel Effects - Design rules and layout diagram – Lambda based design rules.

UNIT-II: MOS Transistors and Inverters (12 Hours)

Introduction- MOS Transistors- the Structure of MOS Transistors- The Fluid Model- Modes of Operation of MOS Transistors-Electrical Characteristics of MOS Transistors- MOS Transistors as a Switch -MOS Inverters- Inverter and Its Characteristics- MOS Inverter Configurations- Switching Characteristics- Delay Parameters- Driving Large Capacitive Loads

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Unit- III: Supply Voltage Scaling for Low Power (12 Hours)

Introduction- Device Feature Size Scaling- Architectural-Level Approaches- Voltage Scaling Using High-Level Transformations - Multilevel Voltage Scaling- Challenges in MVS- Dynamic Voltage and Frequency Scaling- Adaptive Voltage Scaling- Subthreshold Logic Circuits

Unit-IV: Basic Concepts of FPGA (12 Hours)

INTRODUCTION TO FPGAs: Evolution of programmable devices- FPGA Design flow- Applications of FPGA- FPGA boards and Software tools- FPGA building blocks –digital system Design Examples: Design of Universal block- Memory- Floating point multiplier- Barrel shifter.

Unit-V: Circuit Design and Simulation Using VIVADO Design Suite (12 Hours)

Xilinx -Vivado Design Suite - Verilog: Verilog fundamental -Design Flows & EDA Tools- Code Structure- Data types -Operators and Attributes- overloading -Concurrent Code: Concurrent versus Sequential- Using Operators- WHEN, Generate and Block- Sequential Code: Process- Signals and Variables - IF, WAIT- CASE -Using Sequential- Code to Design Combinational Circuits. System Verilog: Verilog + - Coverage – Randomization – Assertion-functional coverage- Object oriented programming, define – parameter–Verilog-AMS: Verilog Family of Languages-Mixed Signal Simulators- Applications of Verilog–AMS-Analog Modeling.

Book for Study:

1. Ajit Pal, *Low-Power VLSI Circuits and Systems*, Springer India, 2015
2. Samir Palnitkar, *Verilog HDL*, 2nd Edition, Pearson Education, 2003

Unit	Book	Chapter	Sections
I	1	1, 2	all
II	1	3, 4	all
III	1	7	all
IV	2	1, 2, 3	all
V	2	8	all

Book for Reference:

1. Peter Van Zant, *Microchip fabrication*, McGraw Hill, 1997.
2. Plummer, J.D., Deal, M.D. and Griffin, P.B., *Silicon VLSI Technology: Fundamentals*, 3rd Edition, Practice and Modeling, Prentice-Hall, 2000.
3. Justin Rajewski, *Leaning FPGAs*, 1st Edition, O'Reilly Media, Inc, 2017.

Web References:

1. https://www.tutorialspoint.com/vlsi_design/index.htm
2. http://www.eeherald.com/section/design-guide/Low-Power-VLSI-Design.html
3. https://www.nandland.com/articles/fpga-101-fpgas-for-beginners.html
4. https://docs.xilinx.com/v/u/hvSo8dqbS1aQfQu8EocbwA
5. https://www.electronicshub.org/introduction-to-fpga/

Semester	Course Code	Title of the Paper	Hours	Credit
III	**22PEL3CC07**	**CORE-7: VLSI DESIGN AND VERILOG PROGRAMMING**	**4**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	2	2	2	2	2	2	2.0
CO-2	2	2	2	2	2	2	2	2	2	3	2.1
CO-3	2	3	3	2	2	2	2	3	2	2	2.3
CO-4	2	2	2	3	3	2	2	3	3	3	2.5
CO-5	2	3	2	3	3	3	2	3	3	3	2.7
									Mean Overall Score		2.32
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3CC08**	**CORE-8: ELECTRONIC INSTRUMENTATION AND VIRTUAL INSTRUMENTATION**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	understand the errors in measurement and characteristics of instrumentation, it is used to solve the problems in instruments.	**K1**
CO-2	describe the various types of electronic instruments and it applied for various applications of real time problems	**K2**
CO-3	Distinguish an AC and DC bridges in instruments will be used to develop a modern tool and analyze a various type of waveform and will be used for the development of audio and radio system	**K3**
CO-4	analyse the basics of Virtual instrumentation for various industrial application	**K4**
CO-5	Evaluate and Create the program by applying SubVIs also empowers to integrate real-world signals sooner for earlier error detection.	**K5, K6**

Unit-I: Introduction to Instrumentation (15 Hours)

Introduction- Functions and Characteristics of instruments- Electrical Units -Measurement Standards- Error in Measurement- Statistical Analysis of Error in Measurement -Limiting Errors-Elements of Electronic Instruments-Selection، Care, and Use of Instruments- Static and Dynamic Characteristics of Instrumentation.

Unit-II: Electronic Instruments (15 Hours)

Electronic Voltmeters-Advantage of Electronic Voltmeters-Vacuum tube Voltmeters (VTVMs)-Average reading Diode Vacuum tube voltmeters-Peak reading Diode Vacuum Tube Voltmeters-Triode Vacuum tube voltmeters-Balanced Bridge Triode Vacuum Tube Voltmeters- Electrometer type VTVM-Transistors Voltmeters (TVM)-Permanent magnet Moving Coil (PMMC)-Multi range DC Voltmeter-Ohmmeter-Multimeter-Ammeter.

Unit-III: Variable Conversion Elements (15 Hours)

Bridge circuits -1 Null-type, D.C. bridge (Wheatstone bridge) -Deflection-type D.C. bridge-Error analysis -A.C. bridges. Resistance measurement-D.C. bridge circuit -Voltmeter–ammeter method -Resistance-substitution method- Use of the digital voltmeter to measure resistance -The ohmmeter - Codes for resistor values- Inductance measurement- Capacitance measurement -Alphanumeric codes for capacitor values- Current measurement- Frequency measurement- Digital counter-timers- Phase-locked loop - Cathode ray oscilloscope -The Wien bridge- Phase measurement - Electronic counter-timer - X–Y plotter - Oscilloscope Phase detector.

Unit –IV: Virtual Instrumentation (15 Hours)

Introduction- Graphical system design (GSD) model - Design flow with GSD -Virtual instrumentation - Virtual instrument and traditional instrument- Hardware and Software in virtual instrumentation- Virtual instrumentation for test, control and design -Virtual instrumentation in the engineering process- Virtual Instruments Beyond Personal Computer-Graphical System Design Using Labview -Graphical Programming And Textual Programming- Software Environment- Creating and Saving a VI-Front Panel Toolbar- Block Diagram Toolbar- Palettes- Shortcut Menus-Property Dialog Boxes - Front Panel Controls And Indicators -Block Diagram- Data Types- Data Flow Program- LabVIEW Documentation Resources- Keyboard Shortcuts**.**

Unit- V: Modular Programming and Motor Control on LabVIEW (15 Hours)

Introduction-Modular Programming in LABVIEW - Build A VI Front Panel And Block Diagram -Icon And Connector Panel-Creating An Icon - Building A Connector Panel-Displaying Sub VI s And Express VIs As Icons Or Expandable Nodes- Creating SubVI From Sections Of A VI- Opening And Editing Sub VIs - Placing SubVIs On Block Diagrams-Saving SubVIs-Creating A Stand-Alone Application-Components of a Motion Control System -Software For Configuration, Prototyping And Development - Motion Controller-Move Types- Motor Amplifiers and Drives.

Book for Study:

1. Larry D. Jones, *Electronic Instruments and Measurements*, 2nd edition, Prentice-Hall International Editions
2. A.K.Sawhney, *A course in Electrical and Electronic Measurements and Instrumentation*, 4th edition, Educational and Technical Publisher.
3. Alan S. Morris, *Measurement and Instrumentation Principles*, 3rd edition, 2001.
4. Jovitha Jerome, *Virtual Instrumentation using LabVIEW*, PHI Learning PVT., Limited, 2010.

Unit	Book	Chapter	Sections
I	1	1	1.1 - 1.10
II	2	2, 3	2.1 - 2.4, 3.2.1, 3.2.2, 3.3.1, 3.3.2
III	3	7	7.1 to 7.7
IV	4	1,2	1.1 to 1.11, 2.1 to 2.15
V	4	3	3.1 to 3.12

Book for Reference:

1. B.A. Gregory, *An introduction to Electrical Instrumentation and measurement System*, Palgrave HE UK; 2nd edition, 1981.
2. Alan S. Morris, Reza Langari, *Measurement and Instrumentation Theory and Application*, Elseiver, 2012.
3. Jeffrey Travis and Jim Kring, *LabVIEW for Everyone*, Prentice Hall Edition, 2007.

Web References:

1. https://ocw.tudelft.nl/wp-content/uploads/Reader_ET8017_Electronic_Instrumentation__Chapter1.pdf.

2. https://www.tutorialspoint.com/electronic_measuring_instruments/index.htm
3. https://www.electronics-notes.com/articles/test-methods/labview/vis-virtual-instruments.php
4. https://mindmajix.com/labview-tutorial
5. https://www.ni.com/getting-started/labview-basics/

Semester	Course Code	Title of the Paper	Hours	Credit
III	**22PEL3CC08**	**CORE-8: ELECTRONIC INSTRUMENTATION AND VIRTUAL INSTRUMENTATION**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	2	3	2	2	2	2	3	3	2	2.4
CO-3	2	2	3	3	2	2	2	2	3	2	2.3
CO-4	3	2	2	2	2	2	2	3	3	3	2.4
CO-5	3	2	2	3	3	3	2	2	2	3	2.5
									Mean Overall Score		2.4
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3CP03**	**ELECTRONICS PRACTICAL - III**	**8**	**6**

Any 16 Experiments

1. I/O programming in Arduino board
2. Design of data logger using Arduino and microSD card for temperature measurement.
3. ESP 8266 -01 interfacing with Arduino
4. ADXL335 interfacing with Arduino.
5. Bluetooth module interfacing with Arduino.
6. GSM and GPS module interfacing with Arduino.
7. Multiplexer and demultiplexer with Quartus II
8. Developing Data Visualization Interfaces in Python with Dash
9. Adder subtractor with Quartus II
10. Study of loading OS and GPIO (DHT11) with Raspberry Pi
11. Web hosting with Raspberry Pi
12. GLCD interfacing with Arduino
13. PCF8591 interfacing with Raspberry Pi for ADC and DAC study.
14. Nodemcu for IoT node configuration (4 nodes)
15. Machine Vision: Recognizing objects and scenes using Python
16. Pick and place robot
17. Developing MUX and DEMUX and verifying the same in Vivado IDE
18. Implementing Full adder, Full subtractor, Multiplexer, divider and ALUin FPGA
19. Implementing Decoder, priority encoder, 8-bit comparator and 8-bit latch in FPGA
20. Implementing D flip-flop with synchronous and asynchronous inputs,4-bit up / down Counter with control input in FPGA (clock source to be switch)
21. Implementing clock divider, pulse counter (for delay program) shift registers and barrel shifter in FPGA
22. Interfacing FPGA with PC through DB9 by implementing UART
23. Interfacing keypad with FPGA.
24. Interfacing LCD with FPGA.
25. Study of different types of network cables and practically implement the cross wired cable and straight through cable using clamp tool. Connect the computers in Local area network
26. OS installation, server command and network configuration
27. Data analysis – LabView
28. ADC, DAC, RTC and PWM – STM32F103
29. Interrupt and Timer in LPC2148 – Stratify OS
30. Design of computer network – LAN

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3ES03A**	**DSE-3: EMBEDDED SYSTEM-II**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	describe the architecture and different modes of operations of a microcontroller and Cortex-M processor	**K1**
CO-2	Outline and restate the microcontroller programs	**K2**
CO-3	Apply the Microcontrollers based embedded system in various applications	**K3**
CO-4	Analyse RTOS and IoT foe different applications	**K4**
CO-5	asses, develop programming skill, design and construct circuits with 8051 microcontroller, Cortex-M Processor and IoT	**K5, K6**

Unit-I: Arduino Embedded System (15 Hours)

AVR architecture - Atmega328p features – architecture – Arduino features – Arduino I/O – Arduino peripheral blocks – Arduino IDE – Arduino language - simple programs

Unit-II: CORTEX-M CORTEX-R Microcontrollers (15 Hours)

LPC2148 features – Architecture – Pinout and description – Development board – ARM Keil IDE – Simple applications - ARM Cortex M85 Architecture and features - ARM Cortex R82 Architecture and features

Unit-III: STM32F103C8 Embedded System (15 Hours)

Features – Architecture – Pinout and Pin description – memory mapping – Development board – STM32Cube – Architecture – Firmware package – Simple applications

Unit-IV: Embedded Linux (15 Hours)

Embedded Linux Fundamentals –Embedded Linux Commands - VI Editors –Kernel - Kernel Module Vs Application - Device Driver - The Role of Device Driver - Types of Device Driver - Character Driver - Block Driver and Network Driver

Unit-V: Embedded System Design (15 Hours)

Train controller – FIR filter - Data compressor – Audio player – Digital Still camera – Engine Control Unit – Air quality monitoring system

Book for Study:

1. Study Material prepared by the department

2. Marilyn Wolf, *Computers as Components Principles of Embedded Computing System Design*, 3rd edition, Elsevier, 2012.

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	3	All
IV	1	4	All
V	2	1-6	E.g., 1.4, 2.1, 3.8, 4.9, 5.12, 6.11

Book for Reference:

1. Data sheet - Atmega328p, LPC2148, Cortex M85, Cortex R82, STM32F103C8, stm32cubef1
2. www.arduino.cc
3. Karim Yaghmour, Jon Masters, Gilad Ben-Yossef and Philippe Gerum, *Building Embedded Linux Systems*, O'Reilly Media, 2nd Edition, 2008.

Web References:

1. https://www.arduino.cc/reference/en/
2. https://www.arm.com/products/silicon-ip-cpu/cortex-m/cortex-m85
3.https://www.st.com/
4. https://ubuntu.com/blog/what-is-embedded-linux
5. https://www.techopedia.com/definition/29946/embedded-linux

Semester	Course Code	Title of the Paper					Hours	Credit			
III	**22PEL3ES03A**	**DSE-3: EMBEDDED SYSTEM-II**					**5**	**4**			
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	3	2	3	3	3	3	2.5
CO-2	2	2	2	3	3	3	3	2	3	3	2.6
CO-3	2	2	3	3	2	2	3	3	2	3	2.5
CO-4	2	2	3	2	3	2	3	2	3	2	2.4
CO-5	2	2	3	3	2	2	2	3	3	3	2.5
Mean Overall Score											2.5
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3ES03B**	**DSE-3: MOBILE COMPUTING**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire the basics of Mobile Computing	**K1**
CO-2	understand concepts of Mobile Communication	**K2**
CO-3	apply network and transport layers in Mobile Communication	**K3**
CO-4	Analyze various protocols of all layers for mobile and ad hoc wireless communication networks	**K4**
CO-5	Evaluate IP and TCP layers of Mobile Communication and explain new design	**K5, K6**

Unit-I: Introduction of mobile computing (15 Hours)

Introduction of Mobile Computing: wireless the beginning-mobile computing, function, Devices- Dialogue Control-Networks- middleware and Gateways-Application and Services – Developing mobile computing application-Security in mobile computing – standards.

Unit-II: Mobile computing Architecture (15Hours)

Architecture for mobile computing-Three-Tier architecture, Presentation (Tier-1), Application Tier (Tier-2), Date Tier (Tier-3)–Design consideration for mobile computing, client context manager, context aware system- Mobile computing through internet – Making existing applications mobile enabled.

Unit-III: Emerging Technology (15Hours)

Introduction –Bluetooth –radio frequency identification (RFID) –Wireless Broadband (WiMAX)-Mobile IP-Internet protocol Version6 (IPv6)-Java card –Global system for mobile communication- GSM architecture –GSM Frequency allocation.

Unit-IV: Wireless LAN and Internet Networks (15Hours)

Wireless LAN advantage –IEEE802.11 standards- Wireless LAN Architecture- Mobility in Wireless LAN – mobile Ad Hoc Network and sensor Networks - Wireless LAN security – Wi-Fi versus 3G- fundamental of call processing –Intelligence in the Networks – soft switch – programmable networks.

Unit-V: Voice over IP and Security Issues in mobile computing (15Hours)

Voice over IP, H.3323 framework – Session initiation protocol (SIP)- Real time Protocols Convergence technology – call routing – voice over application – IP multimedia subsystem (IMS)- Information security – security techniques and algorithms - security protocols – mobile virus, Mobile worm.

Book for Study:

1. Asoke K. Talukder and Roopa Yavagal, *Mobile Computing: Technology, Applications, and Service Creation,*Tata McGrawHILL , Thirteenth reprint, 2009 .

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	4, 5	All
IV	1	10, 11	All
V	1	17, 18	All

Book for Reference:

1. Raj Kamal, *Mobile Computing*, Oxford
2. William Stallings, *Wireless Communications & Networks*, Second Edition, Pearson, 2014
3. Kumkum Garg, *Mobile Computing Theory and Practice*, Pearson

Web References:

1. https://www.javatpoint.com/mobile-computing
2. https://www.tutorialspoint.com/mobile_computing/mobile_computing_overview.htm
3. https://www.techtarget.com/searchmobilecomputing/definition/nomadic-computing
4. https://www.analyticssteps.com/blogs/introduction-mobile-computing
5. https://www.sciencedirect.com/topics/computer-science/mobile-computing

Semester	Course Code	Title of the Paper	Hours	Credit
III	**22PEL3ES03B**	**DSE-3: MOBILE COMPUTING**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	2	2	2	2	2	2	2.0
CO-2	2	3	3	3	3	3	2	2	2	3	2.6
CO-3	2	2	2	2	2	2	2	2	2	2	2.0
CO-4	3	3	2	3	2	3	2	3	2	2	2.5
CO-5	2	3	2	2	2	2	2	2	2	3	2.2
									Mean Overall Score		2.26
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**22PEL3EG02**	**GENERIC ELECTIVE-2(BS): COMPUTER HARDWARE AND NETWORKS**	**4**	**3**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire the basics of computer peripherals	**K1**
CO-2	Explain the functions of each component in the computer	**K2**
CO-3	Operate the computer by installing the Operating System	**K3**
CO-4	Analyze the symptoms of a computer faults	**K4**
CO-5	Decide and plan suitable configuration for a task	**K5, K6**

Unit-I: Computer Architecture (12 Hours)

Basic block of a computer- Motherboard designs-motherboard form factors-components of motherboard-upgrading a motherboard- Chipsets and controllers- socket type- north bridge and south bridge- processor generations- controller chips-chipset function-intel and non-intel chipsets. Expansion cards.

Unit-II: Bios and Boot Process (12 Hours)

Introduction to BIOS-BIOS utilities and programs-BIOS manufacturers-Booting sequence-cold boot versus warm boot-POST process-BIOS start-up screen-system configuration summary. BIOS updates and flash BIOS-flashing dangers-dealing with a corrupt BIOS-boot block.

Unit-III: Computer Memory (12 Hours)

Brief overview of ROM-CMOS-RAM-RAM types-matching memory to the motherboard-Logical memory configuration-Dealing with memory errors-Installing memory modules in a PC-Installing SIMM and DIMM-Configuring the PC for memory-Removing a memory module-installing a cache module-Enabling the internal and external cache.

Unit-IV: Hard Disk Drive (12 Hours)

Construction of HDD-Interfaces-ST506/412-ESDI-IDE-SCSI-FC-AL-system bus interface-Transfer protocols- formatting the disk-partitioning the hard disk-disk space requirements-Disk compression –RAID.

Unit-V: Network and Communication (12 Hours)

Network basics-network structure-network components-Servers-Cabling-Network Devices-Network topologies-network addressing-configuring a pc for network connection-wireless networking-access point and network adapters-Bluetooth.

Book for Study:

1. Ron Gilster, *PC hardware:A beginner's guide*, McGraw Hill, 2001.

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	4, 5	All
IV	1	10, 11	All
V	1	17, 18	All

Book for Reference:

1. Joel Z. Rosenthal, Kevin Jay Irwin, *PC Repair and Maintenance: A Practical Guide*, Charles River Media publishers, 2003
2. Dylan Mach, *Networking for Beginners*, independently published, 2019
3. Kevin Wilson, *Computer hardware*, independently published, 2018

Web References:

1. https://www.geeksforgeeks.org/difference-between-hardware-and-networking/
2. https://www.toolbox.com/tech/networking/articles/what-is-network-hardware/
3. https://www.tutorialspoint.com/Basic-Network-Hardware
4. https://www.youtube.com/watch?v=maG8gHMLfl4
5. https://www.crucial.com/articles/pc-builders/what-is-computer-hardware

Semester	Course Code	Title of the Paper	Hours	Credit
III	**22PEL3EG02**	**GENERIC ELECTIVE-2(BS): COMPUTER HARDWARE AND NETWORKS**	**4**	**3**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	2	2	2	3	2	2	2	2	2.2
CO-2	2	3	2	3	2	3	2	2	2	2	2.3
CO-3	2	3	2	3	2	3	2	2	3	2	2.4
CO-4	2	3	2	3	2	2	2	2	3	3	2.4
CO-5	3	2	2	2	2	3	2	2	2	2	2.2
									Mean Overall Score		2.3
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
IV	**22PEL4CC09**	**CORE-9: CONTROL SYSTEM AND INDUSTRIAL AUTOMATION**	**5**	**5**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire knowledge on basic concepts of control system and industrial automation	**K1**
CO-2	explain the time-domain and frequency-domain analyses of the model to predict the system's behaviour.	**K2**
CO-3	apply various controllers in industrial automation	**K3**
CO-4	Analyze the performance of control systems	**K4**
CO-5	Standardize and compose industrial automation	**K5, K6**

Unit-I: Introduction (15 Hours)

Control System – open loop and closed loop systems- Mathematical models: mechanical system- electrical system -Transfer function- Laplace transforms- Block diagram Algebra- signal flow graphs- feedback characteristics of control system.

Unit-II: Time and frequency domain Analysis (15 Hours)

Time response: type and order of control system- test signals- Time response of first and second order systems to unit step input. Time Domain specifications and their formulae- frequency response- correlation between time and frequency response-bode plots-Nyquist plot-Nyquist stability criterion-determination of closed loop response from open loop response.

Unit-III: Error analysis and Controllers (15 Hours)

The role of feedback system, error analysis- Response of 2^{nd} order system with P, PI and PID controllers- Ziegler Nichols rules for tuning PID controllers- Design of PID controllers with frequency response approach - comparison of the controller response- Design concepts of modified PID controller- two degrees of freedom control- zero placement approach to improve response characteristics

Unit-IV: Introduction to automation (15 Hours)

Automation- basic concept: Definition-positioning concept- components and application of automation system: automation system application –function of automation system- levels of automation- important concepts- Analog and digital- input and output types- numbering system- electrical power - processes- Documentation and file formats.

Unit-V: Automation system (15 Hours)

Components and hardware- power control- actuators, sensors and movement- Ac and DC motors- control devices-machine system- process control system and automated machinery-machine and system design-safety- application.

Book for Study:

1. Katsuhiko Ogata, *Modern control engineering*, 5th Edition, Upper Saddle River, NJ: Prentice Hall, 2010.
2. Nagrath IJ and M Gopal, *Control Systems Engineering*, 4th Edition, New Age International (P) Ltd., Publishers, 2006.
3. Politeknik Port Dickson, *Industrial Automation: An Engineering Approach*, 2013
4. Frank Lamb, *Industrial automation: hands-on*. McGraw-Hill Education, 2013.

Unit	Book	Chapter	Sections
I	1 2	1 2, 3	1.1,1.2,1.3 2.4,2.5, 2.6, 2.7, 3.1- 3.7
II	2 1	5 7	5.1, 5.2,5.3, 5.4, 8.2-8.4 5.8, 7.2, 7.3,7.5, 7.6, 7.8, 7.10
III	1 2	8 3	8.1-8.7 3.1 -3.6
IV	3 2	1, 2 2	1.1, 1.2, 1.3, 2.1-2.4, 2.1-2.7
V	4	3, 4, 9, 10	3.1-3.6, 4.1, 9.1-9.6, 10

Book for Reference:

1. Levine, W.S., *Control system fundamentals*, 2nd Edition, CRC press, 2011.
2. Manesis, S. and Nikolakopoulos, G., *Introduction to industrial automation*. CRC Press. 2018.
3. Norman S. Nise, *Control System Engineering*, 7th Edition, Courier Kendallville, 2015.

Web References:

1. https://sites.google.com/view/vivekmohan/control-system-lecture-notes.
2. https://www.princeton.edu/~cuff/ele201/kulkarni_text/frequency.pdf.
3. https://learnemc.com/time-frequency-domain
4. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0242428.
5. https://www.msec.be/verboten/seminaries/ICS_archs_and_sec_essentials/ICS_Overview.pdf

Semester	Course Code	Title of the Paper	Hours	Credit
IV	**22PEL4CC09**	**CORE-9: CONTROL SYSTEM AND INDUSTRIAL AUTOMATION**	**5**	**5**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	2	3	2	2	3	3	2	2	2.4
CO-2	2	2	3	2	3	2	2	3	2	2	2.3
CO-3	2	3	2	2	2	2	2	2	3	3	2.3
CO-4	2	3	2	2	3	2	2	2	3	2	2.3
CO-5	2	2	3	3	3	2	2	2	3	3	2.5
								Mean Overall Score			2.36
								Result			HIGH

Semester	Course Code	Title of the Course	Hours	Credits
IV	**22PEL4CC10**	**CORE-10: INTERNET Of THINGS AND ARTIFICIAL INTELIGENCE**	**6**	**5**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire knowledge on IoT network model system	**K1**
CO-2	understand the basic concepts of IoT devices	**K2**
CO-3	Enhance the applications of IIoT& Security and Safety	**K3**
CO-4	Analyse IoT protocols and Artificial Intelligence for different applications	**K4**
CO-5	synthesis Artificial Intelligence algorithms.	**K5, K6**

Unit-I: IoT Basics (18 Hours)

Introduction -Applications - Architectures- Wireless Networks-– Devices-Security and Privacy-Event-Driven Systems- IoT System Architectures: Protocols Concepts-IoT-Oriented Protocols-Databases -Time Bases-Security- IoT Devices: The IoT Device Design Space-Cost of Ownership and Power Consumption-Cost per Transistor and Chip Size-Duty Cycle and Power Consumption-Platform Design

Unit-II: IoT Network Model (18 Hours)

Event-Driven System Analysis: Introduction -IoT Network Model-Events-Networks-Devices and Hubs-Single-Hub Networks-Multi-hub Networks-Network Models and Physical Networks-IoT Event Analysis: Event Populations-Stochastic Event - Environmental Interaction Modeling-Event Transport and Migration

Unit-III:IIoT and Security and Safety (18 Hours)

Industrial Internet of Things: Industry 4.0-Industrial Internet of Things (IIoT)- IIoT Architecture-Basic Technologies-Applications and Challenges-Security and Safety: Systems Security-Network Security-Generic Application Security-Application Process Security and Safety-Reliable, Secure design IoT Applications-Run Time Monitoring- ARMET Approach-Privacy and Dependability-Security Testing IoT Systems.

Unit-IV: Introduction to Al (18 Hours)

Overview to AI- Applications of AI—Types of Intelligence –Intelligence Composed—Research Areas of AI - Real Life Applications of Research Areas— Task Classification of AI— Agents and Environments. The AI Problems- Ideal Rational Agent- The Structure of Intelligent Agents –The Nature of Environments -Properties of Environment

Unit-V: AI Algorithms (18 Hours)

Single Agent Path finding Problems - Search Terminology - Brute-Force Search Strategies— Informed (Heuristic)- Local Search Algorithms—Search Strategies - Fuzzy Logic - Fuzzy Logic Systems Architecture— Example of a Fuzzy Logic System - Application Areas of Fuzzy Logic— Natural Language Processing - Components of NLP - Implementation Aspects of Syntactic Analysis - Expert Systems - Development of Expert Systems - Robots - Computer Vision - Application Domains of Computer Vision –Neural Networks— AI Issues .

Book for Study:

1. Dimitrios Serpanos, *Internet-of-Things (IoT) Systems, Architectures, Algorithms, Methodologies,* Springer International Publishing
2. Materials prepared by department

Unit	Book	Chapter	Sections
I	1	1, 2 and 3	all
II	1	4	all
III	1	5 and 6	all
IV	2	1	all
V	2	2	all

Book for Reference:

1. B.K. Tripathy and J. Anuradha, *Internet of Things (IoT) Technologies, Applications, Challenges, and Solutions,* Taylor & Francis Group,
2. Constandinos X. Mavromoustakis George Mastorakis, Jordi Mongay Batalla, *Internet of Things (IoT) in 5G Mobile Technologies,* Springer International Publishing Switzerland, 2016.
3. Anandarup Mukherjee, Arijit Roy, *Introduction to IoT*, Cambridge University Press, 1st edition, 2022

Web References:

1. **https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf**
2. **https://www.itransition.com/blog/industrial-iot-security**
3. **https://www.tutorialspoint.com/artificial_intelligence/index.htm**
4. **https://www.w3schools.com/ai/**
5. **https://www.neuraldesigner.com/learning/neural-networks-tutorial**

Semester	Course Code	Title of the Paper	Hours	Credit
IV	**22PEL4CC10**	**CORE-10: INTERNET Of THINGS AND ARTIFICIAL INTELIGENCE**	**6**	**5**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	3	2	2	3	2	2	2.2
CO-2	2	3	2	2	3	2	2	3	3	2	2.4
CO-3	2	3	2	2	3	2	2	3	3	2	2.4
CO-4	2	2	3	3	3	2	2	2	3	2	2.4
CO-5	2	3	3	2	3	2	2	3	2	2	2.4
									Mean Overall Score		2.36
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
IV	**22PEL4CP04**	**ELECTRONICS PRACTICAL - IV**	**8**	**6**

Any 16 Experiments

1. PID algorithm implementation for temperature control
2. Thermal printer interfacing with microcontroller
3. Study of Heart beat sensor and interfacing with microcontroller.
4. ICM105A VGA CMOS sensor
5. MPU 6050 IMU Sensor interfacing with microcontroller
6. AC bridge for signal conditioning
7. Design of Smart lighting system
8. Battery management system - RTOS
9. RTOS- Arduino (Blink-AnalogRead, IntegerQueue, StructQueue and Interrupts)
10. IOT – warning light connected to an MQTT server
11. IOT – design of WiFi gateway
12. Fiber optic characteristics
13. Data communication
14. Design and analysis of MAC protocol
15. Optical communication – 1
16. Data encryption and decryption using microcontroller.
17. Text and sound data transfer - LASER
18. Brushless motor interfacing with microcontroller
19. Design of RPM counter
20. PAM, PWM, PCM
21. Wireless data transfer.
22. RF communication for Drone.
23. Design of wireless sensor network with two sensors
24. Design of vehicle tracking system
25. FPGA - VivadoHLx Software - Verilog
26. 3-bit binary adder – Verilog
27. Design of accelerometer and application
28. Weather data collection using Python
29. Digital Read, ADC, Interrupt and PWM using Python
30. Embedded Linux Programming
31. Simulation of WSN with LEACH Protocol using Mannasim Simulator

Semester	Course Code	Title of the Course	Hours	Credits
IV	**22PEL4ES04A**	**DSE-4: COMMUNICATION SYSTEMS**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire the knowledge of different communication systems	**K1**
CO-2	Understand the working of various communication devices	**K2**
CO-3	apply the knowledge of satellite communication to various applications	**K3**
CO-4	Analyse the difference between data and mobile communication and evaluate for various security management.	**K4**
CO-5	Create communication protocols for industrial application	**K5, K6**

Unit-I: Optical Fibre Transmission media (15 Hours)

Optical Fiber Communications- Optical Fibers versus Metallic Cable Facilities - Electromagnetic Spectrum -Block Diagram of an Optical Fiber- Optical Fiber Types -Light Propagation - Optical Fiber Configurations - Optical Fiber Classifications - Losses in Optical Fiber Cables - Light Sources - Optical Sources Communications System - Light Detectors – Lasers - Optical Fiber System Link Budget

Unit-II: Microwave Radio Communications and System Gain (15 Hours)

Introduction - Advantages and Disadvantages of Microwave - Analog versus Digital Microwave - Frequency versus Amplitude Modulation - Frequency-Modulated Microwave Radio - FM Microwave Radio Repeater – Diversity Radio - Protection Switching Arrangements - FM Microwave Radio Stations - Microwave Repeater Station – Path Characteristics System - Microwave Radio System Gain

Unit-III: Satellite Communications (15 Hours)

Introduction - Kepler's Laws - Satellite Orbits - Geosynchronous Satellites - Antenna Look Angles - Satellite Classifications, Spacing, and Frequency Allocation - Satellite Antenna Radiation Patterns: Footprints - Satellite System Link Models - Satellite System Parameters - Satellite System Link Equations - Link Budget

Unit-IV: Mobile and Data Communication (15 Hours)

Data Communication: Data Communications Network Architecture, Protocols, and Standards - Layered Network Architecture - Open Systems Interconnection - Data Communications Circuits - Serial and Parallel Data Transmission - Data Communications Networks

Mobile Communication: Architectural Review of UMTS and GSM - history of Mobile Telecommunication Systems - the Need for LTE - from LTE to LTE-Advanced -Carrier Aggregation - Enhanced Downlink MIMO - Enhanced Uplink MIMO - Heterogeneous Networks - Traffic Offload Techniques

Unit-V: VoLTE and the IP Multimedia Subsystem (15 Hours)

Introduction - Hardware Architecture of the IMS - Signaling Protocols - service Provision in the IMS - VoLTE Registration Procedure - Call Setup and Release - Access Domain Selection - Single Radio Voice Call Continuity - IMS Centralized Services – IMS emergency calls – Delivery of SMS and messages over IMS – Performance of LTE and LTE advanced

Book for Study:

1. Wayne Tomasi, *Advanced Electronic Communications*, Sixth Edition, Pearson Education Limited, 2014
2. Christopher Cox, *An Introduction to LTE*, 2nd Edition, John Wiley and Sons Ltd, 2014.

Unit	Book	Chapter	Sections
I	1	1	**1-15**
II	1	13	**1-12**
III	1	14	1-12
IV	1 2	1 1, 19	3, 5, 8 1.1-1.6, 19.2, 19.3, 19.5, 19.6
V	2	22, 23	22.1-22.11, 23

Book for Reference:

1. Taub and Schilling, *Principles of Communication Systems*, 2nd edition, New Delhi: Tata McGraw Hill Ltd., 1998.
2. T.S.Rappaport, *Wireless Communication Principles*,2nd Edition, Pearson, 2002.
3. D. Anuradha, *Optical Fiber and Laser principles and applications*, 2nd Edition, New age, 2009

Web References:

1. https://www.nai-group.com/optical-fiber-technology-how-it-works/
2. https://www.geeksforgeeks.org/difference-between-radio-wave-microwave-and-infrared-waves/
3. https://www.tutorialspoint.com/satellite_communication/satellite_communication_introduction.htm
4. https://www.youtube.com/watch?v=qU49jUvxW00
5. https://www.tutorialspoint.com/communication_technologies/mobile_communication_protocols.htm

Semester	Course Code	Title of the Paper	Hours	Credit
IV	**22PEL4ES04A**	**DSE-4: COMMUNICATION SYSTEM**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	3	2	2	2	2	3	2.4
CO-2	3	2	2	2	2	2	2	2	2	2	2.1
CO-3	3	2	2	3	2	2	3	2	3	2	2.4
CO-4	2	3	3	2	2	2	3	2	3	2	2.4
CO-5	3	2	2	3	3	2	2	3	2	3	2.5
									Mean Overall Score		2.36
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
IV	**22PEL4ES04B**	**DSE-4: WIRELESS SENSOR NETWORKS**	**5**	**4**

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	Acquire Knowledge on Wireless Sensor Networks and understand its functionality	**K1**
CO-2	Comprehend WSN Protocols for various Applications	**K2**
CO-3	Apply the WSN Protocols for various Applications	**K3**
CO-4	Interpret different types of Wireless Sensor Networks	**K4**
CO-5	Evaluate Power, Time and Security management for WSN and Create Wireless Sensor Networks for Social and Industrial Applications	**K5, K6**

Unit-I: Introduction to Wireless Sensor Network (15 Hours)

Introduction – Energy and Wireless Networking challenges and constraints- Security and Design Constraints-Healthcare and Traffic Control Applications-Pipeline Monitoring and Precision Agriculture-Node Architecture-The Sensing and Processor Subsystem-Communication Interfaces-Prototypes.

Unit-II: Basic Architectural Framework (15 Hours)

Physical Layer- Source Encoding and Modulation-Medium Access Control-Types of MAC - Wireless MAC Protocols-Characteristics of MAC Protocols in Sensor Network-Contention-Free MAC Protocols-Contention based MAC Protocols-Hybrid Protocols-Network Layer.

Unit-III: Node and Network Management (15 Hours)

Local Power Management Aspect-Dynamic Power Management- Time Synchronization in WSN-Time Synchronization Protocols- Overview of Localization- Ranging Techniques- Fundamentals of Network Security-Challenges of security in WSN-Security Attacks in WSN-Protocols and Mechanisms for Security.

Unit-IV: Sensor Network Programming (15 Hours)

Challenges in Sensor Network programming- Node-Centered Programming- Microprograming-Dynamic Reprogramming- Sensor Network Simulators- Aspects of Topology Control Algorithms-Centralized Algorithms for Hierarchical networks by denominating sets-Routing Protocols-Energy efficient Unicast-Broadcast and Multicast-Mobile Nodes.

Unit-V: Advancement in WSN (15 Hours)

Data- Centric Routing- Data Aggregation- Transport layer and QoS in WSN-Coverage and deployment-Single Packet delivery-Block delivery-Advancement in Network processing-Security-Application specific support

Book for Study:

1. W. Dargie and C. Poellabauer, *Fundamentals of Wireless Sensor Networks*, 2010, Wiley, USA.
2. Holger Karl and Andreas Willig, *Protocols and Architectures for Wireless Sensor Networks*, 2011, Wiley, USA.

Unit	Book	Chapter	Sections
I	1	1, 2	1.1,1.2.1, 1.2.3, 1.2.5, 1.2.6, 2.2-2.5, 3.1-3.4.
II	1	5, 6, 7	5,1, 6.1-6.6, 7.1
III	1	8, 9, 10, 11	8.1,8.2,9.1,9.2,9.4, 10.1,10.2, 11.1-11.4
IV	1 2	12 10, 11	12.1-12.5 10.1,10.3,11.1,11.3, 11.4,11.6
V	2	12, 13, 14	12.1-12.3, 13.1,13.2, 13.4,13.5, 14.1-14.3

Book for Reference:

1. Ian F. Akyildiz, and Mehmet Can Vuran, *Wireless Sensor Networks*, 2010, Wiley, USA.
2. IBM Bluemix: *The Cloud Platform for Creating and Delivering Applications*,
3. TaiebZnati, Kazem Sohraby, Daniel Minoli, *Wireless Sensor Network: Technology Protocols and applications*, Wiley, 2010

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1. http://www.redbooks.ibm.com/redpapers/pdfs/redp5242.pdf
2. https://www.geeksforgeeks.org/wireless-sensor-network-wsn/
3. https://www.researchgate.net/publication/237201572_Tutorial_on_Wireless_Sensor_Networks_Institute_of_Engineers_Sri_Lanka_Colombo
4. https://www.electronicshub.org/wireless-sensor-networks-wsn/
5. https://youtu.be/sayPu0biqQk

Semester	Course Code	Title of the Paper	Hours	Credit
IV	**22PEL4ES04B**	**DSE-4: WIRELESS SENSOR NETWORKS**	**5**	**4**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	3	2	1	2	2	3	2.3
CO-2	2	2	2	2	2	1	2	3	2	2	2.0
CO-3	2	3	3	2	2	2	3	2	3	2	2.4
CO-4	1	3	3	2	2	2	3	2	3	2	2.3
CO-5	3	2	2	3	3	2	2	3	2	3	2.5
									Mean Overall Score		2.3
									Result		HIGH

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS)
UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to maintain and uphold the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014 – 15, to meet and excel the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system enhances the optimal utilization of both human and infrastructural resources. It also enhances academic mobility and enriches employability. The School system preserves the identity, autonomy and uniqueness of every department and reinforces Student centric curriculum designing and skill imparting. These five schools adhere to achieve and accomplish the following objectives.

Optimal utilization of resources both human and material for the academic flexibility leading to excellence.

Students experience or enjoy their choice of courses and credits for their horizontal mobility.

The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.

Human excellence in specialized areas

Thrust in internship and / or projects as a lead towards research and

The multi-discipline nature of the School System caters to the needs of stake-holders, especially the employers.

Credit system:

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The credits and hours of each course of a programme is given in the table of Programme Pattern. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 130 credits as mentioned in the programme pattern table. The total number of minimum courses offered by the Department is given in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)
LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

OBE is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience, each student should have achieved the goal. There is no single specified style of teaching or assessment in OBE; instead, classes, opportunities and assessments should all help the students achieve the specific outcomes

Outcome Based Education, as the name suggests depends on Outcomes and not Inputs. The outcomes in OBE are expected to be measurable. In fact each Educational Institute can state its own outcomes. The ultimate goal is to ensure that there is a correlation between education and employability

Outcome –Based Education (OBE): is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve, stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.

Some important aspects of the Outcome Based Education

Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs):

PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Programme Educational Objectives (PEOs): The PEOs of a programme are the statements that describe the expected achievement of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after Graduation.

Some important terminologies repeatedly used in LOCF.

Core Courses (CC)

A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE)

Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

DSE: Four courses are offered, two courses each in semester V and VI

Note: To offer **one DSE**, a minimum of two courses of equal importance / weightage is a must.

A department with two sections must offer two courses to the students.

One DSE Course may be offered as interdisciplinary course among the departments in a School (Common Core Course) at the PG level.

Generic Elective Courses

An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective.

Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Two GE Courses are offered one each in semesters V and VI.

(open to the students of other Departments)

The Ability Enhancement Courses (AEC)

"AECC" are the courses based upon the content that leads to Knowledge enhancement; Communicative English, Environmental Science. These are mandatory for all disciplines.

AECC-1: Communicative English: It is a 4 credits compulsory course offered by the Department of English in the first semester of the Degree Programme, Classes are conducted outside the regular class hours.

AECC-2: Environmental Science: is a 2 credit course offered as a compulsory course during the second semester by the Department of Human Excellence.

Skill Enhancement Courses (SECs)

These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme.

These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge**.**

There are four courses under this category

SEC-1 is offered in semester **III as a course** Within the Department **(WD)** it is More of main discipline related skills.

SEC-2is offered in semester **IV as a course** Between schools **(BS)** Offered to students of other schools (Except the school offering the course)

SEC-3 is offered in semester **V as** a compulsory course on Soft Skills offered by the Department of Human Excellence, common to all the students of UG programme.

SEC-4 is offered in semester **VI** as a course **Within School (WS)** Open to all the students within the same school (including the students of the parent department)

Self–paced Learning: It is a course for two credits. It is offered to promote the habit of independent/self learning of Students. Since it is a two credit course, syllabus is framed to complete within 45 hours. It is not taught in the regular working hours.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Comprehensive Examinations: A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL and etc.

Undergraduate Programme:

Programme Pattern:

The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III : Core Course (Theory, Practicals, Discipline Specific Electives, Compulsory and Optional Allied courses, Project, Self paced courses, Internship , Comprehensive Examinations and field visit /industrial visit/Case Study)

Part-IV: Value Education, Ability Enhancement Courses, Skill Enhancement Courses/ Soft Skills , Generic Electives/ National Cadet Corps etc.

Part-V: Outreach Programme (SHEPHERD).

Ability Enhancement Courses (AEC): There are two Ability Enhancement courses viz AECC and SEC.

Value Education Courses:

There are four courses offered in the first four semesters for the First & Second UG Programme.

Course Coding

The following code system (11 alphanumeric characters) is adopted for Under Graduate courses:

21	UXX	N	N	XX	NN/NNX
Year of Revision	UG Department Code	Semester number	Part specification	Part Category	Running number/with choice

N:- Numeral X :- Alphabet

Part Category

GL - Languages (Tamil / Hindi / French / Sanskrit)

GE - General English

CC - Core Theory; CP- Core Practical

WS- Workshop

SP- Self Paced Learning

IS- Internship

FV- Field visit

CE- Comprehensive Examination

PW- Project Work& viva-voce

Electives Courses

ES – Department Specific Electives

EG- Generic Electives

Allied Courses

AC - Allied Compulsory

AO- Allied Optional

EC - Additional Core Courses for Extra Credits (If any)*

Ability Enhancement Courses

AE – Ability Enhancement Compulsory Courses; Bridge Course and Environment Science

SE – Skill Enhancement (WD), (BS), (WS) and Soft skills

VE - Value Education/ Social Ethics/Religious Doctrine

OR – Outreach SHEPHERD & Gender Studies (Outreach)

SU - AICUF / Nature Club / Fine Arts / NCC / NSS /etc. (Service Unit)

CIA AND SEMESTER EXAMINATION

Continuous Internal Assessment (CIA):

Distribution of CIA Marks	
Passing Minimum: 40 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
Total CIA	100

MID-SEM & END – SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective and Descriptive elements; with the below mentioned question pattern PART-A; PART-B; PART-C and PART D.
2. One of the CIA Component II/III for UG & PG will be of 15 marks and compulsorily a online objective multiple choice question type.
3. The online CIA Component must be conducted by the Department / faculty concerned at a suitable computer centre.
4. The 7 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.
6. English Composition once a fortnight will form one of the components for UG general English

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS	Lower Order Thinking			Higher Order Thinking			Total %
	K1	K2	K3	K4	K5	K6	
SEMESTER EXAMINATIONS	15	20	35	30			**100**
MID / END Semester TESTS	12	20	35	33			**100**

QUESTION PATTERN FOR SEMESTER EXAMINATION	
SECTION	**MARKS**
SECTION–A (No choice ,One Mark) **THREE** questions from each unit **(**15x1 =15)	**15**
SECTION-B (No choice ,2-Marks) **TWO** questions from each unit (10x2 =20)	**20**
SECTION-C (Either/or type) (7- Marks) **ONE** question from each unit (5x7 =35)	**35**
SECTION-D (3 out of 5) (10 Marks) **ONE** question from each unit (3x10 =30)	**30**
Total	**100**

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.							**Max Mark : 100**
K- LEVELS / **SECTIONS**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
SECTION–A (One Mark, No choice) (15x1=15)	15						**15**
SECTION-B (2-Marks, No choice) (10x2=20)		10					**20**
SECTION-C (7- Marks) (Either/or type) (5x7=35)			5				**35**
SECTION-D (10 Marks) (3 out of 5) (3x10=30) Courses having only **K4** levels				3			**30**
Courses having **K4** and **K5** levels **One K5 level question is compulsory**				2	1		
(Courses having **all the 6** cognitive levels **One K5 and K6 level questions can be compulsory**				1	1	1	
Total	**15**	**20**	**35**	**30**			**100**

QUESTION PATTERN FOR MID/END TEST			
SECTIONS			**MARKS**
SECTION–A	(No choice, One Mark)	(7x1 =7)	**7**
SECTION-B	(No choice , 2-Marks)	(6x2 =12)	**12**
SECTION-C	(Either/or type) (7- Marks)	(3x7 =21)	**21**
SECTION-D	(2 out of 3) (10 Marks)	(2x10=20)	**20**
		Total	**60**

BLUE PRINT OF QUESTION PAPER FOR MID/END TEST							
DURATION: 2. 00 Hours.							**Max Mark: 60.**
K- LEVELS / **SECTIONS**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
SECTION –A (One Mark, No choice) (7 x 1 = 7)	7						**07**
SECTION-B (2-Marks, No choice) (6 x 2 = 12)		6					**12**
SECTION-C (Either/or type) (7- Marks) (3 x 7 =21)			3				**21**
SECTION-D (2 out of 3) (10 Marks) (2x10=20) Courses having only **K4** levels				2			**20**
Courses having **K4** and **K5** levels **One K5 level question is compulsory**				1	1		
Courses having **all the 6** cognitive levels **One K6 level question is compulsory**					1	1	
Total Marks	**07**	**12**	**21**	**20**			**60**
Weightage for 100 %	**12**	**20**	**35**	**33**			**100**

Assessment pattern for two credit courses.

S. No.	Course Title	CIA	Semester Examination	Total Marks
1	Self Paced Learning Course	25 + 25 = 50	50 Marks (MCQ) (COE)	100
2	Comprehensive Examinations	25 +25 = 50	50 Marks (MCQ) (COE)	100
3	Internship	100	--	100
4	Field Visit	100	--	100
5	Ability Enhancement Course (AEC) for PG	50 (Three Components)	50 (COE) (Specific Question Pattern)	100
Assessment Pattern for Courses in Part - IV				
6	Value Education Courses and Environmental Studies	50	50 Marks (For 2.00 hours) (COE)	100
7	Skill Enhancement Courses(SECs)	50 marks (by Course in-charge) 50 Marks (by an External member from the Department)		100
8	SEC: SOFT SKILLS (For UG and PG)	100 (Fully Internal)		100

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$	$WAM\,(Weighted\,Average\,Marks) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses **Passed** in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

i) For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Prgoramme.
iii) Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
iv) A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.
v) Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	**10**	**O**
80 and above and below 90	**9**	A+
70 and above and below 80	**8**	**A**
60 and above and below 70	**7**	**B+**
50 and above and below 60	**6**	**B**
40 and above and below 50	**5**	**C**
Below 40	**0**	**RA**

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	**O**	**Outstanding**
8.00 to 8.99	A+	Excellent
7.00 to 7.99	**A**	**Very Good**
6.00 to 6.99	**B+**	**Good**
5.0 0 to 5.99	**B**	**Above Average**
4.00 to 4.99	**C**	**Average**
Below 4.00	**RA**	**Re-appearance**

Credit based weighted Mark System is adopted for the individual semesters and cumulative semesters in the column 'Marks secured' (for 100)

Declaration of Result

Mr./ MS. _____ has successfully completed the Under Graduate in _____programme. The candidate's Cumulative Grade Point Average (CGPA) in Part – III is _____ and the class secured is _____ by completing the minimum of 130 credits. The candidate has acquired _____ (if any) more credits from SHEPHERD / AICUF/ FINE ARTS / SPORTS & GAMES / NCC / NSS / NATURE CLUB, ETC. The candidate has also acquired _____ (if any) extra credits by attending MOOC courses.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

The Programme Outcomes (POs)/Programme Specific Outcomes(PSOs) are the qualities that must be imbibed in the graduates by the time of completion of their programme. At the end of each programme the PO/PSO assessment in done from the CO attainment of all curriculum components. The POs/PSOs are framed based on the guidelines of LOCF. There are five POs UG programme and five POs for PG programme framed by the college. PSOs are framed by the departments and they are five in numbers.

For each Course, there are five Course Outcomes to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs. All course outcomes shall have linkage to POs/PSOs in such a way that the strongest relation has the weight 3 and the weakest is 1. This relation is defined by using the following table.

Mapping	<40%	≥ 40% and < 70%	≥ 70%
Relation	Low Level	Medium Level	High Level
Scale	1	2	3

Mean Scores of COs $= \frac{\text{Sum of values}}{\text{Total No.of POs \& PSOs}}$		**Mean Overall Score** $= \frac{\text{Sum of Mean Scores}}{\text{Total No.of COs}}$	
Result	**Mean Overall Score**	**< 1.2**	**# Low**
		≥ 1.2 and < 2.2	**# Medium**
		≥ 2.2	**# High**

If the mean overall score is low then the course in charge has to redesign the particular course content so as to achieve high level mean overall score.

Vision

Forming globally competent, committed, compassionate and holistic persons, to be men and women for others, promoting a just society.

Mission

- Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
- Nurturing comprehensive learning and best practices through innovative and value-driven pedagogy.
- Contributing significantly to Higher Education through Teaching, Learning, Research and Extension.

Programme Educational Objectives (PEOs)

- Graduates will be able to accomplish professional standards in the global environment.
- Graduates will be able to uphold integrity and human values.
- Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

Programme Outcomes (POs)

1. Graduates will be able to apply the concepts learnt, in real life situations with analytical skills.
2. Graduates with acquired skills and enhanced knowledge will be employable/ become entrepreneurs or will pursue higher Education.
3. Graduates with acquired knowledge of modern tools and communicative skills will be able to contribute effectively as team members.
4. Graduates will be able to read the signs of the times analyze and provide practical solutions.
5. Graduates imbibed with ethical values and social concern will be able to appreciate cultural diversity, promote social harmony and ensure sustainable environment.

Programmme Specific Objectives (PSOs)

1. Graduates will be able to familiarize the theories of electronics to develop Critical and analytical skills to meet the real-life needs.
2. Graduates will be able to enhance their experimental, problem solving skill and design electronic circuits for complex problems.
3. Graduates will be equipped with hardware, software trouble shooting and programming skill.
4. Graduates will be competent in applying the appropriate techniques, handling electronic instruments and use of modern tools.
5. Graduates will be able to pursue higher education, adapt excellently to the change in work environment and turn out to be Entrepreneur.

B.Sc. ELECTRONICS						
PROGRAMME STRUCTURE						
Part	**Sem.**	**Specification**	**No. of Courses**	**No. of Hours**	**Credits**	**Total Credits**
I	**I-IV**	**Languages (Tamil / Hindi/ French/ Sanskrit)**	**4**	**16**	**12**	**12**
II	**I-IV**	**General English**	**4**	**20**	**12**	**12**
	I –VI	**Corecourse:Theory**	**10**	**44**	**33**	**82**
III	**I –VI**	**Corecourse: Practical**	**5**	**30**	**12**	
	I-IV	**Core course- Allied /(Practical)**	4	**24**	**16**	
	V-VI	**Discipline Specific Elective**	**4**	**20**	**12**	
	VI	**Project Work**	**1**		**2**	
	V	**Self-paced learning**	**1**	**--**	**2**	
	V	**Field study/ Industrial visit/ Case study**	**1**		**1**	
	V	**Internship**	**1**	**-**	**2**	
	VI	**Comprehensive Exam**	**1**	**--**	**2**	
	II,III,V	**Extra Credit courses (MOOC)**	**(3)**	**--**	**(6)**	**(6)**
IV	**V,VI**	**Generic Elective**	2	**8**	**6**	**20**
	I	**AECC-1 Communicative English**	**1**	**--**	**4**	
	II	**AECC-2 Environmental studies**	**1**	**2**	**2**	
	III	**SEC -1 Within Dept. (WD)**	**1**	**2**	**1**	
	IV	**SEC -2 Between Schools (BS)**	**1**	2	1	
	V	**SEC -3 Soft skill**	**1**	2	1	
	VI	**SEC -4 within school (WS)**	**1**	2	1	
	I-IV	**Value Education**	**4**	**8**	**4**	
V	**I-V**	**Outreach Programme /NCC**	**-**	**-**	**-**	**4**
		Total		**180**		**130(6)**

B.Sc. ELECTRONICS								
PROGRAMME PATTERN								
Course Details						**Scheme of Exams**		
Sem	**Part**	**Course Code**	**Course Title**	**Hrs**	**Cr**	**CIA**	**SE**	**Final**
I	1	21UTA11GL01	General Tamil - I	4	3	100	100	100
		21UFR11GL01	French-I					
		21UHI11GL01	Hindi-I					
		21USA11GL01	Sanskrit-I					
	2	21UEN12GE01	General English -I	5	3	100	100	100
	3	21UEL13CC01	Semiconductor Theory and Electronic Devices	7	5	100	100	100
	3	@	Electronics Practical – I	3	*			
	3	@	Electronics Workshop Practice - I	3	*			
	3	21UEL13AC01	Allied: Mathematics for Electronics-I	6	4	100	100	100
	4	21UEN14AE01	**AECC-1:** Communicative English	(6)	4	100	-	100
	4	21UHE14VE01	Essentials of Humanity	2	1	50	50	50
			Total	**30**	**20**			
II	1	21UTA21GL02	General Tamil - II	4	3	100	100	100
		21UFR21GL02	French-II					
		21UHI21GL02	Hindi-II					
		21USA21GL02	Sanskrit-II					
	2	21UEN22GE02	General English -II	5	3	100	100	100
	3	21UEL23CC02	Electric Circuit Analysis	5	4	100	100	100
	3	21UEL23CP01	CP 1: Electronics Practical – I	3	2	100	100	100
	3	21UEL23WS01	WS-1: Electronics Workshop Practice - I	3	2	100	-	100
	3	21UEL23AC02	Allied: Mathematics for Electronics-II	6	4	100	100	100
	4	21UHE24AE02	**AECC-2:** Environmental Studies	2	2	50	50	50
	4	21UHE24VE02	Techniques of Social Analysis: Fundamentals of Human Rights	2	1	50	50	50
			Extra Credit Courses (MOOC)-1	-	(2)			
			Total	**30**	**21(2)**			
III	1	21UTA31GL03	General Tamil - III	4	3	100	100	100
		21UFR31GL03	French- III					
		21UHI31GL03	Hindi- III					
		21USA31GL03	Sanskrit- III					
	2	21UEN32GE03	General English - III	5	3	100	100	100
	3	21UEL33CC03	Digital Electronics	4	3	100	100	100
	3	21UEL33CC04	Electronic Circuits	4	3	100	100	100
	3	@	Electronics Practical – II	3	*			
	3	21UEL33AO03A	**Allied Optional:** Applied Physics-I	4	3	100	100	100
		21UEL33AO03B	**Allied Optional:** Computer Science-I					
		@	**Allied Optional:** Applied Physics-I Practical	2	-	-	-	-
		@	**Allied Optional:** Computer Science Practical					
	4	21UEL34SE01A	**SEC- 1 (WD):**Sound Engineering	2	1	100	-	100
		21UEL34SE01B	**SEC- 1 (WD):**Lab Equipment Maintenance and Servicing					
	4	21UHE34VE03A	Professional Ethics–I: Social Ethics - I	2	1	50	50	50

		21UHE34VE03B	Professional Ethics -I: Religious Doctrine-I					
			Extra Credit Courses (MOOC)-2		(2)			
			Total	**30**	**17(2)**			
IV	1	21UTA41GL04B	Scientific Tamil (SBS, SPS,SCS)	4	3	100	100	100
		21UFR41GL04	French-IV					
		21UHI41GL04	Hindi- IV					
		21USA41GL04	Sanskrit- IV					
	2	21UEN42GE04	General English - IV	5	3	100	100	100
	3	21UEL43CC05	Linear Integrated Circuits	4	3	100	100	100
	3	21UEL43CC06	Communication Electronics	4	3	100	100	100
	3	21UEL43CP02	CP 2: Electronics Practical - II	3	2	100	100	100
	3	21UEL43AO04A	**Allied Optional**: Applied Physics-II	4	3	100	100	100
		21UEL43AO04B	**Allied Optional**: Computer Science-II					
		21UEL43AP01A	**Allied Optional**: Applied Physics Practical	2	2	100	100	100
		21UEL43AP01B	**Allied Optional**: Computer Science Practical					
	4	21UEL44SE02	**SEC -2 (BS):**PC Assembling and Servicing	2	1	100	-	100
	4	21UHE44VE04A	Professional Ethics–II: Social Ethics - II	2	1	50	50	50
		21UHE44VE04B	Professional Ethics -II: Religious Doctrine-II					
			Total	**30**	**21**			
V	3	21UEL53CC07	Microprocessors and Applications	4	3	100	100	100
	3	21UEL53CC08	Sensors and Electronic Instrumentation	4	3	100	100	100
	3	21UEL53CP03	CP 3: Electronics Practical – III	6	3	100	100	100
	3	21UEL53ES01A	DSE-1: Mobile Communication	5	3	100	100	100
		21UEL53ES01B	DSE-1: Medical Electronics					
		21UEL53ES02A	DSE -2: C and Python Programming	5	3	100	100	100
		21UEL53ES02B	DSE -2: Computer Hardware and Networks					
	3	21UEL53IS01	Internship	-	2	100		100
	3	21UEL53SP01A	**Self-Paced Learning:** RF, Microwave and Optical Communications	-	2	50	50	50
		21UEL53SP01B	PCB Design and Fabrication					
	3	21UEL53FV01	Field Study/ Industrial Visit/ Case Study	-	1	100	-	100
	4	21USS54SE03	**SEC -3** : Soft Skills	2	1	100	-	100
	4	21UEL54EG01A	GE-1**:** Everyday Electronics	4	3	100	100	100
		21UEL54EG01B	GE-1: Wireless Communication					
			Extra Credit Courses (MOOC)-3		(2)			
			Total	**30**	**24(2)**			
VI	3	21UEL63CC09	Microcontroller and Embedded System	4	3	100	100	100
	3	21UEL63CC10	Power Electronics	4	3	100	100	100
	3	21UEL63CP04	CP 4: Electronics Practical – IV	6	3	100	100	100
	3	21UEL63ES03A	DSE-3: Control System	5	3	100	100	100
		21UEL63ES03B	DSE-3:Virtual Instrumentation					
	3	21UEL63ES04A	DSE-4**:** Robotics and Industrial Automation	5	3	100	100	100
		21UEL63ES04B	DSE-4: Digital Image Processing					
	3	21UEL63PW01	Project Work	-	2	100	100	100
	3	21UEL63CE01	Comprehensive Exam	-	2	50	50	50
	4	21UEL64SE04A	**SEC -4 (WS):**Consumer Electronics	2	1	100	-	100

		21UEL64SE04B	**SEC -4 (WS):** Industrial Electronics					
	4	21UEL64EG02A	**GE-2:**CCTV and Smart Security Systems	4	3	100	100	100
		21UEL64EG02B	**GE-2:** Entrepreneurial Electronics					
			Total	**30**	**23**			
I-VI	5	21UCW65OR01	Outreach Programme (SHEPHERD)	-	4			
			Total	**180**	**130(6)**			

@ Practical Exam will be conducted at even semester

*The courses with a scheme of Exam 50 in CIA and SE will be converted to 100 for grading.

SEC-2: BETWEEN SCHOOL 4th Semester							
Between schools (BS)- Offered to students of other schools (Except the school offering the course)							
Course Details					Scheme of Exams		
Offering Department	**Course Code**	**Course Title**	**Hr**	**Cr**	**CIA**	**SE**	**Final**
SBS							
Botany	21UBO44SE02	Mushroom Technology	2	1	100	-	100
SCS							
Computer Science	21UCS44SE02	Data Analysis Using Spreadsheet	2	1	100	-	100
Mathematics	21UMA44SE02	Numerical Ability	2	1	100	-	100
Statistics	21UST44SE02	Quantitative Methods	2	1	100	-	100
Information Technology	21UBC44SE02	Digital Artwork	2	1	100	-	100
SLAC							
English	21UEN44SE02	English for Competitive Examinations	2	1	100	-	100
History	21UHS44SE02	Historical Monuments in Tiruchirappalli	2	1	100	-	100
Tamil	21UTA44SE02A	மேடைப் பேச்சுக்கலை	2	1	100	-	100
Tamil	21UTA44SE02B	திரைப்படத் திறனாய்வும் குறும்பட உருவாக்கம்	2	1	100	-	100
SMS							
Commerce	21UCO44SE02A	Personal Finance Management	2	1	100	-	100
Commerce	21UCO44SE02B	Marketing Skills	2	1	100	-	100
Commerce	21UCO44SE02C	Event Planning and Management	2	1	100	-	100
Economics	21UEC44SE02	Financial Economics	2	1	100	-	100
BBA	21UBU44SE02A	Entrepreneurial Skills Enhancement	2	1	100	-	100
BBA	21UBU44SE02B	Practical Stock Trading	2	1	100	-	100
CommerceCA	21UCC44SE02	Practical Banking in India	2	1	100	-	100
SPS							
Chemistry	21UCH44SE02A	Health Chemistry	2	1	100	-	100
Chemistry	21UCH44SE02B	Industrial Chemistry	2	1	100	-	100
Physics	21UPH44SE02A	Weather Physics	2	1	100	-	100
Physics	21UPH44SE02B	Electrical Wiring	2	1	100	-	100
Electronics	21UEL44SE02	PC Assembling and Servicing	2	1	100	-	100

GENERIC ELECTIVE -1: 5th Semester							
Generic Elective Courses are designed for the students of other disciplines. (open to the students of other departments)							
Course Details					**Scheme of Exams**		
Offering Department	**Course Code**	**Course Title**	**Hrs**	**Cr**	**CIA**	**SE**	**Final**
SBS							
Botany	21UBO54EG01	Landscape Designing	4	3	100	100	100
SCS							
Computer Science	21UCS54EG01	Ethical Hacking	4	3	100	100	100
Mathematics	21UMA54EG01	Mathematics for Competitive Examinations	4	3	100	100	100
Statistics	21UST54EG01	Actuarial Statistics	4	3	100	100	100
Information Technology	21UBC54EG01	Fundamentals Of Data Science	4	3	100	100	100
SLAC							
English	21UEN54EG01	Film Studies	4	3	100	100	100
History	21UHS54EG01	Tamil Heritage and Culture	4	3	100	100	100
Tamil	21UTA54EG01	தமிழிலயக்கத்தில் மனித உரிமைகள்	4	3	100	100	100
SMS							
Commerce	21UCO54EG01A	Computerised Accounting	4	3	100	100	100
Commerce	21UCO54EG01B	Basics of Excel	4	3	100	100	100
Commerce	21UCO54EG01C	Personal Investment Planning	4	3	100	100	100
Economics	21UEC54EG01	Principles of Economics	4	3	100	100	100
Commerce CA	21UCC54EG01	E-commerce and E Business Management	4	3	100	100	100
BBA	21UBU54EG01A	Global Supply Chain Management	4	3	100	100	100
BBA	21UBU54EG01B	Start – Ups and Small Business Management	4	3	100	100	100
SPS							
Chemistry	21UCH54EG01A	Chemistry for Competitive Examinations	4	3	100	100	100
Chemistry	21UCH54EG01B	Everyday Chemistry	4	3	100	100	100
Physics	21UPH54EG01A	Everyday Physics	4	3	100	100	100
Physics	21UPH54EG01B	Renewable Energy Physics	4	3	100	100	100
Electronics	21UEL54EG01A	Everyday Electronics	4	3	100	100	100
Electronics	21UEL54EG01B	Wireless Communication	4	3	100	100	100

GENERIC ELECTIVE -2: 6th Semester							
Generic Elective Courses are designed for the students of other disciplines. (open to the students of other departments)							
Course Details					**Scheme of Exams**		
Offering Department	**Course Code**	**Course Title**	**Hrs**	**Cr**	**CIA**	**SE**	**Final**
SBS							
Botany	21UBO64EG02	Solid Waste Management	4	3	100	100	100
SCS							
Computer Science	21UCS64EG02	3D Printing and Design	4	3	100	100	100
Mathematics	21UMA64EG02	Analytical Skill for Competitive Examinations	4	3	100	100	100
Statistics	21UST64EG02	Applied Statistics	4	3	100	100	100
Information Technology	21UBC64EG02	Industry 4.0	4	3	100	100	100
SLAC							
English	21UEN64EG02	English for the Media	4	3	100	100	100
History	21UHS64EG02	Intellectual Revivalism in Tamil Nadu	4	3	100	100	100
Tamil	21UTA64EG02	சித்த மருத்துவம்	4	3	100	100	100
SMS							
Commerce	21UCO64EG02A	Rural Marketing	4	3	100	100	100
Commerce	21UCO64EG02B	Entrepreneurship Development	4	3	100	100	100
Commerce	21UCO64EG02C	Digital Marketing	4	3	100	100	100
Economics	21UEC64EG02	Economics for Competitive Exams	4	3	100	100	100
CommerceCA	21UCC64EG02	Total Quality Management	4	3	100	100	100
BBA	21UBU64EG02A	Personality Development	4	3	100	100	100
BBA	21UBU64EG02B	NGO Management	4	3	100	100	100
SPS							
Chemistry	21UCH64EG02A	Food And Nutrition	4	3	100	100	100
Chemistry	21UCH64EG02B	Waste Management	4	3	100	100	100
Physics	21UPH64EG02A	Laser Technology and its Application	4	3	100	100	100
Physics	21UPH64EG02B	Physics of Earth	4	3	100	100	100
Electronics	21UEL64EG02A	CCTV and Smart Security Systems	4	3	100	100	100
Electronics	21UEL64EG02B	Entrepreneurial Electronics	4	3	100	100	100

Semester	Course Code	Title of the Course	Hours/Week	Credits
I	21UTA11GL01	General Tamil - I	4	3

CO No.	CO–Statements இப்பாடத்தின் நிறைவில் மாணவர்கள்	Cognitive Levels (K –Levels)
CO–1	இக்கால இலக்கிய வகைகளைக் கண்டறிவர்	K1
CO–2	எழுத்து,சொல் இலக்கணங்களின் அடிப்படைகளைக் கண்டறிவர்	K1
CO–3	அயலகக் கவிதை வடிவங்களை விளங்கிக் கொள்வர்	K2
CO–4	மொழிபெயர்ப்புக் கவிதைகளின் வாயிலாக மொழிபெயர்ப்புத் திறனை வளர்த்தெடுப்பர்	K3
CO–5	புதுக்கவிதை வாயிலாக வெளிப்படும் சமூக, அரசியல் விழுமியங்களை மதிப்பிடுவர்	K4

அலகு - 1 **(12 மணிநேரம்)**

பாரதியார் கவிதைகள் - குயில்பாட்டு (குயில் தன் பூர்வ ஜன்மக் கதை உரைத்தல்)
பாரதிதாசன் கவிதைகள் - சஞ்சீவி பர்வதத்தின் சாரல்
உரைநடை - முதல் மூன்று கட்டுரைகள்

அலகு - 2 **(12 மணிநேரம்)**

வெ.இராமலிங்கனார் - சொல், தமிழன் இதயம்
முடியரசனார் - உயிர் வெல்லமோ, மனத்தூய்மை
பெருஞ்சித்திரனார் - அஞ்சாதீர், மொழி இனம் நாடு,
பட்டுக்கோட்டை
கல்யாணசுந்தரனார் - வருங்காலம் உண்டு, உழைக்காமல் சேர்க்கும் பணம்.
இலக்கணம் - எழுத்து
இலக்கிய வரலாறு - மூன்றாம் பாகம் - தண்டமிழ்த் தொண்டர்கள்

அலகு - 3 **(12 மணிநேரம்)**

சுரதா - நல்ல தீர்ப்பு
கண்ணதாசன் - ஒரு பானையின் கதை
அப்துல் ரகுமான் - வீடு
மேத்தா - ஒரே குரல்
இலக்கிய வரலாறு - மூன்றாம் பாகம் - இருபதாம் நூற்றாண்டு
இலக்கியவளர்ச்சி
சிறுகதை - முதல் ஐந்து சிறுகதைகள்

அலகு – 4 : அரசியல் கவிதைகள் **(12 மணிநேரம்)**

ஈரோடு தமிழன்பன் - அகல் விளக்காக இரு

ஆதவன் தீட்சண்யா - இன்னும் இருக்கும் சுவர்களின் பொருட்டு
சுகிர்தராணி - என் கண்மணியே இசைப்பிரியா
சக்தி ஜோதி - யுகாந்திர உறக்கம்
பழநிபாரதி - வெள்ளைக்காகிதம்
லிவிங் ஸ்மைல் வித்யா - நினைவில் பால்யம் அழுத்தம்
இலக்கணம் - சொல்

அலகு - 5 அயலகக் கவிதைகள் **(12 மணிநேரம்)**

ஓசே ரிசால் - விடைகொடு என் தாய் மண்ணே
ஹைபுன் கவிதைகள் - அறுவடை நாளின் மழை (மூன்று கவிதைகள்)
சிறுகதை - ஆறு முதல் பத்து சிறுகதைகள்
உரைநடை - நான்கு முதல் ஆறு கட்டுரைகள்

பாட நூல்கள்

1. **பொதுத்தமிழ்,** *செய்யுள் திரட்டு, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021*
2. **சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு,** *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017*
3. **நற்றமிழ்க் கோவை** (கட்டுரைத் தொகுப்பு). *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021*
4. **சிறுகதைத் தொகுப்பு** - ஒவ்வொரு கல்வியாண்டிற்கும் ஒவ்வொரு சிறுகதைத்தொகுப்பு
5. *(2021–2022* கல்வியாண்டுக்கு மட்டும்): **நல்லாசிரியர்**, சிறுகதைத் தொகுப்பு, - *தமிழாய்வுத்துறை, நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை, முதற்பதிப்பு, 2021*

Relationship matrix for Course outcomes, Programme outcomes / Programme Specific Outcomes

Semester	**Course code**			**Title of the Course**				**Hours/ week**		**Credits**
I	**21UTA11GL01**			**General Tamil - I**				**4**		**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO–1	**PO–2**	**PO–3**	**PO–4**	**PO–5**	**PSO–1**	**PSO–2**	**PSO–3**	**PSO–4**	**PSO–5**	
CO–1	2	1	2	2	3	3	3	2	3	2	2.3
CO–2	2	1	2	2	2	3	2	2	2	2	2.0
CO–3	2	1	2	2	3	3	3	2	3	2	2.3
CO–4	1	2	1	2	2	3	2	2	3	2	2.0
CO–5	1	1	2	2	3	3	3	2	3	2	2.2
Mean overall Score											**2.16 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
I	21UFR11GL01	FRENCH – I	4	3

CO No.	CO–Statements On successful completion of this course, students will be able to	Cognitive Levels (K –Levels)
CO–1	recall and spell the alphabets, numbers, colours, days of the week and months in French.	K1
CO–2	compare the definite and indefinite articles and its usages.	K2
CO–3	construct simple phrases by using 'er' verbs in present tense.	K3
CO–4	make use of correct terminology and introduce oneself in French.	K3
CO–5	distinguish between affirmative and negative phrases and take part in role play - conversation.	K4

Unit – I **(12 hours)**

TITRE:BONJOUR CA VA?
GRAMMAIRE : Les pronoms personnels sujets, les articles définis et indéfinis, Etre et avoir (verbes auxiliaires)
LEXIQUE : Saluer, Entrer en contact, demander et dire comment ça va ?, L'alphabet, les couleurs, les pays et les nationalités, les animaux domestiques.
PRODUCTION ORALE : Epeler son nom et son prénom, Comprendre des personnes qui se saluent.
PRODUCTION ECRITE : Les formules de politesse

Unit – II **(12 hours)**

TITRE:SALUT ! JE M'APPELLE AGNES
GRAMMAIRE : La conjugaison du 1er groupe, les adjectifs possessifs, la formation du féminin, la formation du pluriel.
LEXIQUE : Se présenter, Présenter quelqu'un, Remercier, Les jours de la semaine, les mois de l'année, les nombres de 0 à 69, la famille
PRODUCTION ORALE : Comprendre des informations essentielles
PRODUCTION ECRITE : Présentez –vous

Unit - III **(12 hours)**

TITRE:QUI EST-CE?
GRAMMAIRE : La phrase interrogative : Qu'est-ce que… ?/Qu'est-ce que c'est ?/Qui est-ce ?, quelques indicateurs du temps, la formation du féminin, les verbes aller et venir
LEXIQUE : Demander et répondre poliment,les professions
PRODUCTION ORALE : Parler de ses projets
PRODUCTION ECRITE : Ecrire de brefs messages

Unit - IV **(12 hours)**

TITRE:DANS MON SAC, J'AI?
GRAMMAIRE : la phrase négative, c'est/il est, les articles contractes, les pronoms personnels toniques
LEXIQUE : Demander des informations personnelles, Quelques objets, la fiche d'identité, les

nombres à partir de 70
PRODUCTION ORALE : Comprendre un message sur un répondeur téléphonique
PRODUCTION ECRITE : Remplir une fiche d'identité

Unit - V **(12 hours)**

TITRE:IL EST COMMENT? / ALLO?
GRAMMAIRE : les adverbes interrogatifs, les prépositions de lieu, les verbes du deuxième groupe, le verbe faire
LEXIQUE : Parler au téléphone, décrire quelqu'un, l'aspect physique, le caractère
PRODUCTION ORALE : Un jeu de rôle – la conversation téléphonique
PRODUCTION ECRITE : Décrivez votre aspect physique et votre caractère en quelques lignes

Book for Study

P. Dauda, L.Giachino and C.Baracco, *Generation A1*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2[e]edition, 2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A1*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers,2011

Web Resources

1. https://www.wikihow.com/Pronounce-the-Letters-of-the-French-Alphabet
2. https://francais.lingolia.com/en/grammar/tenses/le-present
3. https://www.lawlessfrench.com/grammar/articles/
4. https://www.frenchpod101.com/french-vocabulary-lists/10-lines-you-need-for-introducing-yourself
5. https://www.tolearnfrench.com/exercises/exercise-french-2/exercise-french-3295.php

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
I	21UFR11GL01			FRENCH – I				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	3	1	2	3	2	3	2	1	2	3	2.2
CO–2	3	3	3	2	2	2	1	2	2	3	2.3
CO–3	3	1	2	3	2	3	2	1	2	2	2.1
CO–4	2	2	3	2	1	3	2	1	2	3	2.1
CO–5	3	2	3	2	2	3	2	2	3	2	2.4
Mean overall Score											2.22 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UHI11GL01	HINDI- I	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO -1	list out the literary works in Hindi during the period of 12th century in India.	K1
CO -2	compare the vocabulary & expressions related to day-to-day conversation.	K2
CO -3	use simple Phrases from English to Hindi.	K3
CO -4	investigate the values of Indian society & summarize the duties of a citizen for his/her country.	K4
CO -5	identify the sentences in Hindi using basic grammar.	K4

Unit - I **(12 Hours)**

Dr. Abdul Kalam
Ling
Kabir Ke Dohe
Baathcheeth - Aspathal mein
Adhikal - Namakarn

Unit - II **(12 Hours)**

Vachan Badaliye
Thulasi ke Dohe
Adhikal - Samajik Paristhithiyam
Moun Hee Mantra Hai

Unit - III **(12 Hours)**

Sangya
Soordas ke Pad
Baathcheeth - Hotel mein
Adhikal - Sahithyik Paristhithiyam

Unit - IV **(12 Hours)**

Sarvanam
Rahim ke Dohe
Bathcheeth - Kaksha mein
Adhikal - Salient Features, Main Divisions

Unit - V **(12 Hours)**

Anuvad - 1
Visheshan
Bihari - Dohe
Bathcheeth - Kariyalay mein
Adhikal - Visheshathayem

Books for Study

1. M.kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta,2020.
   Unit-I *Chapters 2 and 3*
2. Viswanath Tripaty, *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi,2018.
   Unit-II, III and IV *Chapters 4 and 5*
3. Dr. Sanjeev Kumar Jain, *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, Madhya Pradesh 2019.
   Unit-V *Chapter 1*

Books for Reference

1. Dr.A.P.J.Abdul Kalam, Mere sapnom ka Bharath, Prabath Prakashan, Noida, 2020,
2. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.
3. Aravind Kumar, Sampoorna Hindi Vyakaran our Rachana, Lucent publisher, 2019.
4. Adhunik Hindi Vyakaran our Rachana, bharati bhawan publishers & distributors, 2018.
5. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.

Web Resources

1. https://youtu.be/LrdrcP2oiyU
2. https://youtu.be/Cib2FNv8KyA
3. https://youtu.be/aXARykpYCxA
4. https://youtu.be/RUDFis-tdg4
5. https://youtu.be/upivTmLTPQA

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
I	21UHI11GL01			HINDI - I					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	1	3	1	3	3	2	2.3
CO-2	2	2	3	3	1	3	2	3	3	2	2.4
CO-3	3	2	2	1	2	3	2	3	2	3	2.3
CO-4	3	2	1	3	2	3	2	3	3	2	2.4
CO-5	2	3	3	2	3	2	3	3	3	1	2.5
									Mean Overall Score		2.38 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21USA11GL01	SANSKRIT - I	4	3

CO No.	CO–Statements On successful completion of the course, the student will be able to	Cognitive Levels (K –Levels)
CO-1	remember and Recall words relating to objects.	K1
CO-2	understand classified vocabulary.	K2
CO-3	apply nouns and verbs.	K3
CO-4	analyze different forms of names and verbs.	K4
CO-5	appreciate the good saying of Sanskrit Improve the self-values.	K5

Unit - I **(12 Hours)**

Samyakthakshatra pada paricaya

Unit - II **(12 Hours)**

Vartmanakala prayogaha

Unit - III **(12 Hours)**

Samskruta varathamanakalaha

Unit - IV **(12 Hours)**

Shadha priyoghaa aakaarnta ikaraantha ukarantha

Unit - V **(12 Hours)**

Subhashitani manoharani Dasaslokani

Book for Study

Shaptamanjari , K.M.,Saral Snakrit Balabodh , Bharathiya Vidya Bhavan , Munushimarg Mumbai – 4000 007 2018, 2019

Books for Reference

1. Kulapathy , K.M.,Saral Snakrit Balabodh , Bharathiya Vidya Bhavan , Munushimarg Mumbai – 4000 007 2018
2. R.S.Vadhar & Sons , Book – Sellers and publishers , Kalpathi.Palgahat 678003, Kerala South India , Shabdha Manjari 2019

3. Balasubramaniam R, Samskrita Akshatra Siksha , Vangals Publications, 14th Main road JP Nagar , Bangalore – 78

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
I	21USA11GL01			SANSKRIT- I				4		3
Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	1	1	3	2	3	2	3	2	2	2.2
CO-2	2	2	3	3	1	2	2	3	3	2	2.3
CO-3	3	2	2	2	2	2	2	3	3	2	2.3
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean Overall Score											2.34
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
I	**21UEN12GE01**	**GENERAL ENGLISH - I**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	recall what they observe and experience	**K1**
CO-2	arrange different parts of a text in a coherent manner	**K2**
CO-3	examine the underlying meaning in a text	**K3**
CO-4	analyse and evaluate letters regarding the use of appropriate language and format	**K4 & K5**
CO-5	use conversational English to communicate with friends	**K6**

Unit-I **(15 Hours)**

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I Doing?
09. What was I Doing?
10. Unscramble the Past Actions
11. What did I Do Yesterday?

Unit-II **(15 Hours)**

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Forms of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit-III **(15 Hours)**

22. Plural Forms of Action Words
23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds
27. Indefinite Articles

28. Un/Countable Practice
29. Match the Visual
30. Letter Spell-Check
31. Drafting a Letter

Unit-IV **(15 Hours)**

32. Friendship Word Grid
33. Friends' Details
34. Guess the Favourites
35. Guess Your Friend
36. Friends as Guests
37. Introducing Friends
38. What are We Doing?
39. What is (S)He / are They Doing?
40. Yes / No Question
41. What was S/He Doing?
42. Names and Actions
43. True Friendship
44. Know Your Friends
45. Giving Advice/Suggestions
46. Discussion on Friendship
47. My Best Friend

Unit-V **(15 Hours)**

48. Kinship Words
49. The Odd One Out
50. My Family Tree
51. Little Boy's Request
52. Occasions for Message
53. Words Denoting Place
54. Words Denoting Movement
55. Phrases for Giving Directions
56. Find the Destination
57. Giving Directions Practice
58. SMS Language
59. Converting SMS
60. Writing Short Messages
61. Sending SMS
62. The Family Debate
63. Family Today

Book for Study

Joy, J.L., and Peter, F.M. *Let's Communicate 1*. New Delhi, Trinity P, 2014.

Books for Reference

1. Ahrens, Sönke. *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. New York: Create Space, 2017.
2. Aspinall, Tricia. *Test Your Listening.* London: Pearson, 2002.
3. Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2004.
4. Fitikides, T.J. *Common Mistakes in English* (6th ed.). London: Longman, 2002.

5. Wainwright, Gordon. *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall* (3rd ed.). Oxford: How to Books, 2007.

Web Resources

1. https://learnenglish.britishcouncil.org/
2. https://oneminuteenglish.org/en/best-websites-learn-english/
3. https://www.dailywritingtips.com/best-websites-to-learn-english/

Relationship Matrix for Course Outcomes, Programme Outcomes, and Programmes Specific Outcomes

Semester	Course Code			Title of the Course						Hours	Credit
I	21UEN12GE01			GENERAL ENGLISH – I						5	3
Course Outcome (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO -1	2	3	2	2	3	2	3	2	3	2	2.4
CO -2	2	2	3	2	3	3	2	3	2	2	2.3
CO -3	2	3	2	3	2	2	3	2	3	2	2.4
CO -4	2	2	3	2	3	3	2	3	2	3	2.5
CO -5	2	2	2	3	2	2	2	3	2	2	2.2
									Mean Overall Score		2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UEL13CC01	CORE -1:SEMICONDUCTOR THEORY AND ELECTRONIC DEVICES	7	5

CO.NO.	CO- statements	Cognitive Levels (K- level)
On completion of this course, students would be able to		
CO-1	describe various passive and active electronic components	K1
CO-2	discuss and demonstrate the functioning of passive and active electronic devices	K2, K3
CO-3	solve the circuit issues by employing theory of components and modern tools.	K3, K4
CO-4	assess the need of modern society with professional ethics in Electronics and recommend solutions for the same	K5
CO-5	design and construct the simple Electronics projects using diodes and transistors.	K6

UNITI: SEMICONDUCTOR PHYSICS (21Hours)

Semiconductor Materials - Types of Solids- Space Lattices- Crystal Structure- Crystal Planner and Miller Indices- Formation of Energy Bands - Electrical Conduction in Solids - Energy Band and Band Model - Classification of Materials Based on Band Theory – Semiconductor Materials - Intrinsic Semiconductors -Extrinsic Semiconductors– Drift and Diffusion Currents – Excess Carriers - Density of States - Fermi Function Carrier Distribution - Electron and Hole Concentration - np Product- Carrier Concentration Calculations- Fermi Level Determination - Band Bending - Carrier Generation and Recombination (concept only) - Continuity Equations - Minority Carrier Lifetime – Diffusion Length

UNIT II: PASSIVE ELEMENTS (21Hours)

Resistance - Resistor Color Code – CalculatingResistor Value - Resistor Parameters - Connecting Resisters Together - Capacitance and Charge - Dielectric Materials of a Capacitor - Voltage Rating of a Capacitor - Energy Stored in Capacitors -Types of Capacitors- Characteristics of Capacitors - Charging and Discharging of a Capacitor - Capacitor in Parallel- Capacitor in Series -Construction of Inductor –Inductance-Factors Affecting Inductance -Time Constant of an Inductor-Power and Energy in an Inductor- Inductor in Series and Parallel-Self Inductance -Mutual Induction -Working Principle of Transformer

UNIT III: SEMICONDUCTOR DIODES (21Hours)

Introduction PN-junction - Barrier Potential - Basic Diode Circuit – Ideal Diode- Diode Testing– DC Resistance of Diode – Unbiased Diode – Forward Bias – Breakdown – Reverse Biased Diode - Zero Applied Bias - Reverse Applied Bias - Nonuniformly Doped Junctions - PNJunction Current - Small-Signal Model of pn Junction- Charge Storage and Diode Transients - Tunnel Diode -Special Purpose Diodes - ZenerDiode - SchottkyDiode - Varactor Diode - Step Recovery Diode - GunnDiode

UNIT IV: TRANSISTORS (21Hours)

PNP and NPN Transistors-Transistor Characteristics- Unbiased Transistors-Biased Transistor-Transistor Current– CE, CB and CC Configurations – Base Curve- Collector Curve- Surface Mount Transistors- Variations in Current Gain - Load Line –Darlington Pair – JFET Construction –Characteristics – MOSFET: Types and Characteristics - Nonideal Effects - High Electron Mobility Transistor

UNIT V: OPTO ELECTRONIC DEVICES (21Hours)

LED: Types - Construction – Principle of Operation - Calculating an LED Resistor Value – Advantages and Disadvantages of LED – LCD: Construction and Working – Photodiode - Construction -Working Principle - Photo Transistor - Working Principle - PIN Diode - Solar Cell – Operation – Lasers Diodes – Applications Optoelectronic Devices

BOOK FOR STUDY:

1. Donald A Neamen,*SemiconductorPhysics and Devices*, 4thEdition, McGraw Hill Higher Education, 2012.
2. Albert Malvino, *Electronics Principles*, 8thEdition,McGrawHill Education,2014.
3. R.Y. Borse, *Basic Electronic Passive Components*, 1st Edition, AdhyayanPublishers and Distributors -New Delhi, 2014.

Unit	Book	Chapter	Sections
I	1	1,3,4,5	1.1, 1.2, 1.3, 3.1, 3.2, 3.2.1, 3.2.5, 4.1,4. 3, 5.1, 5.2
II	3	1,2,3	1.1,1.1.1, 1.11, 1.13, 1.6, 1.6.2, 2.3, 2.5, 2.9, 2.10, 2.13-2.14, 3.2-3.5, 3.7, 3.18-3.19 (lecture notes – Self-inductance)
III	1 2	7, 8, 15 2, 3,5	7.1-7.3 8.1,8.3-8.5,15.1-15.2 3.1-3.8, 2.8 -2.14, 5.1-5.4, 5.10 -5.12
IV	2	6,9,11, 12	6.1 - 6.6, 6.9-6.11, 9.6, 11.1 -11.3, 12.1 -12.4
V	1	14	14.2-14.3, 14.5-14.6, (Lecture notes -LCD)

Book for Reference:

1. TharejaB.L. *BasicElectronics*, 3rd Edition, S. Chand and Co., 2012.
2. David Bell, *Electronic Devices and Circuits*, 5th Edition, Oxford, 2009.
3. Mehta V.K, *Principles of Electronics*, 11th Edition, S. Chand & Co., 2008.
4. Forrest. M. Mims, *Getting Started in Electronics*, E-book

Web References:

1. https://www.instructables.com/Basic-Electronics/
2. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.html
3. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html

Relationship Matrix for Course Outcomes, Programme Outcomes, and Programmes Specific Outcomes

Semester	Course Code			Title of the Course				Hours	Credit	
I	21UEL13CC01			CORE -1:SEMICONDUCTOR THEORY AND ELECTRONIC DEVICES				7	5	
Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	1	3	3	3	2	2	2.4
CO-2	3	3	3	2	1	3	2	2	2	2	2.3
CO-3	3	3	3	2	2	3	2	3	2	2	2.5
CO-4	3	3	2	2	2	3	3	2	2	2	2.4
CO-5	3	3	2	2	1	3	3	2	3	2	2.4
Mean Overall Score											2.4
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
I	21UEL13AC01	ALLIED: MATHEMATICS FOR ELECTRONICS-I	6	4

CO. No.	CO- Statements On successful completion of this course, students will be able to	Cognitive Levels (K-levels)
CO-1	acquire knowledge of matrices, differential equations and statistical methods.	K1
CO-2	understand the basic concepts of matrices and techniques in differential equations and various tools of statistics.	K2
CO-3	apply the various method in real life problems.	K3
CO-4	illustrate methods with suitable examples.	K4
CO-5	evaluate the solution of system of linear equations, differential equations, Eigen values and Eigen vectors of a matrix.	K5

Unit-I **(18 Hours)**

Solutions of system of linear equations – Using Cramer's rule- Eigen values and Eigen vectors of a matrix – Cayley Hamilton's Theorem (Without proof).

Unit-II **(18 Hours)**

Second order differential equations – all the types of equations including Constant coefficients and particular integral when X is of the form x, sinax and cosax.

Unit-III **(18 Hours)**

Measures of Central tendency: Mean, Median, Mode (Direct method only) – Measures of variation: Range, Standard deviation.

Unit-IV **(18 Hours)**

Probability – Conditional probability – Baye's theorem (Problems only)

Unit-V **(18 Hours)**

Applications of Binomial distributions, Poisson distributions, Normal Distributions. (Problems only).

Books for Study:

1. M.K. Venkataraman, "**Engineering Mathematics (Vol II)**", Third Edition, the National Publishing Co., Madras, 1988.

Unit I: *Chapter I (pages 40-43,131-138,152-156)*

Unit II: *Chapter (pages 534-570)*

2. R.S.N. Pillai and Bagavathi, "**Statistics- Theory and Practice**", S. Chand and Co. Ltd., New Delhi 2014.

Unit III: *Chapter 9(Pages 124 – 170) Chapter 10(pages 241-245,259-267)*

Unit IV: *Chapter 18(Pages 737-768)*

Unit V: *Chapter 19(Pages 769-802)*

Books for Reference:

1. S. Narayanan and T.R. Manickavasagampillai,"Ancillary Mathematics, Book II", 1999 Edition.
2. P.R. Vittal, "Mathematical Statistics", Margham Publications, Chennai, 2004.
3. J.N. Kapur and H.C. Saxena,"Mathematical Statistics 20th Edition", S. Chand & Co Ltd. NewDelhi,2010.

Relationship Matrix for Course Outcomes, Programme Outcomes, and Programmes Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
I	21UEL13AC01	ALLIED: MATHEMATICS FOR ELECTRONICS-I	6	4

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	2	3	2.4
CO-2	2	3	2	1	2	3	3	2	2	3	2.3
CO-3	1	2	3	2	3	2	3	2	3	2	2.3
CO-4	1	2	2	3	2	2	3	2	2	3	2.2
CO-5	1	2	2	2	3	1	3	2	2	3	2.1
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UHE14VE01	ESSENTIALS OF HUMANITY	2	1

CO.No	CO – Statements	Cognitive Levels (K-levels)
	On completion of this course, the graduates will be able to:	
CO-1	recall the prescribed values and their dimensions	K1
CO-2	examine themselves by learning the developmental changes happening in the course of their life time	K2
CO-3	apply the trained values in their day today life	K3
CO-4	analyze themselves as responsible men and women	K4
CO-5	create a constructive approach to life	K5 & K6

Unit-I Principles of Value Education (6 Hours)

Introduction to values - Characteristics and Roots of Values - Value Education & Value Clarification - Moral Characters - Kinds of Values - Objectives of Values.

Unit-II The Development of Human Personality (6 Hours)

Personality: Introduction, Theories, Integration &Factors influencing the development of personality - SEL Series - Discovering self - Defense Mechanism - Power of positive thinking - Why worry?

Unit-III The Dimensions of Human Development (6 Hours)

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development

Unit-IV Responsible Parenthood (6 Hours)

Human sexuality - Marriage and Family - Sex and Love - Characteristics of Responsible parent - Causes of Marriage disharmony - Art of wise parenting.

Unit-V Gender Equality and Empowerment (6 Hours)

Historical perspective - Women in Independence struggle - Women in Independent India - Education & Economic development - Crimes against Women - Women rights - Time-line of Women Achievements in India

Books for Study:

1. Department of Human Excellence. *Essentials of Humanity*, St. Joseph's College, Tiruchirappali-02, 2021.

Books for Reference:

1. Alphonse Xavier Dr SJ. *You Shall Overcome*,(6th Ed.) Chennai: ICRDCE Publication, 2012.
2. Alex K. *Soft Skills*, New Delhi: S. Chand, 2009.
3. Kalam Abdul APJ. *You Are Unique*, Bangalore: Punya Publishing, 2012.

Web Sources:

http://livingvalues.net. Accessed 05 Mar. 2021.

https://www.apa.org/topics/personality#. Accessed 05 Mar. 2021.

https://www.peacecorps.gov/educators/resources/global-issues-gender-equality-and-womens-empowerment/. Accessed 05 Mar. 2021.

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UTA21GL02**	**General Tamil - II**	**4**	**3**

CO No.	CO- Statement	Cognitive Level (K- level)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	தமிழிலக்கிய வரலாற்றில் சைவ, வைணவ இலக்கியங்கள் பெறும் இடத்தை அறிந்துகொள்வர்	**K 1**
CO-2	அகப்பொருள், புறப்பொருள் இலக்கணங்களின் அடிப்படை அறிவைப் பெறுவர்.	**K 1**
CO-3	காப்பியச் சுவையை மாணவர்கள் புரிந்துகொள்வர்	**K 2**
CO-4	இஸ்லாமிய இலக்கியச் சிந்தனைகளைப் பெறுவர்	**K 3**
CO-5	கிறித்தவ மதிப்பீடுகளைச் சிற்றிலக்கிய வகைகளின் வழியாகத் திறனாய்வர்.	**K 4**

அலகு - 1 **(12 மணிநேரம்)**

சிலப்பதிகாரம் - கனாத்திறம் உரைத்த காதை
மணிமேகலை - ஆபுத்திரன் திறம் அறிவித்த காதை
இலக்கிய வரலாறு - சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.
இலக்கணம் - அகப்பொருள் இலக்கணம்

அலகு - 2 **(12 மணிநேரம்)**

திருவாசகம் - திருச்சாழல்
சிவவாக்கியார் பாடல்கள் - *25* பாடல்கள் *(04, 14, 16, 22, 27, 33, 34, 35, 36,37, 38, 47, 81, 91, 225, 237, 242, 495, 504, 520,522, 533, 534, 536, 548.)*

அலகு - 3 **(12 மணிநேரம்)**

நாலாயிர திவ்வியப் பிரபந்தம்- அமலானாதிபிரான் *(10* பாடல்கள்*)*
- பெருமாள் திருமொழி *(11* பாடல்கள்*)*
கம்பராமாயணம் - கைகேயி சூழ்வினைப்படலம்
உரைநடை - *7* முதல் *9* முடிய உள்ள கட்டுரைகள்

அலகு - 4 **(12 மணிநேரம்)**

சீறாப்புராணம் - உடும்பு பேசிய படலம்
இலக்கணம் - புறப்பொருள் இலக்கணம்
இலக்கிய வரலாறு - தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய

அலகு - 5 **(12 மணிநேரம்)**

திருக்காவலூர்க் கலம்பகம் - சமூக உல்லாசம்
உரைநடை - *10* முதல் *12* வரையிலான கட்டுரைகள்

பாடநூல்கள்:

1. **பொதுத்தமிழ் - செய்யுள் திரட்டு**, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி. திருச்சிராப்பள்ளி, முதற்பதிப்பு, *2021*
2. **சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு,** *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017*
3. **நற்றமிழ்க் கோவை** (கட்டுரைத் தொகுப்பு). *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி,* முதற்பதிப்பு, *2021*

Semester	**Course Code**			**Title of the Course**						**Hours**	**Credit**
II	**21UTA21GL02**			**General Tamil - II**						**4**	**3**
Course Outcomes (Cos)	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	
CO-1	**2**	**2**	**1**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2.1**
CO-2	**2**	**1**	**2**	**2**	**3**	**3**	**2**	**2**	**3**	**2**	**2.2**
CO-3	**2**	**1**	**2**	**2**	**3**	**3**	**2**	**2**	**3**	**2**	**2.2**
CO-4	**1**	**1**	**2**	**2**	**3**	**3**	**2**	**2**	**3**	**2**	**2.1**
CO-5	**1**	**1**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2.1**
Mean Overall Score											**2.14 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UFR21GL02**	**FRENCH – II**	**4**	**3**

CO No.	CO–Statements On successful completion of this course, students will be able to	Cognitive Levels (K –Levels)
CO–1	relate pronominal verbs in expressing one's day today activity.	**K1**
CO–2	compare the different types of articles.	**K2**
CO–3	construct texts using pronouns – passages and dialogues.	**K3**
CO–4	discover the food habits of the French culture.	**K4**
CO–5	appraise the French fashion.	**K5**

Unit - I **(12 hours)**

TITRE:LES LOISIRS
GRAMMAIRE : les adjectifs interrogatifs, les nombres ordinaux, les verbes pronominaux
LEXIQUE : les différentes activités quotidiennes,les loisirs, les activités quotidiennes, les matières
PRODUCTION ORALE : parler sur votre passe-temps
PRODUCTION ECRITE : décrire sa journée

Unit -II **(12 hours)**

TITRE:LA ROUTINE
GRAMMAIRE : les pronoms personnels COD, les verbes du premier groupe en e/er/eler/eter, le verbe prendre
LEXIQUE : exprimer ses gouts et ses préférences, le temps, l'heure, la fréquence
PRODUCTION ORALE : savoir comment dire l'heure
PRODUCTION ECRITE : écrire vos préférences en quelques lignes

Unit - III **(12 hours)**

TITRE:OU FAIRE SES COURSES?
GRAMMAIRE : les articles partitifs, le pronom en (la quantité), très ou beaucoup
LEXIQUE : inviter et répondre à une invitation, les commerces et les commerçants, demander et dire le prix, les quantités
PRODUCTION ORALE : faire des courses pour une soirée
PRODUCTION ECRITE : écrire un message en acceptant l'invitation

Unit - IV **(12 hours)**

TITRE:DECOUVREZ ET DEGUSTEZ
GRAMMAIRE : l'impératif, il faut, les verbes devoir, pouvoir, savoir,vouloir
LEXIQUE : Commander et commenter sur un plat de la carte,les aliments, les services, les moyens depaiement
PRODUCTION ORALE : Jeu de rôle – au restaurant (entre vous et le garçon)
PRODUCTION ECRITE : faire une comparaison avec la carte française et indienne

Unit - V **(12 hours)**

TITRE:TOUT LE MONDE S'AMUSE/ LES ADOS AU QUOTIDIEN
GRAMMAIRE : les adjectifs démonstratifs, le pronom indéfini on, le futur proche, le passé composé, les verbes en –yer, voir et sortir
LEXIQUE : connaitre les marques connues sur les vêtements, les sorties, situer dans le temps, les vêtements et les accessoires
PRODUCTION ORALE : décrire une tenue
PRODUCTION ECRITE : écrire une lettre amicale, une carte postale

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A1*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2^{e}edition,2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A1*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Web Resources

1. https://www.frenchtoday.com/blog/french-verb-conjugation/french-reflexive-verbs-list-exercises/
2. https://www.fluentu.com/blog/french/french-subject-pronouns/
3. https://grammarist.com/french/french-partitive-article/
4. https://www.talkinfrench.com/guide-french-food-habits/
5. https://www.fluentu.com/blog/french/talking-about-clothes-in-french/

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
II	21UFR21GL02			FRENCH – II				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	3	3	3	3	1	3	1	2	2	2	2.2
CO–2	2	1	2	3	2	3	1	2	2	2	2.0
CO–3	3	2	3	2	2	3	3	1	3	2	2.4
CO–4	3	2	2	1	3	3	3	1	1	3	2.2
CO–5	2	1	2	2	3	3	3	2	2	2	2.2
Mean overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UHI21GL02**	**HINDI - II**	**4**	**3**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO -1	Find out the Terms & Expressions related to letter writing	**K1**
CO -2	Explain the works of Hindi writers	**K2**
CO -3	Complete the sentences in Hindi using basic grammar	**K3**
CO -4	Analyze the social & political conditions of Devotional period in Hindi Literature	**K4**
CO -5	Justify the human values stressed on the works of the following authors “Premchand, Nirala, etc.”	**K5**

Unit - I **(12 Hours)**

Kafan
Letter Writing - Chutti Patra
Bakthikal - Namakarn
Sarkari kariyalayom ka naam

Unit - II **(12 Hours)**

Baathcheeth - Dookan mein
kriya
Letter Writing - Rishthedarom ko patra
Bakthikal - Samajik Paristhithiyam

Unit - III **(12 Hours)**

Vah Thodthi patthar
Adverb
Letter Writing - Naukari keliye Avedan Patra
Bakthikal - Sahithyik Paristhithiyam

Unit - IV **(12 Hours)**

Mukthi
Samas
Letter Writing - Kitab Maangne Keliye Patra
Bakthikal - Salient Features, Main Divisions

Unit - V **(12 Hours)**

Anuvad - 2
Sandhi
Letter writing - Nagarpalika ko Patra
Bakthikal - Visheshathayem

Books for Study

1. Viswanath Tripaty, *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi, 2018.
   Unit-I *Chapter 1*
2. M.kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
   Unit-II, III and IV *Chapter 2*
3. Dr.Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
   Unit-V *Chapter 4*

Books for Reference

1. Adhunik Hindi Vyakaran our Rachana, bharati bhawan publishers & distributors, 2018.
2. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.
3. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.
4. Aravind Kumar, Sampoorna Hindi Vyakaran our Rachana, Lucent publisher, 2019.
5. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.

Web Resources

1. https://youtu.be/tE2RHQcqlbI
2. https://youtu.be/Xxvco3qa284
3. https://youtu.be/1z8x95IFGi4
4. https://youtu.be/CBMYf8NRLW4
5. https://youtu.be/h31tMLeFtHs

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Paper					Hours	Credits
II	21UHI21GL02			HINDI - II					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	3	2	2	3	3	3	2	2	2.5
CO-2	1	3	1	2	2	3	3	3	2	3	2.3
CO-3	3	2	3	2	2	3	2	3	2	2	2.4
CO-4	2	3	3	1	3	2	3	2	1	2	2.2
CO-5	3	2	2	2	3	2	3	2	3	2	2.4
Mean Overall Score											2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	21USA21GL02	SANSKRIT - II	4	3

CO No.	CO–Statements On successful completion of the course, the student will be able to	Cognitive Levels (K –Levels)
CO-1	remembering names of different objects , remembering different verbal forms and sandhi.	K1
CO-2	contrast different verbal forms Explain good sayings , Relate good saying to life.	K2
CO-3	apply and build small sentences.	K3
CO-4	analyze different forms of Verbs and nouns.	K4
CO-5	appreciate subhashitas and Sanskrit poetry Expand Sanskrit vocabulary.	K5

Unit - I **(12 Hours)**

Asmath usmath tat kim (MFN)

Unit - II **(12 Hours)**

Sandhi Niyamaaha Abuyaasha (Guna , Visarga , Dirgha , Vrddhi)

Unit - III **(12 Hours)**

Lang lakaaraha Kriyapadaani

Unit - IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 –15)

Unit - V **(12 Hours)**

Suvachana Prayogha

Book for Study

SARALASAMKRITHAM SIKSHA, 2020 , K.M Saral sankrit Balabodh , Bharathiys Vidya Bhavan , Munshimarg Mumbai – 400007, 2018

Books for Reference

1. Paindrapuram Ashram , Srirangam – 620006 Gopalavimshanthi 2019
2. R.S.Vadhyar & Sons book Kulapthy , K.M Saral sankrit Balabodh , Bharathiys Vidya Bhavan , Munshimarg Mumbai – 400007, 2018

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code		Title of the Course			Hours		Credit			
II	21USA21GL02		SANSKRIT -II			4		2			
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	1	3	2	2	2	3	3	2	1	2.1
CO-2	3	2	3	2	2	3	2	3	3	2	2.5
CO-3	2	2	3	2	2	2	2	3	3	1	2.1
CO-4	3	2	3	3	1	2	3	3	3	1	2.4
CO-5	3	2	2	2	3	2	2	3	3	1	2.3
Mean Overall Score											2.28
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UEN22GE02**	**GENERAL ENGLISH - II**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	remember the use of suitable punctuation marks in appropriate places	**K1**
CO-2	describe their pictures with appropriate expressions	**K2**
CO-3	infer meaning from the given context	**K3**
CO-4	analyse real-life situations and ask open-ended questions	**K4 & K5**
CO-5	use polite expressions in appropriate ways	**K6**

Unit-I **(15 Hours)**

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The Best Monosyllabic Comparison
09. The Best Di/Polysyllabic Comparison
10. Practising Quality Words

Unit –II **(15 Hours)**

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role Play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

Unit-III **(15 Hours)**

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humourous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

Unit-IV **(15 Hours)**

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Word Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
48. Emailing an Application
49. Mock Interview

Unit-V **(15 Hours)**

50. Society Word Grid
51. Classify Society Wordlist
52. Rearrange the Story
53. Storytelling
54. Story Cluster
55. Words Denoting Time
56. Expressing Time
57. What Can You Buy?
58. Noise Pollution
59. Positive News Headlines
60. Negative News Headlines
61. Matching Conditions
62. What Would You Do?
63. If I were Elected
64. My Dream Country

Book for Study

Joy, J.L. & Peter, F.M. *Let's Communicate 2*, New Delhi: Trinity Press, 2014.

Books for Reference

1. Ahrens, Sönke. *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. New York: CreateSpace, 2017.
2. Aspinall, Tricia. *Test Your Listening.* London: Pearson, 2002.
3. Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2004'
4. Fitikides, T.J. *Common Mistakes in English* (6th ed.). London: Longman, 2002
5. Wainwright, Gordon. *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall* (3rd ed.). Oxford: How to Books, 2007.

Web Resources

1. https://learnenglish.britishcouncil.org/
2. https://oneminuteenglish.org/en/best-websites-learn-english/
3. https://www.dailywritingtips.com/best-websites-to-learn-english/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course					Hours	Credits
II	21UEN22GE02	GENERAL ENGLISH - II					5	3

Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
									Mean Overall Score		2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UEL23CC02**	**CORE -2: ELECTRIC CIRCUIT ANALYSIS**	**5**	**4**

CO.NO.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe and write Network Theorems and Circuit concepts	**K1**
CO-2	discuss and predict the appropriate electric circuits to the need	**K2**
CO-3	illustrate and usethe electric circuits in real time applications	**K3**
CO-4	investigate and explain the responses of AC and DC circuits	**K4**
CO-5	recommend, design and construct Electrical Circuits for ecofriendly environment with energy saver mode.	**K5, K6**

UNITI: CIRCUIT ANALYSIS (15 Hours)

The Circuit – Ohm's Law - Kirchhoff's Voltage Laws – Voltage Division – Power in Series Circuit - Kirchhoff's Current Law – Current Division – Power in a Parallel Circuit – Tree and Co-tree – Incidence Matrix and KCL - Cut-Set and Tree Branch Voltages – Mesh Analysis – Nodal Analysis.

UNITII: NETWORK THEOREMS (15 Hours)

Star-Delta Transformation - Superposition Theorem - Thevenin's Theorem - Norton's Theorem – Reciprocity Theorem – Compensation Theorem - Maximum Power Transfer Theorem - Duals and Duality - Sample Problems.

UNITIII: SERIES AND PARALLEL A.C. CIRCUITS (15 Hours)

Purely Resistive- Inductive and Capacitive A.C. Circuit – R-L Series A.C Circuit – R-C Series A.C. Circuit – R-L-C Series A.C. Circuit – Series Resonance – Q-factor – Bandwidth and Selectivity – Power in A.C. Circuits – Power Triangle and Power Factor – R-L Parallel A.C. Circuit – R-C Parallel A.C.Circuit – L-C Parallel A.C.Circuit – L-R-C Parallel A.C.Circuit - Three Phase Supply – Star Connection – Delta Connection – Power in Three-Phase System – Measurement of Power in Three-Phase Systems – Comparison of Star and Delta Connection.

UNITIV: STEADY STATE AND TRANSIENT RESPONSE OF CIRCUITS (15Hours)

Steady State and Transient Response – DC Response of an R-L Circuit – DC Response of an R-C Circuit – DC Response of an R-L-C Circuit – Practice Problems – Sinusoidal Response if an R-L Circuit – Sinusoidal Response of an R-C Circuit – Sinusoidal Response of an R-C Circuit – Sinusoidal Response of an R-L-C Circuit – Simple Problems.

UNIT-V: COUPLED CIRCUITS (15 Hours)

Conductivity Coupled Circuit and Mutual Impedance – Mutual Inductance – Dot Convention - Coefficient of Coupling – Analysis of Multi-Winding Coupled Circuits – Tuned Circuits – SimpleProblems.

Book for Study

1. A.Sudhakar, Shymmohan S Palli, *Circuits and Networks Analysis and Synthesis*, 5th Edition, Tata McGraw Hill Publishing Company Ltd, 2017.
2. John Bird, *Electrical Circuit Theory and Technology*, 4th Edition, Elsevier Ltd. 2010

Unit	Book	Chapter	Sections
I	1	1,2	1.4, 1.9 - 1.15, 2.2, 2.6, 2.12
II	1	3	3.1 – 3.8
III	2	15,16,19	15.1 - 15.11, 16.1 – 16.7,19.2 - 19.7
IV	1	11	11.1 – 11.7
V	1	10	10.2 -10.5, 10.7, 10.10

BOOKS FOR REFERENCE:

1. Paranjothi, S.R, *Electric Circuit Analysis*, 4th Edition, New AgeInternational, 2011.
2. B.L.Theraja, A.K.Theraja,*A Textbook of Electrical Technology*, S.Chand and Company Ltd, 2005.
3. Robert L. Boylstad, *Introductory Circuit Analysis*, 13thEdition, Pearson, 2015.

Web References:

1. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic
2. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic/ee-dc-circuit-analysis/a/ee-circuit-analysis-overview
3. https://www.circuitbasics.com/circuit-analysis/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	**Course Code**	**Title of the Course**						**Hours**	**Credit**
II	**21UEL23CC02**	**CORE -2: ELECTRIC CIRCUIT ANALYSIS**						**5**	**4**
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	2	3	3	3	2	2	2.5
CO-2	3	3	2	2	2	3	3	3	2	2	2.5
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	2	2	2	2	2	3	3	3	2	2	2.3
CO-5	2	2	2	2	2	3	2	3	2	2	2.2
									Mean Overall Score		**2.4**
									Result		**High**

Semester	Course Code	Title of the Course	Hours	Credits
II	21UEL23CP01	CP-1: ELECTRONICS PRACTICAL - I	3	2

List of Experiments (Any sixteen experiments)

1. Verification of ohm's law
2. Study of Series and parallel connection of resistance in circuits
3. Study of series and parallel connection of capacitor in circuits.
4. Study of RC time constant using DC source
5. Study of Diode characteristics
6. Study of Zener Diode characteristics
7. Study of Transistor characteristics
8. Study of opto electronic devices (photodiode, phototransistor, LDR, LED)
9. Verification of Kirchhoff's voltage law
10. Verification of Kirchhoff's current law.
11. Branch voltage identification using Mesh analysis
12. Node current measurement using Nodal analysis
13. Verification of Thevenin's theorem
14. Verification of Norton's theorem
15. Verification of Superposition theorem
16. Verification of Compensation theorem
17. Verification of Reciprocity theorem
18. Verification of Maximum power transformation theorem
19. Study of sinusoidal steady state analysis of series RC and LC
20. Study of steady state and transient analysis of series RLC circuit.
21. Study of transient analysis of series RC and LC
22. Study of steady state and transient analysis of Parallel RLC circuit.
23. Study of load current and load voltage in star delta transformation.

Book for Study

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours	Credits
II	21UEL23WP01	WS-1: ELECTRONICS WORKSHOP PRACTICE - I	3	2

List of Practices (Any sixteen experiments)

1. Electronic components identification and testing using multimeter
2. Resistance color code calculation and verification
3. Study the function of CRO and Function Generator
4. Study the function of Multimeter and LCR meter
5. Soldering and de-soldering the components in PCB layout.
6. Construction of power supply-I (single supply)
7. Construction of Power supply-II (Dual supply)
8. Cabinet making for power supply.
9. Construction and testing of LEDs in serial and parallel
10. PCB layout preparation using software. (PCB track width and copper square area calculation)
11. PCB Layout design and etching.
12. SMD component Soldering and De-soldering
13. Transformer Identification and troubleshooting
14. Construction of Transformer-less power supply
15. Hobby circuit - I
16. Hobby circuit - II
17. Hobby circuit - III
18. House wiring-I (fitting switches, AC pin sockets and indicator lamp in switch box)
19. House wiring-II (Two-way switches, circuit breaker-ELCB, MCB)
20. PC hardware assembling
21. Audio system assembling (amplifier and speaker)
22. Mobile phone troubleshooting
23. Study of SMPS power supply
24. Simple emergency lamp with 12V battery

Book for Study

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours	Credits
II	21UEL23AC02	ALLIED: MATHEMATICS FOR ELECTRONICS-II	6	4

CO No.	CO-Statements	Cognitive Levels (K-levels)
	On successful completion of this course, students will be able to	
CO-1	have the knowledge of correlation, numerical methods, Laplace transforms, Fourier series and trigonometry.	K1
CO-2	understand the concepts in correlation, numerical methods such as solving algebraic and transcendental equations also simultaneous equations.	K2
CO-3	apply various statistical and numerical methods in real life problems.	K3
CO-4	illustrate methods with suitable examples.	K4
CO-5	evaluate the roots of equations, solution of simultaneous equations and correlation coefficient.	K5

Unit-I **(18 Hours)**

Correlation coefficient- Rank correlation - curve fitting by least square methods - Fitting a straight line (No derivation, Numerical problems only)

Unit-II **(18 Hours)**

Solving algebraic and transcendental equations: Bisection Method - Newton-Raphson method. Solving simultaneous equations - Gauss elimination-Iteration methods - Gauss-Seidal Methods (problems only).

Unit-III **(18 Hours)**

LaplaceTransforms-Definition-properties-theinversetransforms-solving differential equations using Laplace transforms (simple problem only).

Unit-I V **(18 Hours)**

Fourier series - Even and odd functions - properties of odd and even functions-Halfrange Fourier series (Omitting general interval).

Unit-V **(18 Hours)**

Expansion of $\sin nq$ and $\cos nq$ - Powers of sines and cosines of q in terms of functions of multiples of q.

Books for Study

1. R.S.N. Pillai and Bagavathi, "**Statistics- Theory and Practice**", S. Chand and Co. Ltd., New Delhi 2014.
   UnitI *Chapter 12 (Pages 396-410), Chapter 15 (Pages 602-608).*
2. M.K. Venkataraman, "**Numerical Methods in science and Engineering**", 2nd Edition, the National Publishing Co., Madras 1987.
   UnitII *Chapter III (Sec: 5*) *Chapter IV (Sec: 1*,6) *(Pages* 81-85,97-106,113- 120,140-146).
3. Narayanan and Manickavachagam Pillai, "**Ancillary Maths Book II**",S. Viswanathan Pvt.

Ltd., Madras.

UnitIII *Chapter VII (Pages 289-311).*

Unit IV *Chapter II (Pages 123-149).*

4. S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagam Pillay, Kandaswamy, "**Ancillary Mathematics Vol - I**", 2009 Edition.

Unit V *Chapter 5 (Sec: 5.1-5.4; Pages 220-242).*

Books for Reference

1. Dr. P. R. Vittal, "Allied Mathematics"(In single volume) Margham Publications, Reprint 2003.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathy,"Numerical Methods" S. Chand & Company Ltd, Reprint 1999.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
II	21UEL23AC02	ALLIED: MATHEMATICS FOR ELECTRONICS-II	6	4

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	1	3	3	2	2	3	2	2	2	2	2.2
CO-2	2	2	3	3	2	3	3	2	3	3	2.6
CO-3	3	2	1	2	3	2	3	3	3	3	2.5
CO-4	2	2	2	3	2	1	2	2	3	2	2.1
CO-5	3	2	3	3	2	2	2	2	2	3	2.4
Mean Overall Score											2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	21UHE24AE02	Environmental Studies	2	2

CO No.	CO - Statements	Cognitive Levels (K-levels)
	On Completion of this course, the graduates will be able to:	
CO-1	identify the concepts related to the environmental global scenario	K1
CO-2	comprehend the natural resources and environmental organizations	K2
CO-3	apply the acquired knowledge to sensitize individuals and public about the environmental crisis	K3
CO-4	analyze the causes and changes in the structure of biodiversity	K4
CO-5	enhance their skills in the society by solving the environmental problems and preserving nature by the acquired knowledge	K5

Unit I Introduction to Environmental Studies (6 Hours)

Introduction – Scope and Importance – Subsystems of Earth – Various recycling Methods – Environmental Movements in India – Eco- Feminism – Public awareness – Suggestions to conserve environment

Unit II Natural Resources (6 Hours)

Food Resources – Land Resources – Forest resources – Mineral Resources – Water Resources – Energy Resources

Unit III Ecosystems, Biodiversity and Conservation (6 Hours)

General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids – Levels of Biodiversity - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

Unit IV Environmental Pollution (6 Hours)

Air Pollution – Water Pollution – Oil Pollution – Soil Pollution – Marine Pollution – Noise Pollution - Thermal Pollution – Radiation Pollution

Unit VEnvironmental Organizations and Treatise (6 Hours)

United Nations Environment Program (UNEP) - International treaties on Environmental protection - Ministry of Environment, Forest and Climate Change - Important National Environmental Acts and rules– Environmental Impact Assessment.

Books for Study

Department of Human Excellence, *Environmental Studies*, St. Joseph's College, Tiruchirappali-02, 2021.

Books for Reference

1. Rathor, V.S. and Rathor B. S. *Management of Natural Resources for Sustainable Development*. New Delhi: Daya Publishing House, 2013.
2. Sharma P.D,*Ecology and Environment*, 8 ed., Meerut: Rastogi Publications, 2010.
3. Agrawal, A and C.C. Gibson. *Introduction: The Role of Community in Natural Resource*

4. *Conservation.* NJ: Rutgers University Press, 2001.

Web Sources

https://www.unep.org/. Accessed 05 Mar. 2021.
http://moef.gov.in/en/ Accessed 05 Mar. 2021.
https://www.ipcc.ch/reports/. Accessed 05 Mar.2021.

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UHE14VE02**	**TECHNIQUES OF SOCIAL ANALYSIS: FUNDAMENTALS OF HUMAN RIGHTS**	**2**	**1**

CO No.	CO - Statements	Cognitive Levels (K-levels)
	On completion of this course, the graduates will be able to:	
CO-1	identify the importance and the values of human rights	**K1**
CO-2	understand the historical background and the development of Human Rights and the related organizations	**K2**
CO-3	apply the provisions of National and International human rights to themselves and the society	**K3**
CO-4	analyse the violations of human rights to the marginalized section in the society	**K4**
CO-5	animate the people to involve in the struggles and activities of the human rights organizations	**K5**

Unit-I Human Rights - An Introduction (6-Hours)
Introduction- Classification of Human Rights- Scope of Human Rights-Characteristics of Human Rights-NHRC-SHRC- Challenges for Human Rights in the 21stCentury.

Unit-II Historical Development of Human Rights (6-Hours)
Human Rights in Pre-World War Era- Human Rights in Post-World War Era- Evolution of International Human Rights Law - the General Assembly Proclamation- Institution Building, Implementation and the Post- Cold War Period. The ICC.

Unit-III India and Human Rights (6-Hours)
Introduction-Classification of Fundamental Rights-Salient Features of Fundamental Rights- and Fundamental Duties.

Unit-IV Human Rights of Women and Children (6-Hours)
Women's Human Rights- Issues related to women's rights - and Rights of Women's and Children

Unit-V Human Rights Violations and Organizations (6-Hours)
Human Rights Violations - Human Rights Violations in India - the Human Rights Watch Report, January 2012- Human Rights Organizations.

Books for Study
The Department of Human Excellence, *Techniques of Social Analysis: Fundamentals of Human Rights*, St. Joseph's college, Tiruchirappalli -02, 2021.

Books for Reference

1. Venkatachalem. Dr.*The Constitution of India,Salem:Giri Law House,* 2005.
2. NaikVarunand Mukesh Shany. *Human rights education and training,* New Delhi:crescent Publishing Corporation, 2011.
3. BhathokeNeera. *Human Rights content and extent,*New Delhi: swastika publications, 2011.

Web Sources

https://www.un.org/en/universal-declaration-human-rights/. Accessed 05 Mar. 2021.
https://www.ilo.org/global/lang--en/index.htm. Accessed 05 Mar. 2021.
https://www.amnesty.org/en/. Accessed 05 Mar. 2021.

Semester	Course Code	Title of the Course	Hours	Credits
III	21UTA31GL03	General Tamil - III	4	3

CO No.	CO- Statement	Cognitive Level (K- level)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO-1	சங்க இலக்கிய வகைகளை நினைவுகூருவர்	K 1
CO-2	இலக்கியத்தினை நுட்பமாக அறிதலின் வழியாக ஆற்றுப்படுத்தும் திறன் பெறுவர்	K 2
CO-3	இலக்கிய அறநெறிகளைத் தற்கால வாழ்வியலில் பயன்படுத்தும் திறன் பெறுவர்	K 3
CO-4	அகம் மற்றும் புற இலக்கியத் திணை, துறைகளைப் பகுத்தாராய்வர்	K 4
CO-5	யாப்பு, அணி இலக்கண நுட்பங்களை இலக்கியங்களில் மதிப்பிடுவர்	K 5

அலகு - 1 **(12 மணிநேரம்)**

பொருநராற்றுப்படை (முழுமையும்)

அலகு - 2 **(12 மணிநேரம்)**

நற்றிணை - 5 பாடல்கள் - (1, 19, 21, 70, 148)
ஐங்குறுநூறு - அன்னாய் வாழிப்பத்து.
யாப்பிலக்கணம் - வெண்பா, ஆசிரியப்பா

அலகு - 3 **(12 மணிநேரம்)**

கலித்தொகை - (குறிஞ்சிக்கலி- 62, பாலைக்கலி -22, மருதக்கலி- 87, நெய்தற்கலி-149, முல்லைக்கலி - 116)
இலக்கிய வரலாறு - முதற்பாகம் ('தமிழ் மொழியின் தொன்மையும் சிறப்பும்' முதல் 'சங்க தொகை நூல்கள்' முடிய),
புதினம் - குடும்ப அட்டை (2022-2023)

அலகு - 4 **(12 மணிநேரம்)**

பதிற்றுப்பத்து - 3 பாடல்கள் (14, 32, 61)
புறநானூறு - 5 பாடல்கள் (95, 121, 130, 204, 279)
அணியிலக்கணம்

அலகு - 5 **(12 மணிநேரம்)**

திருக்குறள் - புறங்கூறாமை, பழமை, புலவி நுணுக்கம் ஆகிய அதிகாரங்கள்
திரிகடுகம் - 5 பாடல்கள் (2, 6, 12, 15, 42)

இலக்கிய வரலாறு - சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய

பாடநூல்கள் :

1. **பொதுத்தமிழ்** செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2, முதற்பதிப்பு, *2021*
2. **சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு,** *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017*
3. **புதினம்** (ஒவ்வொரு கல்வியாண்டிற்கும் ஒவ்வொரு புதினம்)

2022 – 2023 கல்வியாண்டுக்கு மட்டும் : வீ.செந்தில் குமார், **குடும்ப அட்டை,** தாமரை பப்ளிகேஷன்ஸ் பிரைவேட் லிமிடெட், சென்னை, முதற்பதிப்பு, *2009*

Semester	Course Code	Title of the Course					Hours	Credit			
III	21UTA31GL03	General Tamil - III					4	3			
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	2	3	2	3	3	2	2.5
CO-2	2	2	2	3	3	2	2	3	3	2	2.4
CO-3	3	3	2	3	3	2	2	3	3	3	2.7
CO-4	3	2	2	3	2	3	2	3	2	3	2.5
CO-5	2	3	2	3	2	3	2	3	2	3	2.5
Mean Overall Score											2.52 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UFR31GL03**	**FRENCH – III**	**4**	**3**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO–1	relate colours, materials and shapes to the french clothing.	**K1**
CO–2	select appropriate prepositions in giving directions.	**K2**
CO–3	construct a text in present tense using different verbs.	**K3**
CO–4	examine the travel manners and celebrations of the French.	**K4**
CO–5	justify the usage of past tense in a biography.	**K5**

Unit – I **(12 hours)**

TITRE:VIVRE LAVILLE
GRAMMAIRE : la comparaison, les prépositions avec les noms géographiques, les pronoms personnels COI, le pronom y (le lieu)
LEXIQUE : se repérer sur un plan de ville, la ville, les lieux de la ville
PRODUCTION ORALE : demander et indiquer une direction dans un dialogue
PRODUCTION ECRITE : décrire votre ville natale, créez les affiches en appréciant votre ville

Unit - II **(12 hours)**

TITRE:VISITER UNE VILLE
GRAMMAIRE : la position des pronoms compléments, les verbes du premier groupe en – ger et – cer, les verbes ouvrir et accueillir
LEXIQUE : dire les informations sur une ville de votre choix, les transports, les points cardinaux, les prépositions de lieu
PRODUCTION ORALE : Indiquer le chemin
PRODUCTION ECRITE : Demander des renseignements touristiques

Unit - III **(12 hours)**

TITRE:ON VEND OU ON GARDE
GRAMMAIRE : la formation du pluriel, les adjectifs de couleurs, l'adjectif beau, nouveau,vieux
LEXIQUE : savoir comment s'habiller des grandes occasions, les couleurs, les formes, les matériaux
PRODUCTION ORALE : comprendre une présentation de catalogues vestimentaires en France
PRODUCTION ECRITE : adresser des souhaits à quelqu'un

Unit - IV **(12 hours)**

TITRE:VENTES D'AUTREFOIS, VENTES D'AUJOURD'HUI
GRAMMAIRE : les pronoms relatifs qui et que, l'imparfait, les verbes connaitre, écrire,

mettre et vendre, la question avec inversion
LEXIQUE : comprendre la description de personnes dans un extrait de roman, les mesures, l'informatique
PRODUCTION ORALE : imaginez un dialogue avec un personnage célèbre. Utilisez l'inversion.
PRODUCTION ECRITE : écrire une biographie en utilisant les pronoms relatifs

Unit- V **(12 hours)**

TITRE:FELICITATIONS ! / ON VOYAGE!
GRAMMAIRE : les pronoms démonstratifs, les articles : particularités, les pronoms interrogatifs variables : lequel, les adverbes de manières, les verbes recevoir et conduire
LEXIQUE : les moyens de transports, les voyages, les fêtes, l'aéroport et l'avion, la gare et le train, l'hôtel
PRODUCTION ORALE : Présenter ses vœux
PRODUCTION ECRITE : Faire une réservation

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A2*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *EchoA2*, CLE International, 2^{e}edition,2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A2*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Web Resources

1. https://francais.lingolia.com/en/grammar/prepositions
2. https://www.lawlessfrench.com/grammar/present-tense/
3. https://www.thoughtco.com/textures-french-adjectives-and-expressions-1368980
4. https://study.com/academy/lesson/past-tense-in-french.html
5. https://absolutely-french.eu/french-celebrations/?lang=en

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
III	21UFR31GL03			FRENCH – III				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	2	1	2	2	3	2	3	1	2	3	2.1
CO–2	3	2	3	3	1	2	1	2	2	3	2.2
CO–3	2	1	3	2	2	3	1	3	2	2	2.1
CO–4	3	1	3	2	3	3	3	1	2	3	2.4
CO–5	3	2	3	2	2	3	3	2	2	1	2.3
Mean overall Score											2.22 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UHI31GL03**	**HINDI - III**	**4**	**3**

CO No.	CO–Statements On successful completion of the course, students will be able to	Cognitive Levels (K –Levels)
CO-1	find out the dialects of Hindi language.	**K1**
CO-2	compare the poems of Sumithra Nandanpanth, Prasad & Bachan in Context with their experience of life.	**K2**
CO-3	illustrate the importance given to family ethics by the youth in the modern period according to "Bahoo Ki vidha" One Act play.	**K3**
CO-4	categorize the poetics in some selective poems.	**K4**
CO-5	justify the social & political conditions of Devotional period in Hindi Literature.	**K5**

Unit - I **(12 Hours)**

Tera sneh na khooon
Samband Bodak
Reethikal - Namakarn
Tense

Unit - II **(12 Hours)**

Himadri Thung Sring Se
Paribakshik shabdavali
Samuchaya Bodak
Reethikal - Samajik Paristhithiyam

Unit - III **(12 Hours)**

Insan our Kuthae
Vismayadi Bodak
Reethikal - Sahithyik Paristhithiyam
Reethikal - Salient Features

Unit - IV **(12 Hours)**

Shokgeeth
Avikary shabdh
Reethikal - Main Divisions
Social media and modern world

Unit - V **(12 Hours)**

Reethikal - Visheshathayem
Anuvad – 3
Bahoo ki vidha (one act play)

Books for Study

1. Dr. Sanjeev Kumar Jain, Anuwad: Siddhant Evam Vyavhar, Kailash Pustak Sadan, Madhya Pradesh, 2019.
   Unit-I *Chapter 1*
2. M. Kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
   Unit-II, III and IV *Chapter 2*
3. Dr. Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
   Unit-V *Chapter 4*

Books for Reference

1. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 2016.
2. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.
3. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.
4. Hindi Niband Sangrah,V&S Publishers, 2015.
5. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.

Web Resources

1. https://youtu.be/Xxvco3qa284
2. https://youtu.be/e9wK-pYfVPc
3. https://youtu.be/75tHr53f5_o
4. https://youtu.be/eFNM6y_cpjY
5. https://youtu.be/jHWXWLMxJtw

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
III	21UHI31GL03			HINDI - III					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	3	2	3	2	1	3	2	2.4
CO-2	3	2	3	2	2	3	2	3	2	3	2.5
CO-3	3	2	2	3	1	3	2	3	2	3	2.4
CO-4	2	3	3	2	3	2	3	3	2	1	2.4
CO-5	3	2	2	3	3	2	1	3	2	3	2.4
Mean Overall Score											2.42 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	21USA31GL03	SANSKRIT - III	4	3

CO No.	CO–Statements On successful completion of the course, the student will be able to	Cognitive Levels (K –Levels)
CO-1	remember Characters and events of Ramayana.	K1
CO-2	understand social ethics and moral duties.	K2
CO-3	apply the values learnt , in day to day life.	K3
CO-4	analyzing the Vedic Philosophy.	K4
CO-5	evaluate and create new words with upasargas.	K5

Unit - I **(12 Hours)**

Romodantam , Balakandam (1-15)

Unit - II **(12 Hours)**

Romodantam , Balakandam (15-30)

Unit - III **(12 Hours)**

Vedas – Vedangas vivaranam

Unit - IV **(12 Hours)**

Puranas .Upanishands

Unit - V **(12 Hours)**

Upasargas , Bhavishyat Kaalah

Book for Study

VEDIC LITERATURE, 2019

Books for Reference

1. Parameshwara, Ramodantam, LIFCO Chennai 2018
2. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palghat – 678003 , Kerala , south India , History of Sanskrit Literature 2019
3. Kulapathy , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2018

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credit
III	21USA31GL03			SANSKRIT-III					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	1	2	2	3	3	3	3	3	2	1	2.3
CO-2	3	3	2	3	3	2	2	3	3	3	2.7
CO-3	3	3	1	3	3	1	1	3	3	3	2.4
CO-4	2	2	1	2	3	2	2	3	2	1	2.0
CO-5	3	3	2	3	2	2	3	3	3	2	2.6
Mean Overall Score											2.4
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UEN32GE03**	**GENERAL ENGLISH - III**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K-Levels)
	On successful completion of this course, students will be able to	
CO -1	recall the meaning of familiar words in different contexts	**K1**
CO-2	comprehend the complex written texts by guessing meaning of unfamiliar words using contextual clues	**K2**
CO-3	use tenses and punctuations appropriately in sentences	**K3**
CO-4	analyse formal and informal letters to rewrite them meaningfully	**K4**
CO-5	compare different genres of writing and construct paragraphs	**K5 & K6**

Unit-I **(15 Hours)**

1. Suggestions to Develop Your Reading Habit
2. General Writing Skill: Letter Writing – Informal
3. Grammar: Simple Present Tense

Unit-II **(15 Hours)**

4. The Secret of Success: An Anecdote
5. General Writing Skill: Letter Writing – Formal
6. Grammar: Present Continuous Tense

Unit-III **(15 Hours)**

7. The Impact of Liquor Consumption on the Society
8. General Writing Skill: Letter to Newspaper
9. Grammar: Simple Past Tense

Unit-IV **(15 Hours)**

10. Dr. A.P.J. Abdul Kalam: A Short Biography
11. General Writing Skill: Job Application Letter
12. Grammar: Past Continuous Tense

Unit-V **(15 Hours)**

13. Golden Rule: A Poem
14. General Writing Skill: Circular-Writing
15. Grammar: Simple Future Tense and Future Continuous Tense

Book for Study

Jayraj, S. Joseph Arul et al. *Trend-Setter*: *An Interactive General English Textbook for Undergraduate Students*. Trinity, 2016.

Books for Reference

1. Malkani, Neelam. *A comprehensive Guide on General English for Competitive Exams*. Agra: Oswal Publications, 2020.
2. Jain, B. B. *Compendium General English*. Agra: Upkar Prakashan, 2010.
3. Aggarwal, R.S. *Quick Learning Objective General English*. India: S Chand, 2006.
4. T. Ferrari, Bernard. *Power Listening: Mastering the Most Critical Business Skill of All.* USA: Penguin Publishers, 2012.
5. Barry, Marian. *Steps to Academic Writing*. USA: Cambridge University Press, 2011.

Web Resources

1. https://www.nypl.org/events/classes/english
2. https://www.waywordradio.org/listen/podcast-itunes/?gclid=EAIaIQobChMIrbeRtbP12AIVCYZpCh0-XwnvEAAYAiAAEgLcjvD_BwE
3. https://eltlearningjourneys.com/2015/05/19/websites-for-learning-english/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course						Hours	Credits
III	21UEN32GE03			GENERAL ENGLISH - III						5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
									Mean Overall Score		2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UEL33CC03**	**CORE -3: DIGITAL ELECTRONICS**	**4**	**3**

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe digital signals, digital building blocks and digital circuits	**K1**
CO-2	outline and compare the digital logic circuits for green environment	**K2**
CO-3	infer, analyze and identify the digital circuits for real time needs	**K3, K4**
CO-4	use modern tools to compare and contrast the digital circuits	**K3, K4**
CO-5	appraise, evaluate digital concepts and synthesize digital solutions for Entrepreneurship	**K5, K6**

UNIT I: FUNDAMENTALS OF DIGITAL CONCEPTS (12Hours)

Digital and Analog Quantities – Binary Digits - Logic Levels and Digital Waveforms– Digital Integrated Circuits- Introduction to Number Systems - Binary Codes - Error Detection and Correction Codes- Boolean Operations and Expressions - Laws and Rules of Boolean Algebra - DE Morgan'sTheorem– Consensus Theorem- Simplification Using Boolean Algebra- Boolean Expressions: SOP And POS - Minimization of Boolean Expression- Standard Forms of Boolean Expressions - KarnaughMap – Five Variable K-Map – QuineMcCluskey – Introduction To Digital Logic Families

UNIT II: LOGIC GATES AND COMBINATIONAL CIRCUITS (12 Hours)

Logic Gates - NANDandNOR as Universal Building Blocks - Implementationby using NAND only – Combinational Circuits: Half and Full Adder – Half and Full Subtractor - Parallel Binary Adders – Magnitude Comparators - 4 Bit Decoders - BCD To Decimal Decoder - BCD to 7 Segment Decoder – Decimal toBCDEncoder – Priority Encoder - Code Converters - 4 Input Multiplexer - Implementation of Combinational Logic using MUX - 1:4 Demultiplexer - Designing Combinational Circuits for Real Time Problems

UNIT III: SEQUENTIAL LOGIC CIRCUITS (12Hours)

Sequential Logic Circuits - Latches vs Flip-Flops- Edge Triggered Flip-Flops - SR Flip-Flop - D Flip-Flop - JK Flip-Flop - Master-Slave Flip-Flops – T Flip-Flop – Realization of one F/F using another F/F - Shift Registers: SISO – SIPO – PISO - PIPO - Bidirectional Shift Registers – Pseudo- Random Sequence Generator- Basics of Semiconductor Memory - RAM

UNIT IV: COUNTERS, ROM AND PLDs (12Hours)

Asynchronous Counter - 2-Bit and 3-Bit Asynchronous Binary Counter - Asynchronous Decade Counter - Synchronous Counter – 2-Bit and 3-Bit Synchronous Binary Counter - Up/Down Synchronous Counter - Johnson Counter - Ring Counter - ROM - PROMs and

EPROMs - Flash Memories - Memory Expansion - Programmable Logic Devices: PLA – PAL – FPGA - 2-Bit ALU Design

UNIT V: HARDWARE DESCRIPTION LANGUAGE (12 Hours)

Verilog HDL – Data Types – Operators –Entity Declaration and Statements - Architecture Body –Continuous Assignment Statement - Procedural Assignment Statement –Always statement- If Statement - Case Statement - Loop Statement –Functions- Tasks- Module Instantiation Statement- ParameterizedDesigns- HDL Models for SimpleCircuits

Book for Study:

1. A.P. Godse, D.A. Godse, *Digital Logic Circuits*, 2nd Edition, Technical publications, 2019.
2. T. L. Floyd and R.P. Jain, *Digital Fundamentals*, 8thEdition, PearsonEducation, 2008.
3. Bhasker. J, *A Verilog HDL Primer*, 3rdEdition, B.S.Publications, 2015.

Unit	Book	Chapter	Sections
I	1 2	1,2,10 1	1.1,1.2,1.9,1.10, 2.1-2.15, 10.1,10.2 1.1,1.3,1.4
II	1 2	3,4 5,6	3.1-3.3,3.8,4.1-4.6, 4.12-4.17 5.5, 6.11
III	1 2	5 10	5.1-5.4,5.5.3,5.5.4 10.1,10.2
IV	1	5,8,9	5.5.5, 5.5.6, 8.1-8.3,9.1-9.5
V	3	2, 3	2.1-2.7, 2.12-2.16, 2.19, 2.20, 2.23, 3.1, 3.2

Book for Reference:

1. M. Morris Mano and Michael D. Ciletti, *Digital Design*, 4thEdition, Pearson Education, 2008.
2. G.K. Kharate, *Digital Electronics*, 1stEdition, Oxford University Press, 2010.
3. John F. Wakerly, *Digital Design: Principles and Practices*, 4thEdition, Prentice Hall, 2006.
4. Donald P. Leach, Albert Paul Malvino and Goutam Saha, *Digital Principles and Applications*, 7thEdition,Tata McGraw Hill Publishing Company Ltd., 2010.

Web References:

1. https://nptel.ac.in/courses/108/105/108105132/
2. https://www.coursera.org/learn/digital-systems
3. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
III	21UEL33CC03	CORE -3: DIGITAL ELECTRONICS	4	3

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	1	2	3	2	1	2	2.1
CO-2	3	3	2	3	2	3	3	3	2	2	2.6
CO-3	2	2	2	2	3	2	2	2	2	3	2.2
CO-4	3	3	2	3	2	3	3	3	2	2	2.6
CO-5	2	3	2	3	2	2	3	2	1	3	2.3
Mean Overall Score											2.36
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	21UEL33CC04	CORE -4: ELECTRONIC CIRCUITS	4	3

CO (COURSE OUTCOME)

S.No.	CO statements	Cognitive Level (K- level)
	On completion of this course, students would be able to	
CO-1	describe and relate electronic circuits	**K1**
CO-2	explain and demonstrate the functioning of electronic circuits	**K2**
CO-3	classify and investigate various electronic circuits	**K3, K4**
CO-4	examine and categorize the electronic circuits	**K3, K4**
CO-5	assess the electronic circuits need of modern society with professional ethics in electronics,design and construct electronics projects for the same	**K5, K6**

UNIT I: APPLICATIONS OF DIODES (12 Hours)

Half Wave Rectifier – Full Wave Rectifier – Efficiency - Filter Circuits – Clippers – Clampers – Zener Voltage Regulator – Regulated Power Supply

UNITII: BIASING OFTRANSISTORS AND FET (12 Hours)

Selection of Operating Point for BJT- DC Load Line – BJT: Types of Biasing (Fixed, Emitter Feedback, Collector Feedback &Voltage Divider) – Bias Stabilization – Bias Compensation – FET: Types of Biasing (Gate, Self, Voltage Divider, Source &Current Source) – MOSFET: Types of Biasing (Drain Feedback &Voltage Divider)

UNITIII: SMALL SIGNAL ANALYSIS (12 Hours)

BJT Amplifiers: AC Equivalent – AC Load Line and Compliance – BJT Amplifiers: Small Signal Analysis: Classifications of Amplifier – Common Emitter Amplifier - Common Base Amplifier - EmitterFollower - Re' Model - h Parameter – Hybrid S Model – Frequency Response Analysis of CEAmplifier– Miller Effect - Multistage Amplifier - Cascade Connection (N Stage CE) – Darlington Amplifier.

JFET and MOSFET Amplifiers: Small Signal Model - Common Source – Common Drain – Common Gate - Small SignalParameters - Small Signal Equivalent Circuit – Common Source Amplifier – Common Drain Amplifier

UNIT IV: FEEDBACK AMPLIFIERS AND OSCILLATORS (12 Hours)

Effect of Positive and Negative Feedback on Amplifiers – Feedback Connection Types – Feedback Amplifiers – Merits and Demerits – Oscillators - Principle of Operation – Phase Shift – Wien's Bridge – Crystal – LC Oscillators using BJT - UJT Relaxation Oscillator

UNIT V: TUNED AND POWER AMPLIFIERS (12 Hours)

Single Tuned – Double Tuned – Stagger Tuned Amplifiers - Working Principle of Class A, Class AB, Class B, Class C, Class D and Class S Power Amplifiers – Efficiency of Class A, B and C Power Amplifiers.

BOOK FOR STUDY

1. Salivahanan. S, Suresh Kumar.N, Vallavaraj. A, *Electronic Devices andCircuits*, 2nd Edition, TMH, 2008.
2. R.Y.Borse, *Basic Electronic Devices and Circuits*, 1st Edition, AdhyayanPublishers and Distributors – New Delhi, 2012.

Unit	Book	Chapter	Sections
I	1	16,18	16.3,16.5, 18.1,18.2
II	1	6,7	6.3, 6.12, 7.16, 7.18
III	1	6,9,10	6.1, ,6.6-6.8, 6.10-6.13,9.3-9.13,10.1-10.3
IV	1	14, 15,17	14.1 – 14.6, 15.1-15.6, 15.11, 15.12,15.14,17.2
V	1	12, 13	13.1,13.2,13.4-13.6, 12.1,12.3,12.6-12.9,12.13,12.14

Book for Reference:

1. TharejaB.L. *Basic electronics*, 3rdEdition, S. Chand and Co., 2012.
2. David Bell, *Electronic Devices and Circuits*, 5th Edition, Oxford, 2008.
3. Mehta V.K, *Principles of Electronics*, 11th Edition, S. Chand & Co., 2008.

Web References:

1. https://www.allaboutcircuits.com/technical-articles
2. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.html
3. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
III	**21UEL33CC04**	**CORE -4: ELECTRONIC CIRCUITS**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	3	3	2	2.6
CO-2	3	3	3	2	2	3	3	3	2	2	2.6
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	3	3	3	2	2	3	3	2	3	2	2.6
CO-5	3	3	2	2	2	3	3	3	3	2	2.6
										Mean Overall Score	**2.6**
										Result	**HIGH**

Semester	Course Code	Title of the Course	Hours	Credit
III	21UEL33AO03A	ALLIED: APPLIED PHYSICS-I	4	3

(Offered to Department of Electronics)

CO.NO	CO-STATEMENTS	COGNITIVE LEVELS (K-Levels)
	On the successful completion of the course, student will be able to	
CO-1	acquire the required basic concepts in general physics and be able to interpret them in daily life.	K1, K2
CO-2	cvarious materials by comparing various properties accordingly.	K3
CO-3	analyse various materials Quantum Behaviours based on Quantum theory.	K4
CO-4	apply the concept of Ultrasonics on various applications by analysing various problems.	K3, K4
CO-5	experiment with and give solutions on choosing various materials for fabrication thereby managing the existing eco system in a smarter way.	K3

UNIT - I: ATOMIC PHYSICS AND THERMAL PHYSICS (12 Hours)

Atomic Physics: Vector atom model - Associated quantum numbers - Coupling Schemes - Pauli's Exclusion principle - Magnetic Dipole moments - Stern and Gerlach experiment.

Thermal Physics: Specific heat capacity of gases - Specific heat determination - Thermal conductivity - Rectilinear flow of heat through a rod - Forbe's method - Newton's law of cooling - Cooling method - Lee's disc method.

UNIT - II: QUANTUM MECHANICS (12 Hours)

Historical Background - Planck Q. theory - De-Broglie Wave - Properties of Matter Waves - Experimental verification - Heisenberg Uncertainty Principle - Illustration - Schrodinger Wave equation (1D) TISE - TDSE - Application of S.E. - Particle in a 1D potential well.

UNIT - III: CONDUCTING MATERIALS AND SEMICONDUCTING MATERIALS (12 Hours)

Classical free electron theory of metals - Quantum theory - Free electron gas - Fermi energy and carrier concentration. Fermi level - variation of Fermi level with temperature (Intrinsic semiconductor) - Bandgap Determination - Extrinsic Semiconductors - Variation of Fermi level with temperature and impurity concentration - Hall Effect and its Applications.

UNIT - IV: MAGNETIC MATERIALS AND SUPER CONDUCTING MATERIALS (12 Hours)

Origin of magnetic moment - Bohr magnetron - Diamagnetism, Paramagnetism and Ferromagnetism - Hysteresis - Anti-ferromagnetic materials - Ferrites – Applications.

Meissner effect - Transition temperature - Isotope effect - Types of superconductors - BCS theory - High - TC superconductors - Applications of superconductors.

UNIT - V: ULTRASONICS **(12 Hours)**

Introduction - Production of ultrasonic waves - Detection of ultrasonic waves - Properties of ultrasonic waves - Cavitation - Acoustic grating - Industrial applications - SONAR - Non-destructive testing - Medical applications.

BOOKS FOR STUDY

1. D.K. Bhattacharya & A. Bhaskaran, Engineering physics, Oxford University Press.
2. G. Aruldhas, Engineering Physics, -Prentice-Hall of India Pvt Limited, 2010.
3. Pearson Hugh D Young, Roger A. Freedman, Fourteenth Edition, University Physics with Modern Physics.

UNIT	BOOK	CHAPTERS	SECTIONS
I			**#Cyclostyled material will be given**
II	2	9	9.1, 9.2, 9.5, 9.6, 9.7, 9.9, 9.10, 9.11, 9.12, 9.13, 9.14, 9.15, 9.16, 9.21
III	1	6	6.2-6.5, 7.1, 7.4 ,7.5, 7.7, 7.9, 7.11
IV	1	8	8.1-8.8, 9.2-9.8
V	1	1	1.1-1.10

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
III	**21UEL33AO03A**			**ALLIED: APPLIED PHYSICS-I**				**4**		**3**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**				**Mean Scores of COs**
	PO 1	**PO 2**	**PO3**	**PO 4**	**PO 5**	**PSO 1**	**PS O2**	**PS O3**	**PSO 4**	**PSO 5**	
CO-1	3	2	1	3	2	3	3	1	2	2	2.2
CO-2	3	2	2	3	2	3	3	2	2	3	2.5
CO-3	3	2	2	3	2	3	3	2	2	3	2.5
CO-4	3	3	2	3	2	3	3	2	2	2	2.5
CO-5	3	3	2	3	3	3	3	2	2	3	2.7
Mean Overall Score											**2.48**
Result											**High**

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UEL33AO03B**	**ALLIED: COMPUTER SCIENCE-I (Internet and Database Concepts)**	**4**	**3**

CO No.	CO- Statement	Cognitive Level (K- level)
After successful completion of the course, the student will be able to		
CO-1	acquire knowledge of Internet concepts and Protocols.	**K1**
CO-2	understand the basic knowledge of HTML tags & develop simple programs in HTML.	**K2**
CO-3	apply the knowledge of HTML tags in web related applications.	**K3**
CO-4	understand and adapt the basic concepts of Database.	**K2, K4**
CO-5	apply the SQL queries to Database.	**K3, K4**

UNIT- I **(12 Hours)**

Introduction to the Internet: Computers in Business – Networking – Internet – Email – Resource Sharing – WWW – Protocols.

UNIT - II **(12 Hours)**

Introduction to HTML: Designing a home page – HTML document – Anchor tag - Hyperlinks – Head and Body sections – Header section – Title – Prologue – links – colourful pages – comments – body section – heading – Horizontal ruler – paragraph – tabs.

UNIT – III **(12 Hours)**

Images and pictures - Lists and their types – nested lists – table handling. Forms and form elements.

UNIT - IV **(12 Hours)**

Database System Applications – Database Systems versus File Systems – View of Data – Data Models – Database Languages – Database Users and Administrators – Transaction Management – Database System Structure – Application Architectures.

UNIT - V **(12 Hours)**

SQL Statements: Data Retrieval: SELECT, Data Definition Languages: Create, Alter, Drop, Rename, and Truncate, Data Manipulation Language: Insert – Update, Delete – Merge. Transactional Control: Commit, Rollback and Data Control Language: Grant, Revoke, Select Order By – Select Group By.

Books for Study

1. C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill, Second Edition, 2000. Unit 1-3: Chapters 1-6
2. Henry F. Korth Abraham Silberschatz, Database System Concepts, Fourth Edition, McGraw Hill International Editions, 2002. Unit 4-5: Chapters 1-4

Books for Reference:

1. Wendy Willard, "Web Design – A beginners Guide", Tata McGraw Hill, 2010.
2. Thomas A. Powell, "The Complete Reference Web Design", Tata McGraw Hill, 2019.
3. C.J. Date, An Introduction to Database System, seventh edition, Pearson Education, New Delhi, 2002.

Semester	Course Code	Title of the Course	Hours	Credit
III	21UEL33AO03B	ALLIED: COMPUTER SCIENCE-I (Internet and Database Concepts)	4	3

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	2	3	2.4
CO-2	2	3	2	2	2	3	3	2	2	3	2.4
CO-3	2	2	3	2	3	2	3	3	3	2	2.5
CO-4	2	2	2	3	2	2	3	2	3	3	2.4
CO-5	1	2	2	2	3	2	3	2	2	3	2.2
									Mean Overall Score		2.38
									Result		# High

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UEL34SE01A**	**SEC-1 (WD): SOUND ENGINEERING**	**2**	**1**

CO. No.	CO Statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	define the Fundamentals concepts of Sound and Measurement	**K1**
CO-2	compare the Acoustic Environment	**K2**
CO-3	classify the Audio Electronic devices	**K3**
CO-4	analyze various audio systemstechnology	**K4**
CO-5	recommend the sound systems for the need	**K5**

UNITI: FUNDAMENTALS OF SOUND AND MEASUREMENT (6 Hours)

Audio Principles- Physics of Sound- Wavelength- Periodic and Aperiodic Signals- Sound and the Ear- Level and Loudness- Frequency Discrimination- Frequency Response and Linearity- Sine Wave- Root Mean Square Measurements – Decibel- Audio Level Metering- Measurement - Concepts Underlying the Decibel and its use in Sound Systems- Measuring Electrical Power- Expressing Power as an Audio Level- The Decibel in Acoustics - LP, LW, and LI- Acoustic Intensity Level (LI) - Acoustic Power Level (LW) - Acoustic Pressure Level (LP)

UNITII: ACOUSTIC ENVIRONMENT (6 Hours)

Acoustic Environment- Inverse Square Law- Atmospheric Absorption- Velocity of Sound- Temperature-Dependent Velocity- Effect of Altitude on the Velocity of Sound in Air- Typical Wavelengths- Doppler Effect- Reflection and Refraction- Effect of a Space Heater on Flutter Echo – Absorption- Classifying Sound Fields- Acoustic Environment Indoors.

UNITIII: AUDIO ELECTRONICS (6 Hours)

Building Block Component-Power Supply Design- High Power Systems- Music Power- Influence of Signal Type on Power Supply Design- High Current Power Supply Systems- Over current Protection- Battery Supplies-Preamplifiers and Amplifiers - Introduction to Audio Amplification- Preamplifiers and Input Signals - Noise Levels- Audibility of Distortion- General Design Considerations- Controls.

UNIT IV: MICROPHONE AND LOUDSPEAKERS TECHNOLOGY (6 Hours)

Microphone Sensitivity- Microphone Selection- Nature of Response and Directional Characteristics- Wireless Microphones- Microphone Connectors – Cables - Phantom Power- Measurement Microphones – Loudspeakers- Characteristic Impedance- Radiation Impedance- Sound Pressure Produced at Distance - Diaphragm/Suspension Assembly- Diaphragm Size- Diaphragm Profile – Straight-Sided Cones- Moving Coil Loudspeaker- Loudspeaker Enclosures

UNITV: SOUND REPRODUCTION SYSTEMS (6 Hours)

Recording Consoles- Standard Levels and Level Meters- Standard Operating Levels and Line-Up Tones- Digital Line-Up- Sound Mixer Architecture and Circuit Blocks- Audio Mixer Circuitry- Mixer Automation- Digital Consoles- Embedded Digital Audio in the

Digital Video Interface- Room Acoustics- Noise Control- Studio and Control Room Acoustics- Audio Test and Measurement- Fundamentals and Instruments- Instrument Types.

Book for Study:

1. Douglas Self Richard Brice Ben Duncan John Linsley Hood Ian Sinclair Andrew Singmin Don Davis Eugene Patronis John Watkinson, *Audio Engineering*, 1stEdition, Elsevier, 2009.

Unit	Book	Chapter	Sections
I	1	1,2	1.1-1.4, 1.8-1.13, 2.1-2.6
II	1	3	3.1 -3.13
III	1	4,5,6,7	4.1,5.1-5.5,5.10,5.13,6,7,7.11,7.16-7.18
IV	1	22,23,24	22.1-22.6, 23.1-23.3,23.6, 23.8-23.11,23.16,24.1,24.2
V	1	26,27,28,29,30	26.1-26.8, 27.2. 28.9,29.1-29.3,30.1

Book for Reference:

1. Douglas Self, *Audio Engineering Explained Professional Audio Recordings*, 1st Edition, Elsevier, 2010.
2. John Linsleyhood, *Audio Electronics*, 2ndEdition, Newnes Publishers, 1995.
3. Bob Cordell, *Designing Audio Power Amplifiers*, 1st Edition, McGraw Hill Professional, 2011.

Web References:

1. https://en.wikipedia.org/wiki/Audio_engineer
2. https://www.thehighereducationreview.com/news/what-is-sound-engineering-scope-and-career-opportunities-nid-956.html
3. https://www.avanse.com/blog/all-you-need-to-know-about-sound-engineering/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course					Hours	Credit			
III	**21UEL34SE01A**	**SEC-1** (WD)**: SOUND ENGINEERING**					**2**	**1**			
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	2	2	3	2	2	3	3	2	2	2.3
CO-2	3	2	2	2	2	3	2	2	2	2	2.2
CO-3	2	3	3	2	2	2	2	3	2	2	2.3
CO-4	3	2	2	2	3	3	3	2	2	2	2.4
CO-5	2	2	3	3	2	3	2	2	2	2	2.3
Mean Overall Score											2.3
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UEL34SE01B**	**SEC-1 (WD): LAB EQUIPMENT MAINTENANCE AND SERVICING**	**2**	**1**

CO. No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the electronic components and lab equipment	**K1**
CO-2	explain various lab equipment	**K2**
CO-3	use lab equipment to analyze the electronic signals	**K3**
CO-4	maintain and follow the safety measures of lab equipment	**K4**
CO-5	inspect and service the lab equipment.	**K5**

UNITI: PASSIVE AND ACTIVE COMPONENTS (6 Hours)

Resistors – Types – Color-code – Wattage – Tolerance – Capacitors – Types – Inductors – Transformer – Step-up and Step Down – Uses – Diode – Operation – Transistor – NPN and PNP – Switching – Amplifier – Diode and Transistor Testing – MOSFET – Types –Testing.

UNITII: POWER SUPPLY (6 Hours)

AC Power Supply – Parameters – DC Power Supply Design – Regulated Power Supplies – Single – Dual – Variable Voltage – Switched Mode Power Supply – Transformer Less Power Supply Design– Design of Fuses – Testing and Troubleshooting.

UNITIII: ANALOG EQUIPMENT (6 Hours)

Variable Resistance Box – Variable Capacitance Box – Variable Inductance Box – Cathode Ray Oscilloscope – Block Diagram – Frequency Measurement – Function Generator – Range of Frequencies – Amplitude – Types of Waves -Meters – Ammeter – Voltmeter - Testing and Trouble Shooting.

UNITIV: DIGITAL EQUIPMENT (6 Hours)

LED – Current Limiting Concept – Switches – Types - Logic Module – Circuit Diagram – Concept of Common Ground – Pulse Generator – Circuit Diagram – Active Low and Active High Pulses – Logic Modules Interfacing Boards – Kits – Testing and Troubleshooting Methods.

UNITV: COMMON CHEMISTRY LAB EQUIPMENT (6 Hours)

Digital Balance – Block Diagram – Load Cell Sensors – pH Meter – Electrode Specifications –Stirrer – Centrifuge – Rotation Per Minute Measurement – Magnetic Stirrer with Paddle – Block Diagram – Oven Heating Elements

Book for Study:

1. Material prepared by the department

Unit	Book	Chapter	Sections
I	1	1	all
II	1	2	all
III	1	3	all
IV	1	4	all
V	1	5	all

Book for Reference:

1. Philip Kiameh, *Electrical Equipment Handbook: Troubleshooting and Maintenance*, 2nd Edition, McGraw Hill, 2004.

Web References:

1. https://www.mynewlab.com/blog/laboratory-equipment-maintenance-101/
2. https://conductscience.com/laboratory-equipment-care-and-maintenance/
3. https://www.labmate-online.com/news/laboratory-products/3/breaking-news/5-tips-for-laboratory-equipment-maintenance/30637

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
III	**21UEL34SE01B**	**SEC-1 (WD): LAB EQUIPMENT MAINTENANCE AND SERVICING**	**2**	**1**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	3	2	2	3	3	3	3	2.5
CO-2	2	2	2	2	2	2	2	2	3	3	2.2
CO-3	2	1	1	2	2	2	2	3	2	2	1.9
CO-4	1	2	2	3	3	3	3	3	3	3	2.6
CO-5	2	2	2	1	2	3	2	2	2	3	2.1
									Mean Overall Score		**2.3**
									Result		**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UHE24VE03A**	**PROFESSIONAL ETHICS–I: SOCIAL ETHICS - I**	**2**	**1**

CO No.	Co- Statements	Cognitive Level (K- level)
	On completion of this course the graduates will be able to	
CO-1	know the responsibility of the educated youth.	K1
CO-2	understand the values prescribed under social ethics.	K2
CO-3	apply their minds critically to the various types of cyber crime.	K3
CO-4	analyse the various kinds of political systems.	K4
CO-5	analyse the behaviour of the elected representatives.	K4

Unit-I Introduction to Social Ethics (6-Hours)

Introduction to social ethics and social responsibility, important role of Social ethics on the various areas, religion influences social changes - secularism. Social ethics and corporate dynamics, forms of social ethics.

Unit-II The Economic and Political System of Today (6-Hours)

Planned economy and communism – market economy and capitalism- socialism - mixed economy -the emerging market economy - political system- totalitarian system- oligarchic system.

Unit-III Integrity in Public Life National Integration (6-Hours)

What is Integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as Democratic State, Behavior of a elected representative of India , Noticeable degradation acts of elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity.

Unit-IV Cyber Crime (6-Hours)

Business Ethics, Business ethics permeates the whole organization, Measuring business ethics , The Vital factors highlighting the importance of business ethics , Cyber crime, Strategies in committing Cyber Crimes, Factors aiding Cyber Crime, computer Hacking, Cyber Bullying, Telecommunications piracy, Counter Measures to Cyber Crime, Ethical Hacking.

Unit-V Social Integration (6-Hours)

Global challenges, The future is with the Educational Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, Right to Education, Eradicating gender inequality, Sustainable Human Development , Social Integration, Elimination Crime, Integration with Global Market

Books for Study

Department of Human Excellence, *Formation of Youth*, St Joseph's College(Autonomous), Tiruchirappali -02, 2021

Books for Reference

1. Ramesh K. Arora, *Ethics, Integrity and Values* by Public Service Paperback ,– 1 January 2014
2. Cunningham, D. *There's something happening here: The new left, the Klan, and FBI counterintelligence*. Berkeley: University of California Press, 2004.
3. Adv. Prashant Mali, *Cyber law & Cyber Crimes simplified* by Cyber Info media Paperback – 1 January 2017.
4. Matthew Richardson, *Cyber Crime: Law and Practice Hardcover – Import*, Wildy publications, 29 November 2019

Web Sources:

https://cybercrime.gov.in/
https://open.lib.umn.edu/sociology/chapter/14-2-types-of-political-systems/
https://www.esv.org/resources/esv-global-study-bible/social-ethics/
https://en.wikipedia.org/wiki/Political_system

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UHE34VE03B**	**PROFESSIONAL ETHICS I: RELIGIOUS DOCTRINE- I**	**2**	**1**

CO.No.	Co – Statements	Cognitive Levels (K- levels)
	On completion of this course, the graduates will be able to:	
CO-1	understand the history of the Catholic Church	**K1**
CO-2	examine and grasp the Sacraments of the Catholic Church	**K2**
CO-3	apply the Christian Prayer to their everyday life	**K3**
CO-4	analyze themselves in the light of Sacraments & Christian Prayer	**K4**
CO-5	create a harmonious society learning values from all religions	**K5 & K6**

Unit-I	**God of salvation**	**(6 Hours)**
Unit-II	**Life & Mission of Jesus Christ**	**(6 Hours)**
Unit-III	**The Holy Spirit**	**(6 Hours)**
Unit-IV	**Biblical Values**	**(6 Hours)**
Unit-V	**Mother Mary**	**(6 Hours)**

Books for Study

Department of Human Excellence, *Life in the Lord: Religious Doctrine.* St. Joseph's College, Trichirappalli-02, 2021.

Books for Reference

1. *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India, 1994.
2. Holy Bible (NRSV).

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UTA41GL04B	Scientific Tamil (SBS, SPS,SCS)	4	3

CO No.	CO- Statements	Cognitive Level (K- level)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	பண்டைத் தமிழர்களின் அறிவியலறிவை அறிந்துகொள்வர்.	K 1
CO-2	பண்டைத் தமிழிலக்கியங்களுள் காணலாகும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.	K 2
CO-3	தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்மை அறிவையும் அறிந்துகொள்வர்.	K 3
CO-4	இக்கால இலக்கியங்களுள் அறிவியல்துறை பெற்றுள்ள செல்வாக்கை அறிந்துகொள்வர்.	K 4
CO-5	அறிவியல் கலைச்சொற்களைத் தமிழில் கற்றுக் கொண்டு அறிவியல் தமிழ் வளரத் துணைபுரிவர்.	K 5

அலகு – 1 **(12 மணிநேரம்)**

தொல்காப்பியம் :

நிலம் தீ நீர் வளி விசும்போடு (தொல்.பொருள் 635)

ஒன்றறிவதுவே (தொல்.பொருள் 571)

புறநானூறு

மண் திணிந்த நிலனும் (புறம்.2)

செஞ்ஞா யிற்றுச் செலவும் (புறம். 30)

அகநானூறு

அம்ம வாழி, தோழி (அகம்.141)

பதிற்றுப்பத்து

நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று.14)

நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று.24)

உரைநடைக்கட்டுரை : வியக்க வைக்கும் தமிழரின் அறிவியல்

அலகு- 2 **(12 மணிநேரம்)**

சித்தர் பாடல்கள்

பதார்த்த குண சிந்தாமணி

குளத்து சலந்தானே கொடிதான (27)

ஏரிசலம் வாதமிகு மதுவே (31)

அருவிநீர் மேக மகற்றுங் *(39)*

மேவிய சீவன் வடிவது சொல்லிடில் *(திருமூலர்)*

அணுவில் அணுவினை ஆதிபிரானை *(திருமூலர்)*
நட்டகல்லைத் தெய்வமென்று *(சிவவாக்கியர்)*
உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

அலகு - 3 **(12 மணிநேரம்)**

திருக்குறள் *(2 அதிகாரங்கள்)*

வான் சிறப்பு, மருந்து

வலைப்பூக்கள் உருவாக்கல், பராமரித்தல்

புதிய அறிவியல் கலைச்சொல்லாக்கங்களை உருவாக்குதல்

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் நீர் மேலாண்மையியல்

அலகு- 4 **(12 மணிநேரம்)**

புதினம்: சொர்க்கத்தீவு – சுஜாதா

நூல் - திறனாய்வு

அறிவியல் புனைவு ஆவணப்படம், திரைப்படம் - திறனாய்வு

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

அலகு - 5 **(12 மணிநேரம்)**

அறிவியல் கலைச்சொற்கள்

அன்றாட வாழ்வில் அறிவியல் பழமொழிகளைத் தொகுத்தல்

மூலிகைகள், கீரைகள் ஆகியவற்றின் முக்கியத்துவத்தைக் காட்சிப்படுத்துதல்.

தமிழர் அறிவியல் கண்காட்சி நடத்துதல்

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்

பாட நூல்கள்

1. **அறிவியல் தமிழ்**, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, *2022*
2. சுஜாதா, **சொர்க்கத்தீவு,** விசா பப்ளிகேஷன்ஸ், சென்னை-*17*, ஒன்பதாம் பதிப்பு, *2009*
3. மூர்த்தி அ.கி., **அறிவியல் அகராதி,** மணிவாசகர் பதிப்பகம், சென்னை, *2001*

பார்வை நூல்கள்

1. குழந்தைசாமி.வா.செ., **அறிவியல்தமிழ்,** பாரதி பதிப்பகம், சென்னை-*17*, 6ஆம்பதிப்பு, *2001*
2. நெடுஞ்செழியன், **இன்னும் மீதமிருக்கிறது நம்பிக்கை,** பூவுலகின் நண்பர்கள் வெளியீடு, சென்னை, முதற்பதிப்பு, *2017*

3. பரிமேலழகர்(உரை.), **திருக்குறள்,** பாரதி பதிப்பகம், சென்னை-17, ஏழாவது பதிப்பு, *2000.*
4. வையாபுரிப்பிள்ளை, **பாட்டும் தொகையும்,** பாரி நிலையம், சென்னை, இரண்டாம் பதிப்பு, *1967.*

Semester	**Course Code**			**Title of the Course**			**Hours**			**Credit**
IV	**21UTA41GL04B**			**Scientific Tamil (SBS, SPS,SCS)**			**4**			**3**
Course Outcomes (COs)	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**				**Mean Scores of COs**
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	
CO-1	**1**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**2.2**
CO-2	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**2.3**
CO-3	**1**	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**2.3**
CO-4	**2**	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**2**	**2.4**
CO-5	**3**	**1**	**2**	**2**	**2**	**2**	**3**	**2**	**3**	**3**	**2.3**
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
IV	**21UFR41GL04**	**FRENCH – IV**	**4**	**3**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO–1	recall the vocabulary pertaining to dwelling place.	**K1**
CO–2	outline crisis management in France.	**K2**
CO–3	develop a travel diary of your own.	**K3**
CO–4	simplify the French education system.	**K4**
CO–5	interpret past tenses in a text.	**K5**

Unit- I **(12 hours)**

TITRE:ON FAIT LE MELANGE!
GRAMMAIRE : le présent progressif, les pronoms possessifs, la phrase négative
LEXIQUE : décrire les étapes d'une action, la maison, les taches ménagères
PRODUCTION ORALE : comprendre le récit d'un voyage
PRODUCTION ECRITE : raconter ses actions quotidiennes

Unit – II **(12 hours)**

TITRE:A PROPOS DE LOGEMENT
GRAMMAIRE : quelques adjectifs et pronoms indéfinis, les verbes lire, rompre et se plaindre
LEXIQUE : la localisation et le logement, les pièces, meubles et équipement
PRODUCTION ORALE : jeu de rôle –votre ami et vous s'installe dans un nouveau meuble
PRODUCTION ECRITE : décrire votre maison/appartement

Unit- III **(12 hours)**

TITRE:TOUS EN FORME!
GRAMMAIRE : le passé composé et l'imparfait, le passé récent, l'expression de la durée
LEXIQUE : un souvenir et les évènements du passées, le corps humain : extérieur, le corps humain : intérieur
PRODUCTION ORALE : échanger sur ses projets de vacances
PRODUCTION ECRITE : raconter un souvenir

Unit – IV **(12 hours)**

TITRE:ACCIDENTS ET CATASTROPHES
GRAMMAIRE : les adjectifs et les pronoms indéfinis : rien/ personne/aucun, les verbes dire, courir et mourir
LEXIQUE : savoir les mots et les expressions des catastrophes naturelles, les maladies et les remédies, les accidents, les catastrophes naturelles
PRODUCTION ORALE : comprendre des personnes qui expriment leur accord ou leur désaccord selon un thème donné
PRODUCTION ECRITE : écrivez sur une catastrophe naturelle en articulant la cause et la conséquence

Unit –V **(12 hours)**

TITRE:FAIRE SES ETUDES A L'ETRANGER/ BON VOYAGE/ LA METEO
GRAMMAIRE : les pronoms démonstratifs neutres, le futur simple, situer dans le temps, moi aussi/non-plus – moi non/si, les verbes impersonnels, les verbes croire, suivre et pleuvoir
LEXIQUE : savoir vivre en France, le système scolaire, les formalités pour partir à l'étranger.
PRODUCTION ORALE : exprimer son opinion sur la météo/parler del'avenir
PRODUCTION ECRITE: comparer le système scolaire français et indien

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A2*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A2*, CLE International, 2^{e}edition,2013
2. Régine Mérieux and Yves Loiseau, *Latitudes A2*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers,2011

Web Resources

1. https://www.frenchcourses-paris.com/french-travel-journal/
2. http://www.saberfrances.com.ar/vocabulary/house.html
3. https://www.thoughtco.com/different-past-tenses-in-french-1368902
4. https://www.youtube.com/watch?v=JZdwJM7sEY8
5. https://www.scholaro.com/pro/Countries/France/Education-System

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
IV	21UFR41GL04			FRENCH – IV				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	3	1	3	2	2	3	2	1	2	2	2.1
CO–2	3	1	2	3	3	3	2	1	3	1	2.2
CO–3	3	2	3	2	2	3	2	1	3	2	2.3
CO–4	3	1	2	2	3	3	3	1	3	3	2.4
CO–5	2	2	3	3	1	3	1	2	3	2	2.2
Mean overall Score											2.24 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHI41GL04	HINDI - IV	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to	
CO-1	list out the social conditions prevailed in Modern Period which are depicted in Hindi Literature.	K1
CO-2	discuss the dialects of Hindi language.	K2
CO-3	illustrate the works of some eminent Hindi Writers related to society.	K3
CO-4	analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliyah”.	K4
CO-5	evaluate the film & Literary works in Hindi.	K5

Unit - I **(12 Hours)**

Computer ka yug
Prathyay
Adhunik Kal - Namakarn
Namakaran

Unit - II **(12 Hours)**

Vigyan hani/labh
Paryayvachy Shabdh
Adhunik Kal - Samajik Paristhithiyam
Samanarthy Shabdh

Unit - III **(12 Hours)**

Nari shiksha
Upasarg
Adhunik Kal – Sahithyik Paristhithiyam
Adhunik kal – Salient Features

Unit - IV **(12 Hours)**

Review- Book/Film
Paryavaran Pradookshan
Adhunik Kal - Main Divisions
Adhunik Kal - Visheshathayem

Unit - V **(12 Hours)**

Sapnom Kee Home Delivery (Novel)
Anuvad - 4

Books for Study

1. Dr. Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020. **Unit-I** *Chapters 4*
2. M. Kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020. **Unit-II, III and IV** *Chapter 2*
3. Dr. Sanjeev Kumar Jain, *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, MadhyaPradesh,2019 **Unit-V** *Chapter 2*

Books for Reference

1. Hindi Niband Sangrah,V&S Publishers, 2015.
2. Rajeswar Prasad Chaturvedi, Hindi vyakarana, Upakar prakashan,2015.
3. Ramdev,Vyakaran Pradeep, Hindi Bhavan, 2016.
4. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.
5. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.

Web Resources

1. https://youtu.be/xmr-DaQ3LhA
2. https://youtu.be/xIm-VEmgEg0
3. https://youtu.be/ZHuqxWbMtas
4. https://youtu.be/HGS63OJuHto
5. https://youtu.be/r-i3autqPug

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
IV	21UHI41GL04			HINDI - IV					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	3	2	3	2	3	1	2.4
CO-2	3	2	3	3	2	3	2	3	1	2	2.4
CO-3	3	2	2	3	2	2	1	3	2	3	2.3
CO-4	3	2	3	1	3	3	2	3	3	2	2.5
CO-5	3	2	2	3	3	2	3	2	3	3	2.6
Mean Overall Score											2.44 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21USA41GL04	SANSKRIT - IV	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember and identifying Mahabharatha characters and events.	K1
CO-2	understand human behaviors by studying dramas.	K2
CO-3	apply the morals learnt in day to day life.	K3
CO-4	create new conversational sentences and to Improve self-character (Personality Development).	K4
CO-5	appreciate ancient Sanskrit dramas.	K5

Unit - I **(12 Hours)**

Samskrita Vyavahara sahasri vakiya Prayogaha

Unit - II **(12 Hours)**

Lot Lakaarah , Prqayaogh Kartari Vaakyaani

Unit - III **(12 Hours)**

Naatakasya Itihaasah Vivaranam, Thuva and Tum Prathiyaha

Unit - IV **(12 Hours)**

Karnabhaaram , Naatakasya Visistyam

Unit - V **(12 Hours)**

Samskrita Rachanani priyogaha

Book for Study

Karnabhavam & Literature Language, 2019 , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007

Books for Reference

1. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palghat – 678003 , Kerala , south India , History of Sanskrit Literature 2019

2. Kulapathy , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2018
3. Samskrita Bharathi , Aksharam 8 th cross , 2nd phase Giri nagar Bangalore Vadatu sanskritam – Samaskara Binduhu 2019

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
IV	21USA41GL04			SANSKRIT-IV				4		3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	3	2	3	2	3	3	2	2.5
CO-2	2	2	3	2	3	3	3	3	3	2	2.4
CO-3	3	3	2	3	2	1	1	3	3	3	2.4
CO-4	2	3	3	3	2	1	3	3	3	2	2.5
CO-5	2	2	3	2	3	3	3	3	2	3	2.6
Mean Overall Score											2.48
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
IV	**21UEN42GE04**	**GENERAL ENGLISH - IV**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	identify different local and global issues in given passages	**K1**
CO-2	understand explicit and implicit information given in written texts	**K2**
CO-3	use appropriate words and punctuations in writing	**K3**
CO-4	analyse written texts and modify them for better clarity	**K4**
CO-5	assess the coherence and cohesion of written texts and rewrite them	**K5 & K6**

Unit-I **(15 Hours)**

1. Women through the Eyes of Media
2. General Writing Skill: Writing Minutes of a Meeting
3. Grammar: Present Perfect Tense

Unit-II **(15 Hours)**

4. Effects of Tobacco Smoking
5. General Writing Skill: Note-Taking
6. Grammar: Present Perfect Continuous Tense

Unit-III **(15 Hours)**

7. Short Message Service (SMS)
8. General Writing Skill: Note-Making
9. Grammar: Past Perfect Tense

Unit-IV **(15 Hours)**

10. An Engineer Kills Self as Crow Sat on his Head: A Newspaper Report
11. General Writing Skill: Précis Writing
12. Grammar: Past Perfect Continuous Tense

Unit-V **(15 Hours)**

13. Traffic Rules
14. General Writing Skill: Paragraph Writing
15. Grammar: Future Perfect Tense and Future Perfect Continuous Tense

Book for Study

Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. Trinity, 2016.

Books for Reference

1. Clark Peter, Roy. *Writing Tools: 50 Essential Strategies for Every writer*. USA: Little, Brown Spark Publishers, 2008.
2. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. India: Fingerprint Publishers, 2018.
3. Vaughn, Steck. *Reading Comprehension*. USA: Steck-Vaughn Co, 2014.
4. Birkett, Julian. *Word Power: A Guide to Creative writing*. India: Bloomsburry Acdemic, 2016.
5. Knight, Dudley. *Speaking with Skill: An Introduction to Knight-Thompson Speechwork*. USA: Methuen Drama, 2016.

Web Resources

1. https://blog.lingoda.com/en/10-news-sites-to-practice-your-english-reading-skills/
2. https://www.espressoenglish.net/how-to-learn-english-for-free-50-websites-for-free-english-lessons/
3. https://www.ef.com/wwen/english-resources/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
IV	21UEN42GE04			GENERAL ENGLISH - IV					5	3
Course Outcome (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
Mean Overall Score											2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEL43CC05	CORE -5: LINEAR INTEGRATED CIRCUTS	4	3

CO. No.	CO - statements	Cognitive Levels (K- levels)
On completion of this course, students would be able to		
CO-1	describe linear integrated circuits using op-amp and timer	**K1**
CO-2	explain the fabrication techniques and applications of linear integrated circuits	**K2**
CO-3	apply Op-amp for various applications in electronics	**K3**
CO-4	analyze different analog integrated circuit and is used in real time problems	**K4**
CO-5	Evaluate, compare and construct different circuits using op-amp and timer ICs	**K5, K6**

UNIT I: INTEGRATED CIRCUIT FABRICATION (12Hours)

Introduction - Classification - IC Chip Size and Circuit Complexity - Fundamentals of Monolithic IC Technology - Basic Planar Process - Fabrication of a Typical Circuit - Active and Passive Components for ICs - Fabrication of FETs - Thin and Thick Film Technology - Technology Trends

UNIT II: OPERATIONAL AMPLIFER (12Hours)

Op-Amp - Ideal Operational Amplifier - Open Loop Operation of Op-Amp - Feedback in Ideal Op-Amp - Inverting Amplifier - Input Resistance - Output Resistance - Non-Inverting Amplifier -Voltage Follower - Differential Amplifier - Difference Mode and Common Mode Gain - Common Mode Rejection Ratio - Operational Amplifier Internal Circuit - AC Characteristics and DC Characteristics.

UNIT III: APPLICATIONS OF OPERATIONAL AMPLIFIER (12Hours)

Basic Op-Amp Application - Summing Amplifier - Inverting Summing Amplifier - Non-Inverting Summing Amplifier – Subtractor – Adder – Subtractor - Instrumentation Amplifier - AC Amplifier - V to I and I To V Converter - Op-Amp Circuits using Diodes: - Half-Wave Rectifier - Full-Wave Rectifier - Peak Detector - Clipper - Clamper - Sample and Hold Circuit – Differentiator -Integrator – Comparator - Zero Crossing Detector - Window Detector - Phase Detector - Schmitt Trigger.

UNIT IV: WAVEFORM GENERATORS AND FILTERS USING OP AMP (12Hours)

Square Wave Generator (AstableMultivibrator) - MonostableMultivibrator - Triangular Wave Generator - Basic Principle of Sine Wave Oscillators - Saw Tooth Wave Generator - Active Filters 1st and 2nd Order: Low Pass – Bandpass – Band Reject - High Pass.

UNIT V: 555 TIMERS AND A/D, D/A CONVERTERS (12Hours)

555 Timers - Operating Modes – Pin Functions - Free Running or AstableOperation - Application in AstableOperation - One Shot or MonostableOperation - Application in MonostableOperation-Introduction of Digital-To-Analog Converter-DAC Characteristics -R-

2R Ladder DAC- Analog-To-Digital Converter-ADC Characteristics-Integrating ADC-Successive Approximation ADC-Flash Converter

Book for Study

1. D. Roy Choudhury, Shail B. Jain, *Linear Integrated Circuits*, 4th Edition, New Age International (P) Limited, 2017.
2. Robert F. Coughlin and Frederick F. Driscoll, *Operational Amplifiers and Linear Integrated Circuits*, 6thEdition, Prentice Hall, 2001.

Unit	Book	Chapter	Sections
I	1	1	1.1 - 1.10
II	1	2, 3	2.1 - 2.4, 3.2.1, 3.2.2, 3.3.1, 3.3.2
III	1	4, 5	4.1 - 4.8, 4.10, 4.11, 5.2, 5.3.
IV	1 2	5, 7 6, 11	5.3-5.7,7.1-7.3 6.4, 11.1 - 11.6, 11.8, 11.9, 11.10
V	1 2	8,10 13, 14, 15	8.1-8.5, 10.1-10.4 13.0 -13.6, 14.0-14.2, 15.0-15.3 15.7

Book for Reference

1. James M. Fiore, *Operational Amplifiers and Linear Integrated Circuits*: *Theory and Application*, Creative Commons Edition, 2020.
2. S. Salivahanan and V. S. KanchanaBhaaskaran, *Linear Integrated Circuits*, 1st Reprint, Tata McGraw Hill, 2008.
3. Ramakant A. Gayakwad, *Op-Amps and Linear Integrated Circuits*, 4th Edition, Printice Hall, 2002.

Web References

1. https://www.tutorialspoint.com/linear_integrated_circuits_applications/basics_of_linear_integrated_circuits_applications.htm
2. https://www.tutorialspoint.com/linear_integrated_circuits_applications/index.htm
3. https://whatis.techtarget.com/definition/linear-integrated-circuit-linear-IC

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
IV	**21UEL43CC05**	**CORE -5: LINEAR INTEGRATED CIRCUTS**	**4**	**3**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	3	3	2	2	3	3	3	2	2	2.6
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	3	2	3	2	2	3	2	2	2	2	2.3
CO-5	3	3	2	2	2	3	3	2	2	2	2.4
Mean Overall Score											2.46
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEL43CC06	CORE -6: COMMUNICATION ELECTRONICS	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	list and describe different types of modulation techniques	**K1**
CO-2	deduce solutions to reduce noise to establish green communication	**K2, K3**
CO-3	examine and develop the concepts of communication for real time needs	**K3, K4**
CO-4	analyze and perceive communication modules to troubleshoot them	**K4**
CO-5	asses and create communication modules and adapt for Entrepreneurship and higher education	**K5, K6**

UNITI: AMPLITUDE MODULATION (15 Hours)

Modulation – Need of Modulation - Types of Modulation – Mathematical Expression for AM Wave - Side Frequencies - Modulation Index – Power Relationship - Component Phasor of AM Signal - Spectrum of AM Wave. Generation of AM Waves – DSB - SC - AM – SSB - AM – VSB - AM - Linear Modulation -: Collector, Base and Emitter Modulation - Square Law Modulator - Balanced Modulator –DSS- SC-SSB - SC Generation - VSBDemodulationof AM Waves – AM Applications

UNIT II: ANGLE MODULATION (15 Hours)

Phase and Frequency Modulation – Mathematical Representation of FM And PM - Frequency Spectrum of FM - Bandwidth Of FM: Bessel's Identity - Carson's Rule - Spectrum of Narrow Band and Wide Band FM- Generation of FM From PM And PM From FM. Generation of FM - Direct and Indirect Method – Demodulation of FM Waves – Pre-Emphasis and De-Emphasis in FM - FM Applications

UNIT III: TRANSMITTER AND RECEIVERS (15 Hours)

Communication Transceiver - Block Schematic Study of Transmitters – AM Transmitter - High Level and Low-Level AM Transmitters - SSB-SC Transmitter - FM Transmitter - Direct and Indirect FM Transmitters - Block Schematic Study of Receivers - TRF Receiver- Super Heterodyne Receiver –Double Conversion Receiver - Choice of IF Frequencies - Tracking -Alignment – AGC - AFC - Characteristics of Receivers

UNIT IV: DIGITAL COMMUNICATION TECHNIQUES (15 Hours)

Sampling Process - PAM - PWM- PPM – PCM - DPCM – Delta Modulation – ASK –FSK- PSK – QAM – TDMA – FDMA - CDMA – Spread Spectrum Communication

UNIT V: TRANSMISSION LINES AND NOISE (15 Hours)

Fundamentals of Transmission Lines - Characteristic Impedance – SWR - Losses In Lines - Transmission Line Components: Double Stub - Baluns – Noise - Classification Of Noise - Atmospheric Noise - Extra-Terrestrial Noise - Man Made Noise - Thermal Noise - Shot Noise -Addition of Noise Due To Several Sources - Addition of Noise Due to Several Amplifiers in Cascade - Noise in Reactive Circuits - Signal to Noise Ratio - Noise Figure - Calculation of Noise Figure - Noise Figure in Terms of Equivalent Noise Resistance - Noise Temperature

Book for Study:

1. Kennedy and George Davis, *Electronic Communication Systems*, 6th Edition, McGraw Hill Education, 2017.
2. Wayne Tomasi, *Electronic Communication Systems*, 5th Edition, Pearson education, 2008.
3. Bernard Sklar,*Digital Communications Fundamentals and Applications*, 3nd Edition, Prentice Hall, 2021

Unit	Book	Chapter	Sections
I	1 2	3, 4 6	3.1,3.2, 4.1, 4.2, 4.3 6.1-6.6
II	1 2	5 7	5.1, 5.2, 5.3 7.5- 7.16
III	1	13	13.1, 13.2
IV	1 3	6 4,11	6.1,6.2,6.3,6.4,6.5 4.2, 4.4, 11.1
V	1	2, 7	2.1, 2.2,2.3,2.4,2.5,7.1,7.2,7.3

Book for Reference:

1. Simon Haykin, *Communication Systems*, 4thEdition, John Wiley, 2007.
2. G.K. Mithal, *RadioEngineering*, 20thEdition, KannaPublication, 2002.
3. Dennis Roddy and John Coolen, *Electronic Communications*, 4th Edition, Pearson Education, 2008.

Web References:

1. https://onlinecourses.nptel.ac.in/noc20_ee69/
2. https://www.vlab.co.in/ba-nptel-labs-electronics-and-communications
3. https://www.circuitstoday.com/basic-terminologies-electronic-communication

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
IV	**21UEL43CC06**	**CORE -6: COMMUNICATION ELECTRONICS**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	3	1	2	2	2	2	3	2	2.2
CO-2	3	2	2	3	2	3	2	3	2	2	2.4
CO-3	2	2	3	3	3	3	2	2	2	2	2.6
CO-4	2	3	2	3	1	2	2	3	3	2	2.3
CO-5	2	3	2	3	2	3	3	2	2	3	2.5
Mean Overall Score											**2.4**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEL43CP02	CP 02: ELECTRONICS PRACTICAL - II	3	2

List of Experiments (Any sixteen experiments)

Digital Experiments:

1. Construction and study of basic gates (NOT, AND and OR) using transistor and diodes
2. Simplification logical expression using K-map and implementation using gates
3. Construction and study of 4:1 Multiplexer and 1:4 Demultiplexer and study of IC 74151 and IC74154
4. Construction and study of encoder and decoder
6. Construction and study of Flip-Flops
7. Construction and study of Shift registers
8. Construction and study of Asynchronous counters
9. 2 bit ALU

Analog experiments (Electronics devices and Circuits)

10. Study of Zener diode characteristics.
11. Study of clipper and clamper circuits using diodes
12. Study of transistor biasing, calculation of Q-point and DC load line analysis
13. Study of FET biasing.
14. Study of Transistor characteristics –CE, CB and CC mode
15. Construction and Study of RC coupled Transistor amplifier
16. Construction and verification of Hartley oscillator and Colpitts's oscillator
17. Construction and verification of RC phase shift oscillator and Wien's bridge oscillator
18. Construction and study of Class A and Class B Power Amplifier

Communication and LIC Experiments

19. Study of AM
20. Study of FM
21. Study of PAM, PWM
22. Study of PPM and PCM
23. Study of Transmission Line Characteristics
24. Construction and study of ASK and FSK
25. Study of op-amp characteristics using LM741
26. Construction and study of inverting, non-inverting, voltage follower, summing amplifier using op-amp LM741
27. Construction and study of comparator, integrator and differentiator using op-amp TL064
28. Construction and study of instrumentation amplifier using op-amp LM358
29. Construction and study of filters using op-amp LM358 (Low pass filter, High pass filter and Band pass filter)
30. Construction and study of Phase shift and Wiens's bridge oscillator using op-amp LM358
31. Construction and study of astable and monostablemultivibrator using IC555.
32. Construction and study of 4-bit DAC using R-2R ladder method
33. Construction and study of 4-bit flash type ADC

Book for Study: Practical manual by the Department

Semester	Course Code	Title of the Course	Hours	Credit
IV	21UEL43AO04A	ALLIED: APPLIED PHYSICS – II	4	3

(Offered to Department of Electronics)

CO.NO	CO- STATEMENTS	Cognitive Level (K-Levels)
On the successful completion of the course, student will be able to		
CO-1	Acquire the required basic concepts in general physics and be able to interpret them in daily life.	**K1, K2**
CO-2	Categorize various dielectric materials by comparing various crystal properties accordingly.	**K3**
CO-3	Analyse and summarise various Modern materials based on studying the physics behind them.	**K2, K4**
CO-4	Apply the concept of LASER and Fibre optics on various applications through analysing various problems.	**K3, K4**
CO-5	Experiment with and give solutions on choosing various materials for fabrication thereby managing the existing eco system.	**K3**

UNIT - I: WAVE OPTICS (12 Hours)

Superposition - Superposition of Waves - Young's double slit Experiment - Coherence - Wedge Shaped Films - Newton's Rings.

Diffraction - Types: Fresnel and Fraunhoffer - Diffraction of Circular Aperture - Diffraction Grating - Resolving Power - Grating, Prism Comparison

Polarization - Types of Polarized Light - Polarization by reflection - Malus Law - Double Refraction (Huygen's ppl.), Nicol Prism.

UNIT - II: LASERS AND FIBER OPTICS (12 Hours)

Lasers: Introduction - Principle - Einstein's theory - Methods of achieving population inversion - Ruby Laser - He-Ne Laser - Applications.

Fibre Optics: Introduction - Structure of optical fibres - Materials - Classifications - Fibre Loss - FOC.

UNIT - III: CRYSTAL PHYSICS (12 Hours)

Lattice (unit cell) - Bravais lattice - Miller indices - d-spacing - number of atoms per unit cell - Atomic radius - Coordination number - Packing factor - Crystal structure (examples) - Crystal defects - Burger vector.

UNIT - IV: DIELECTRIC MATERIALS (12 Hours)

Basic definitions - Various types of polarization in dielectric materials - Frequency and temperature dependence of polarization - Internal field or local field - Clausius-Mosotti equation - Dielectric losses - Dielectric breakdown - Applications of dielectric materials - Ferro electricity.

UNIT - V: MODERN ENGINEERING MATERIALS (12 Hours)

Engineering Physics Metallic glasses - Shape memory alloys - Nano materials - Carbon nanotubes - Solar Cells.

BOOKS FOR STUDY

1. D.K. Bhattacharya & A. Bhaskaran, Engineering physics, Oxford University Press.
2. V Rajendran, Engineering physics, Tata McGraw Hill Education.
3. G. Aruldhas, Engineering Physics, Prentice-Hall of India Pvt Limited.

BOOK FOR REFERENCE

1. Pearson Hugh D. Young Roger A. Freedman, University Physics with Modern Physics, Fourteenth Edition,

UNIT	BOOK	CHAPTERS	SECTIONS
I	3	3,4,5	3.1, 3.2, 3.4, 3.8, 3.9; 4.1, 4.2, 4.4, 4.5, 4.8; 5.2, 5.3, 5.5, 5.6, 5.8, 5.9
II	2	11,12	11.1,11.2, 11.3, 11.4, 11.7.1, 11.7.2, 11.10.10, 12.1-12.6, 12.8, 12.9
III	1	5	5.1-5.10, 5.12, 5.13
IV	1	10	10.1-10.10
V	1	11	11.1-11.4
	2	15	15.4

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
IV	21UEL43AO04A			ALLIED: APPLIED PHYSICS – II				4		3
Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				Mean Scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO1	PSO 2	PSO3	PSO 4	PSO 5	
CO-1	3	2	1	3	2	3	3	1	2	2	2.2
CO-2	3	2	2	3	2	3	3	2	2	3	2.5
CO-3	3	2	2	3	2	3	3	2	2	3	2.5
CO-4	3	3	2	3	2	3	3	2	2	2	2.5
CO-5	3	3	2	3	3	3	3	2	2	3	2.7
Mean Overall Score											2.48
Result											High

Semester	Course Code	Title of the Course	Hours	Credit
IV	21UEL43AP01A	ALLIED: APPLIED PHYSICS PRACTICALS	2	2

Any 16 of the following

1. Young's modulus of a Uniform Bar by optical lever method: Uniform bending
2. Young's modulus of a Uniform Bar by optical lever method: Non-Uniform bending
3. Vibration of Strings: Melde's Apparatus
4. Sonometer – Frequency
5. Spectrometer – Refractive index of a prism
6. Spectrometer – Normal Incidence: Grating – Wavelength
7. Air Wedge – Thickness of a wire
8. Newton's Rings – Determination of R
9. Convex lens
10. Concave lens
11. P.O Box – Temperature coefficient – Thermistor
12. Specific Heat of the liquid by cooling – Cooling Graph
13. Thermal Conductivity of a bad (cardboard) conductor – Lee's Disc
14. Carey Foster 's Bridge – low resistance and specific resistance
15. Potentiometer – Ammeter Calibration
16. Potentiometer – Specific Resistance of a coil of wire R
17. Conversion of a Galvanometer into voltmeter
18. Spot Galvanometer – Figure of merit & Resistance of the Galvanometer
19. Field along the axis of a coil – deflection magnetometer
20. Comparison of Magnetic Moments – null method (one in Tan A, other in Tan B)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEL43AO04B	ALLIED: COMPUTER SCIENCE-II (Data And Communication Networks)	4	3

CO.NO.	CO- Statement On successful completion of the course, the student will be able to	Cognitive Levels (K- level)
CO-1	understand the foundations of data communications	K2
CO-2	appraise the classification and basic concepts of Switching and Routing	K5
CO-3	analyze the concepts of LAN Network	K4
CO-4	use the concepts of Wireless LAN Technology	K3
CO-5	acquire the basic knowledge on IoT	K1

UNIT - I **(12 Hours)**

Introduction to Computer Networks and Data Communication: Need for Computer Networks – Evolution – Data Communication Fundamentals – Data Transmission– Transmission Media.

UNIT – II **(12 Hours)**

Network Classification, Communication and Components: Classification of Computer Networks – Switching and Routing – Routing – Multiplexing and Concentration – Concentrator – Terminal Handling – Components of Computer Network.

UNIT - III **(12 Hours)**

Network Standards and OSI Model: Need for Network Standards – The OSI Reference Model. Local Area Network: The Evolution of LAN – LAN Architecture – LAN advantages and Services – Characteristics of LAN – LAN Topologies.

UNIT - IV **(12 Hours)**

Wireless LAN and VSAT: Wireless LANs – Components of Wireless LAN – Working of Wireless LANs –Infrared Technology – Wireless LAN Types – Protocols for Wireless LAN – Uses of Wireless LANs – Bluetooth Technology.

UNIT - V **(12 Hours)**

Introduction to Internet of Things: Definition of Internet of Things –Application Areas of IoT – Characteristics of IoT – Things in IoT – IoT Stack – Enabling Technologies – IoT Challenges.

Books for Study

1. Rajesh, Eswarakumar and Balasubramanian, "Computer Networks, Fundamentals and Applications", Vikas Publishing House Pvt. Ltd., 2002.
   Unit I: Chapter-1
   Unit II: Chapter-2
   Unit III: Chapter-3 (Sec.3.1 & 3.2) Chapter-5 (Sec.5.1 to 5.5)

Unit IV: Chapter-7 (Sec.7.1 to 7.3, 7.5 to 7.7, 7.9 & 7.12)

2. Shriram K Vasudevan, Abhishek S. Nagarajan and R.M.D., Sundaran, "Internet of Things", Wiley Publication, 2nd Edition, 2020.
   Unit V: Chapter-1 (Sec.1.1, 1.3 to 1.8)

Books for Reference

1. William Stallings, "Data and Computer Communications", Prentice Hall of India, Seventh Edition, 2004.
2. Andrew S Tanenbaum, "Computer Networks", Prentice Hall of India, New Delhi 1999.
3. Arshdeep Bahga and Vijay Madisetti, "Internet of Things- A Hands-on Approach", Universities Press Private Limited, India, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
IV	21UEL43AO04B	ALLIED: COMPUTER SCIENCE-II (Data And Communication Networks)	4	3

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	3	2	2	3	2.4
CO-2	2	3	2	1	2	3	3	2	2	3	2.3
CO-3	1	2	3	2	3	2	3	2	3	3	2.4
CO-4	2	2	2	3	2	2	3	2	2	3	2.3
CO-5	2	2	2	2	3	1	3	2	2	3	2.2
Mean Overall Score											2.32
Result											High

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEL43AP01B	ALLIED: COMPUTER SCIENCE PRACTICALS	2	2

CO No.	CO- Statement	Cognitive Level (K- level)
	On successful completion of the course, the student will be able to	
CO-1	understand the various text formatting tags, adding images to web page, presenting list of information.	K1, K2
CO-2	apply the knowledge in creating a simple web page with links to other web page and display information in table form.	K3
CO-3	design a form in a web page and divide the browser window in multiple sections using frames.	K3, K6
CO-4	categorize various commands in SQL.	K4, K5
CO-5	analyze and build a web page.	K4, K6

1. Simple web page with all the Text Formatting tags
2. Adding Images to Web Pages
3. Creating Lists (Ordered and Unordered List)
4. Adding Links to Web Pages
5. Creating Tables using various attributes
6. Creating Frames
7. Designing forms (DDL)
8. Implementation of Data Definition language commands
9. Implementation of DML, TCL and DCL commands

Simple Projects using HTML

1. Web blogs creation.
2. Department Website creation.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
IV	21UEL43AP01B	ALLIED: COMPUTER SCIENCE PRACTICALS	2	2

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	1	2	3	3	2	2	2.3
CO-2	2	3	2	2	1	2	3	3	2	2	2.2
CO-3	3	2	2	2	2	2	3	3	2	2	2.3
CO-4	3	3	2	3	2	2	2	3	2	1	2.3
CO-5	3	3	2	3	2	2	3	3	2	2	2.5
Mean Overall Score											2.32
Result											High

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEL44SE02	SEC-2 (BS): PC ASSEMBLING AND SERVICING	2	1

CO No	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe and explain various computer modules	**K1, K2**
CO-2	explain various PC servicing methods	**K2**
CO-3	classify and use the suitable configuration to assemble a PC	**K3**
CO-4	identify and categorize the peripherals for a PC	**K4**
CO-5	Assemble, install the software, maintain and service the PC	**K5, K6**

UNITI: PC ORGANIZATION (6 Hours)

Introduction to Computer Hardware – Processors - Components of Mother Boards – Connectors Types: Onboard - Front Panel – Back Panel – Ports - Slots - Add on Cards – Graphics Cards – BIOS.

UNITII: POWER SUPPLY (6 Hours)

Power Supply Unit - SMPS Outputs - Voltage Measurements - CPU Connector and Device Connectors - Cabinet Types – AT- ATX- BTX- SFF- ITX - Form Factor - Types of Cases: Tower Case – Desktop Case - Portable Case.

UNITIII: MEMORIES (6 Hours)

Semiconductor Memory – ROM– PROM– EPROM – DDR RAM– Virtual Memory - Cache Memory - Linear and Physical Memory - Video Memory - Secondary Memories: HDD – SSD – M.2 SSD – M.2 NVME SSD - CD Rom - CD-RW-DVD.

UNITIV: INPUT AND OUTPUT DEVICES (6 Hours)

Input Devices – Keyboard – Mouse - Types of Mouse - DIN/PS2 Port - Serial Port – Parallel Ports – USB Ports – Scanner - Output Devices - Monitor- Printer.

UNITV: ASSEMBLING AND INSTALLATION (6 Hours)

PC Assembling – Bios Setting - Booting Sequence Setting - Installation Menu Selection– Partitioning- Formatting– OSInstallation - Device Driver Installation – Network Setup.

Book for Study

1. Study material prepared by the Department.

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	3	All
IV	1	4	All
V	1	5	All

Book for Reference:

1. Scott Mueller, *Upgrading and Repairing PCs*, 19th edition, Pearson education, Inc, 2010.
2. Stephen Bigelow, *Troubleshooting, Maintaining and Repairing PCs*, 5th Edition, McGraw Hill Education, 2017.
3. Craig Zacker, *PC Hardware: The Complete Reference*, 1st Edition, McGraw Hill Education, 2017.

Web References:

1. https://khalisuraj.wordpress.com/pc-troubleshooting-i-pc-assembly-hardware-configuration-servicing/
2. http://www.aarscomputers.com/computer-assembling-services/
3. https://www.instructables.com/How-To-Assemble-A-Basic-Desktop-PC/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
IV	**21UEL44SE02**	**SEC-2 (BS): PC ASSEMBLING AND SERVICING**	**2**	**1**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	3	2	2	3	3	3	3	2.5
CO-2	2	2	2	2	2	2	2	2	3	3	2.2
CO-3	2	1	1	2	2	2	2	3	2	2	1.9
CO-4	1	2	2	3	3	3	3	3	3	3	2.6
CO-5	2	2	2	1	2	3	2	2	2	3	2.1
Mean Overall Score											**2.3**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHE44VE04A	PROFESSIONAL ETHICS–II: SOCIAL ETHICS - II	2	1

CO No.	Course Outcomes:	Cognitive Level
	On completion of this course the graduates will be able to:	
CO-1	know the value of natural recourses and to live in a harmony with nature.	K1
CO-2	comprehend the importance of a healthy life.	K2
CO-3	apply the plans of disaster management in the society.	K3
CO-4	analyse the importance and differences of science and religion.	K3
CO-5	apply counseling skills and solve their problems.	K4

Unit-I Harmony with Nature (6-Hours)

What is environment, Why should we think of harmony, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Natural Resources, Fruits of disharmony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life. Harmony with animal kingdom.

Unit-II Issues Dealing with Science and Religion (6-Hours)

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science and Technology Innovation Policy of India.

Unit-III Public Health (6-Hours)

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Drug Addiction and Drug abuse

Unit-IV Disaster Management (6-Hours)

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid.

Unit-V Counselling for Adolescents (6-Hours)

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news.Importance of Career Guidance Counselling.

Books for Study

Department of Human Excellence, *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappali 02, 2021.

Books for Reference

1. Albert, D. and Steinberg, L, *Judgment and decision making in adolescence*: Journal of Research on Adolescence, page no: 211-224. 2011
2. Larry R. Collins, *Disaster Management and Preparedness*, Lewis Publications, 22 November 2000.
3. Elizabeth B. Hurlock, *Developmental Psychology: A: Life-Span Approach*, New Delhi: Tata McGraw-Hill, 1981, 5th Edition, August 18, 2001.
4. Sangha, Kamaljit. *Ways to Live in Harmony with Nature: Living Sustainably and Working with Passion.* Australia, Woodslane Pty Limited, 2015.

Web Sources:

https://en.wikipedia.org/wiki/Disaster_management_in_India
https://ndma.gov.in/
https://talkitover.in/services/child-adolescent-counselling/
https://www.nipccd.nic.in/schemes/adolescent-guidance-centre-19#gsc.tab=0

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHE44VE04B	PROFESSIONAL ETHICS II: RELIGIOUS DOCTRINE - II	2	1

CO.No.	CO-Statements	Cognitive Levels (K- level)
	On completion of this course, the graduates will be able to:	
CO-1	Understand the history of the Catholic Church	K1
CO-2	Examine and grasp the Sacraments of the Catholic Church	K2
CO-3	Apply the Christian Prayer to their everyday life	K3
CO-4	Analyze themselves in the light of Sacraments & Christian Prayer	K4
CO-5	Create a harmonious society learning values from all religions	K5 & K6

Unit-I	**The Catholic Church**	**(6 Hours)**
Unit-II	**Sacraments of Initiation**	**(6 Hours)**
Unit-III	**Sacraments of Healing & at the Service of Community**	**(6 Hours)**
Unit-IV	**Christian Prayer**	**(6 Hours)**
Unit-V	**Harmony of Religions**	**(6 Hours)**

Books for Study

Department of Human Excellence, *Life in the Lord: Religious Doctrine.* St. Joseph's College, Trichirappalli 02, 2021.

Books for Reference

1. *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India, 1994.
2. Holy Bible (NRSV).

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53CC07	CORE -7: MICROPROCESSORS AND APPLICATIONS	4	3

CO. No.	CO Statements	Cognitive Levels (K- level)
On completion of this course, students would be able to		
CO-1	describe microprocessor and explain its working	K1, K2
CO-2	explain and illustrate microprocessor programmes	K2, K3,
CO-3	Examine real time problems, solve with microprocessor by employing modern tools.	K3, K4
CO-4	assess the need of microprocessors to solve the problems with professional tools and recommend the solutions for the same	K5
CO-5	design and construct the microprocessor projects	K6

UNIT I: INTEL 8085 **(12 Hours)**

Overview of Microprocessors - Architecture of 8085 Microprocessor – Pin Configuration – Intel 8085 Instructions – Opcode and Operands – Instruction Cycle – Machine Cycle and T-State Instruction and Date Flow - Timing Diagram: Opcode Fetch Cycle – Memory Read – I/O Read – Memory Write – I/O Write - Stack and Stack Operations.

UNIT II: 8085 PROGRAMMING **(12 Hours)**

Instruction Set - Data Format - Addressing Modes - Status Flags – Assembly Language - High Level Language; Programming Exercises: Addition – Subtraction - Multiplication – Division; Array Manipulation: Average in Array - Ascending -Descending - BCD to Seven Segment Display - Subroutines - Delay Subroutine - Interrupt and Programming

UNIT III: PERIPHERAL INTERFACES **(12 Hours)**

PPI 8255 - UART 8251 – 8253 Timer - 8259 Interrupt Controller - 8257 Programmable DMA – 8275 Programmable CRT Controller - 8279 Keyboard and Display Interface Controller - Applications Stepper Motor and Traffic Controller Using 8085 Microprocessors - 8085 Simulator Software

UNIT IV: INTEL 8086 **(12 Hours)**

Intel 8086 Architecture - Pin Description and Function Overview – Minimal and Maximum Mode - Bus Activities During Read/Write Operation - Interrupt Structure and Operation - Comparative Study of 286,386,486 and Pentium Processors – Simple Programs

UNIT V: INTEL CORE I5 **(12 Hours)**

Multi Core – Thread – CacheMemory - Processor Configuration – Register Definitions – Host Bridge – DRAM Controller – Processor Graphics – PCI Controller – Dynamic Tuning Technology – Power and Performance – Debug – Power Management – Thermal Management –Signal Description

Book for Study

1. B. Ram, *Fundamentals of Microprocessors and Microcomputers*, 5th Edition, Reprint, Dhanpat Rai Publications, New Delhi, 2003.
2. Study Material Prepared by the Department

Unit	Book	Chapter	Sections
I	1	3	Relevant sections
II	1	4, 5	Relevant sections
III	1	7, 10, 11, 12	Relevant sections
IV	2	1	All
V	2	2	All

Book for Reference

1. Ramesh S. Gaonkar, *Microprocessor Architecture, Programming and Application with the 8085*, 6th Edition, Penram International Publishing, Mumbai, 2013.
2. V. Vijayendran, *Fundamentals of Microprocessor-8085*, 1st Edition, S. Viswanathan Publishers, Chennai, 2009.
3. Barry B. Brey, *the Intel Microprocessors: 8086 --- Core2 … - Architecture Programming and Interfacing*, 8th Edition, Pearson Education India, 2008.

Web References

1. https://www.youngwonks.com/blog/What-is-A-Microprocessor-And-What-Are-Its-Applications
2. https://www.javatpoint.com/microprocessor-applications
3. https://www.watelectronics.com/what-is-a-microprocessor-architecture-types-its-applications/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
V	**21UEL53CC07**	**CORE -7: MICROPROCESSORS AND APPLICATIONS**	**4**	**3**

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	3	2	2	2.5
CO-2	3	3	3	2	2	3	3	3	2	2	2.6
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	3	3	3	2	2	3	3	2	2	2	2.5
CO-5	3	3	2	2	2	3	3	2	2	2	2.4
Mean Overall Score											**2.52**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53CC08	CORE -8: SENSORS AND ELECTRONIC INSTRUMENTATION	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	list and discuss the basics of sensors	K1, K2
CO-2	predict the errors in measurement, list the characteristics of instrumentation and use to solve the problems in instruments.	K1, K2
CO-3	apply electronic instruments in various applications of real time problems.	K3
CO-4	analyze various type of AC and DC bridges in instruments and develop a modern tool.	K4
CO-5	inspect and construct various instruments	K5, K6

UNITI: SENSORS (12 Hours)

Analogue and Digital Quantities - Classification of Sensing Devices – Sensors - Transducers -Actuators - Basic Sensor Technology - Sensor Systems - Characteristics of Sensor - System Characteristics–Resistive Sensor - Capacitive Sensor - Inductive Sensor - Level Sensor – Photosensor - Piezoelectric Pressure Sensors

UNITII: MEASUREMENT AND INSTRUMENTATION SYSTEM (12 Hours)

Functions and Characteristics of Instruments - Electrical Units - Measurement Standards - Error in Measurement - Statistical Analysis of Error in Measurement - Limiting Errors - Elements of Electronic Instruments – Selection, Care, and Use of Instruments - Static and Dynamic Characteristics of Instrumentation.

UNITIII: MEASUREMENT OF AC AND DC BRIDGES (12 Hours)

Wheat Stone Bridge - Kelvin Bridge - A.C. Bridges - Sources and Detectors - General Equation for Bridge Balance - General Form of A.C. Bridge - Maxwell Inductance Bridge - Hay's Bridge -De Santy's Bridge - Schering Bridge - Source of Errors in A.C. Bridges - Factors to reduce the Errors.

UNITIV: ELECTRONIC INSTRUMENTS AND INTERPRETATION (12 Hours)

Electronic Voltmeters - Advantage of Electronic Voltmeters - Transistors Voltmeters (TVM) - Permanent Magnet Moving Coil (PMMC) - Multi Range DC Voltmeter – Ohmmeter - Multimeter – Ammeter - Function Generators - Resonant Wave Analyzers - Heterodyne Wave Analyzer -Distortion Meters - Basic Spectrum Analyzer - Spectral Displays - Spectra of Different Signals.

UNITV: VARIOUS ANALYTICAL INSTRUMENTS (12 Hours)

Elements of an Analytical Instrumentation - Colorimeter/Photometers – Spectrophotometers - Chromatography - Gas Chromatography - Principle ofNMR - Constructional Details of NMR Spectrometers - ThermoAnalytical Methods - Thermo Gravimetric Analysis - PrincipleofpH

Measurement - pH Meters – Air Pollution Monitoring Instruments - Water Pollution Monitoring Instruments.

Book for Study

1. M.J.Usher and D. A. Keating, *Sensors and Transducer Characteristics, Applications, Instrumentation, Interfacing*, 2nd Edition, MACMILLAN PRESS LTD, 1996.
2. Jon S. Wilson, *Sensor Technology Handbook*, Har/Cdr Edition, Newnes is an imprint of Elsevier, Elsevier Inc, 2005.
3. Larry D. Jones, *Electronic Instruments and Measurements*, 2nd edition, Prentice-Hall International Editions, 2007.
4. R.S.Khandpur, *Handbook of Analytical Instrumentation*, 2nd Edition, McGraw-Hill Education Private Limited, 2006.
5. A.K.Sawhney, *A course in Electrical and Electronic Measurements and Instrumentation*, 4th edition, Educational and Technical Publisher, 2015.

Unit	Book	Chapter	Sections
I	1 2	1 1,8,14, 16,19	1.1 - 1.5 1.1, 1.2, 8.2, 8.3, 14.1, 16.2, 19.1, 19.2,
II	3	1	1.1 - 1.10
III	4 5	20, 8 22	20.1 - 20.9, 8.5, 8.11 - 8.22 22.17 - 22.27
IV	4	13, 16	13.5 - 13.11, 13.12, 13.13, 13. 16,6.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.11, 16.12, 16.15, 16.16, 16.21
V	4	1, 2, 10, 16,18, 21, 24	1.1, 2.5, 2.6, 10.1, 10.4, 16.1, 16.3, 18.1, 18.2, 21.1, 21.4, 24.1, 24.8

Book for Reference

1. B. A. Gregory, *An introduction to electrical instrumentation and measurement systems*, 2nd Edition, A Halsted Press book, 1981.
2. SonalSapra and J P Navani, *Sensors and Instrumentation*, 1st Edition, S. Chand Publishing, 2014
3. Dominique Placko, *Fundamentals of Instrumentation and Measurement*, 1st Edition, Wiley, 2007.

Web References

1. https://www.seia-conference.com/
2. https://www.edibon.com/en/mechatronics-automation-compumechatronics/mechatronics/electronics/sensors-and-electronic-instrumentation
3. https://www.mdpi.com/journal/sensors/special_issues/SEIA_2020

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
V	21UEL53CC08	CORE -8: SENSORS AND ELECTRONIC INSTRUMENTATION	4	3

Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	2	2	3	3	3	2	2	2.6
CO-2	3	2	3	2	2	3	3	2	3	2	2.5
CO-3	3	2	3	2	2	3	3	3	2	2	2.5
CO-4	2	2	3	2	2	3	3	2	2	2	2.3
CO-5	3	3	3	2	2	3	3	2	2	2	2.5
Mean Overall Score											2.48
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53CP03	CP -3: ELECTRONICS PRACTICAL - III	6	3

List of experiments:

Any sixteen: Microprocessor, Sensor and Instrumentation and 'C' and Python Programming

1. Microprocessor 8085- Programming I {Data transfer and rotate operations}
2. Microprocessor 8085- Programming II {addition, subtraction, multiplication and division}
3. Microprocessor 8085- Programming III {Code conversion - Gray to Binary, Binary to BCD
Binary to Gray, BCD to Binary}
4. Microprocessor 8085 - Programming IV {largest, smallest, sorting in ascending order and Descending order}
5. Microprocessor 8085 - Programming V {Using user routines in Monitor program}
6. Microprocessor Interfacing - Input and Output using8255 PPI
7. Microprocessor Interfacing - 8253
8. Microprocessor Interfacing - Traffic Controller.
9. Microprocessor Interfacing - Stepper Motor Controller.
10. Microprocessor 8086- Programming I {Data transfer and rotate operations}
11. Microprocessor 8086- Programming II {addition, subtraction, multiplication and division}
12. Study the linearity characteristics of Pressure using capacitive transducer and Distance using
    Ultrasonic transducer
13. Study of Sensors - I {Temperature – LM35, RTD, Thermocouple)
14. Study of Sensors - II {LVDT, Hall Effect, Strain Gauge, Flow and Level}.
15. Study of Sensors – III {optotriac, opto SCR, Opto coupler}
16. C programming-I (input, output, string and file manipulation)
17. C programming-II (implementation of statistical functions)
18. C programming-III (functions and header file creation)
19. C programming-IV (pointers and structures)
20. Programs on operators & I/O operations.
21. Programs on basic control structures & loops.
22. Programs on strings and Lists.
23. Programs on functions and tuples
24. Study of Solar Panel with Controller

Book for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53ES01A	DSE-1: MOBILE COMMUNICATION	5	3

CO.No.	CO statements	Cognitive Level (K- level)
On successful completion of this course, students would be able to		
CO-1	describe the basics of mobile communication	K1
CO-2	compare and outline mobile communication protocols	K2
CO-3	illustrate wireless communication	K3
CO-4	investigate the functionality of transport and application layer	K4
CO-5	categorize and recommend mobile system	K4, K5

UNIT I: WIRELESS COMMUNICATION (15 Hours)

Signals – Antennas - Signal Propagation - Path Loss of Radio Signals – Additional Signal Propagation Effects – Multipath Propagation – Multiplexing - Space Division Multiplexing – Frequency Division Multiplexing – Time Division Multiplexing – Code Division Multiplexing – Modulation: ASK – FSK – PSK - Multi Carrier Modulation - Spread Spectrum - Cellular Systems

UNIT II: TELECOMMUNICATION SYSTEMS (15 Hours)

GSM: Mobile Services - System Architecture - Radio Interface – Protocols - Localization and Calling – Handover – Security - New Data Services – DECT: System Architecture - Protocol Architecture – TETRA - UMTS and IMT-2000: UMTS Releases and Standardization - UMTS System Architecture - UMTS Radio Interface – UTRAN - Core Network - Handover - SDMA – FDMA – TDMA – CDMA

UNIT III: SATELLITE AND BROADCAST SYSTEM (15 Hours)

Introduction – GEO – LEO – MEO – Routing – Localization – Handover – Cyclical Reception of Data – Digital Audio Broadcasting – Digital Video Broadcasting - DVB Data Broadcasting – DVB for High-Speed Internet Access – Convergence of Broadcasting and Mobile Communications.

UNIT IV: WIRELESS LAN (15 Hours)

Infra-Red vs Radio Transmission - Infrastructure and Ad-Hoc Network – IEEE 802.11: System Architecture - Protocol Architecture - Physical Layer - Medium Access Control Layer - MAC Management - 802.11b 231 - 802.11a 234 - Newer Developments - HIPERLAN – Bluetooth

UNIT V: GENERATION OF MOBILE COMMUNICATION (15Hours)

From 1G to 3G – From UMTS ToLTE – LTE to LTE Advanced: High Level System Architecture – Principle and Operation – 4G Communication – Volte – 5G Communication: Architecture – Research and Development – 5G Internet

Book for Study

1. Jochen Schiller, *Mobile Communications*, 2nd Edition, Pearson Education limited, 2003.
2. Christopher Cox, *an Introduction to LTE, LTE–Advanced, SAE, VoLTEand 4G Mobile Communication*, 2nd Edition, Wiley, 2014.
3. Jonathan Rodriguez, *Fundamentals of 5G Mobile Networks*, 1st Edition, Wiley, 2015.
4. T.S.Rappaport, *Wireless Communications: Principles and Practice*, 2ndEdition, Pearson Education, 2012

Unit	Book	Chapter	Sections
I	1	2	2.2 – 2.8
II	1	3, 4	3.2 – 3.5, 4.1 – 4.4
III	1	5, 6	5.1 – 5.6, 6.2 – 6.5
IV	1	7	7.1 – 7.5
V	2,3	1,2	1.1 – 1.6, relevant section

Book for Reference:

1. Saad Z. Asif, *5G mobile communications*, CRC Press, 2019.
2. Jochen Schiller, *Mobile Communications*, 2nd Edition, Pearson Education, 2014.
3. BrijeshVerma, *Mobile Communications*, Reprint Edition, S. K. Kataria and Sons, 2013

Web References:

1. https://itlaw.wikia.org/wiki/Mobile_communications
2. https://www.nibusinessinfo.co.uk/content/advantages-and-disadvantages-mobile-technology
3. https://www.sciencedirect.com/topics/social-sciences/mobile-communication

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
V	**21UEL53ES01A**	**DSE-1: MOBILE COMMUNICATION**	**5**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	2	2	2	2	2.2
CO-2	3	3	2	2	2	2	3	2	2	2	2.3
CO-3	3	2	2	2	2	3	2	2	2	2	2.2
CO-4	3	2	2	2	2	3	3	2	2	2	2.3
CO-5	3	3	2	2	2	3	3	2	2	2	2.4
									Mean Overall Score		**2.28**
									Result		**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53ES01 B	DSE-1: MEDICAL ELECTRONICS	5	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	classify and know the various types of electrodes and transducers	K1, K2
CO-2	explain the functioning of bio medical recorders	K2
CO-3	solve issues by employing measurement and analysis techniques	K3
CO-4	compare the results from the measurements	K4
CO-5	assess the need of modern society with professional ethics in imaging system and recommend solutions for the same	K5

UNITI: ELECTRODES & TRANSDUCERS (15 Hours)

Origin of Bioelectric Signals–Electrode - Electrolyte Interface –Skin Contact Impedance - Half Cell Potential - Types of Electrodes - Surface, Needle and Micro Electrodes –Electrodesfor ECG-ElectrodesforEEG-Electrical Conductivity of Electrode Jellies and Cream - Pressure Transducers - Pulse Sensors - Respiration Sensors.

UNIT II: BIOMEDICAL RECORDERS (15 Hours)

Basic Recording System - General Considerations for Bioelectric Recorder Amplifiers - Sources of Noise in Low Level Recording Circuits -Preamplifiers Main Amplifier and Driver Stage - Writing Systems - Electrocardiograph - Electroencephalograph –Electromyography

UNIT III: MEASUREMENT AND ANALYSIS TECHNIQUES IN BLOOD (15 Hours)

Blood Flow Meters: Electromagnetic Blood Flow Meter-Blood Gas Analyzers: Blood pH Measurement- Measurement of Blood pCO_2 - Blood pO_2Measurement - Blood Cell Counters: Methods of Cell Counting - Coulter Counters - Automatic Recognition and Differential Counting ofCells.

UNIT IV: MODERN IMAGING SYSTEMS (15 Hours)

X-Ray Machine - CT scanner: Basic Principle - Contrast Scale - System Components-NMR: Principles of NMR Imaging- Fourier Transform of The FID - Bloch Equation - Image Reconstruction Techniques - Discrimination Basedon Relaxation Rates- Basic NMR Components –Applications - Biological Effects - Advantages of NMR Imaging System.

UNITV: ADVANCES IN BIOMEDICALINSTRUMENTATION (15 Hours)

Pacemakers - Types - Artificial Heart Valves – Defibrillators Types - Ventilators – Audiometers -Anesthesia Machine - Angiography - Endoscope.

Book for Study:

1.Leslie Cromwell, *Biomedical Instrumentation and Measurement*, 2nd Edition, Prentice Hall of India, New Delhi, 2007.

2. Dr. M**.** Aurmugan, *Biomedical Instrumentation,* 2nd Edition, GomathiSekar, 2003.

Unit	Book	Chapter	Sections
I	1	2,4	2.2-2.4,4.1-4.3
II	2	4	4.1-4.6
III	1 2	6 6,7	6.1-6.3, 6.13,6.14,7.2
IV	2	7,10	7.8,7.9,10.7,10.10
V	2	5,6,7,10	5.2,5.4,5.5, 6.8,6.9,7.7,7.12,10.4

Book for Reference:

1. Khandpur R.S, *Handbook of Biomedical Instrumentation*, 2nd Edition, Tata McGraw-Hill, New Delhi, 2007.
2. Myer Kutz, Standard Handbook of Biomedical Engineering and Design, 1st Edition, McGraw Hill Publisher, 2003.
3. Joseph J. Carr and John M. Brown, *Introduction to Biomedical Equipment Technology*, 4th Edition, Pearson Education, 2004

Web References:

1. https://www.sciencedirect.com/topics/engineering/
2. https://www.myklassroom.com/Engineering-branches/80/MEDICAL-ELECTRONICS
3. https://ieeexplore.ieee.org/document/6123659/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
V	**21UEL53ES01B**			**DSE-1: MEDICAL ELECTRONICS**				**5**		**3**
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	3	2	1	3	2	2	2	2	2.2
CO-2	3	3	2	1	1	3	3	3	2	1	2.2
CO-3	3	3	3	2	1	3	2	2	2	1	2.2
CO-4	3	2	2	2	1	3	3	3	2	1	2.2
CO-5	3	2	2	2	1	3	3	2	2	2	2.2
Mean Overall Score											**2.2**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53ES02A	DSE-2: C AND PYTHON PROGRAMMING	5	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	outline the programming of C Language and python	**K1**
CO-2	examine and explain Electronics related problems with the help of Python and C Language	**K2, K3**
CO-3	assess C language program in solving problems related to Electronics	**K3, K4**
CO-4	compose Programs in Python and C language for novel applications	**K4, K5**
CO-5	construct programing and analytical skills using C and Python to solve real time problems	**K6**

UNITI: DATA TYPES, OPERATORS AND EXPRESSIONS (15 Hours)

Structure of C Language – Lexical Elements of C Language: C Character Set – Constants – Keywords – Delimiters – Variables – Data Types and Sizes – Variable Declaration – Labels – Expressions – Statements. Operators and Expressions: Arithmetic Operators– Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators- Conditional Operator-Bitwise Operators-Special Operators-Arithmetic Expressions Evaluation of Expressions- Precedence of Arithmetic Operators- Type Conversions in Expressions- Operator Precedence and Associativity- Simple Problems

UNITII: I/O AND CONTROL STATEMENTS (15 Hours)

Input Functions – Output Functions – Formatted Input / Output - Control Structures - UnconditionalControl–BidirectionalConditionalControl–Multi-ConditionalControl - Loop Control Structures.

UNITIII: ARRAYS AND FUNCTIONS (15 Hours)

Array Declaration – Multidimensional Array - Array Initialization – Rules to Initialize an Array Strings/Character Arrays – Rules - C Functions - Library Functions – User Defined Functions – Advantages of the Functions – Arguments – Function Declaration – Recursive Functions –Storage Class Specifiers - Scope of the Variables – Scope Rules for Identifiers – Simple Electronics Problems.

UNITIV: BASICS OF PYTHON (15 Hours)

Basic Elements of Python – Branching Programs-Strings and Input–Iteration-Functions and Scoping – Specifications – Recursion - Global Variables – Modules – Files - Simple Programs.

UNITV: HIGHER-ORDER FUNCTIONS (15 Hours)

Tuples - Ranges - Lists and Mutability - Functions as Objects– Strings - Extrapolation – Micro Python IDE - Numpy - Scipy – Circuit Python - Classes and Object-Oriented Programming.

Book for Study:

1. E. Balagurusamy, *Programming in ANSI C*, 8thEdition, McGraw Hill Education (India) Private Limited, NewDelhi. 2019.
2. John V Guttag. *Introduction to Computation and Programming Using Python*, 3rdEdition, Prentice Hall of India, 2021.

Unit	Book	Chapter	Sections
I	1	2, 3,4	2.7, 3.2 -3.16, 4.1- 4.4
II	1	5,6, 7	5.1-5.4,6.1-6.5, 7.1-7.8
III	1	8, 9,10	8.1 – 8.10, 9.1- 9.20,10.1,10.2
IV	2	2, 4	2.1- 2.4, 4.1- 4.6
V	2	5	5.1-5.5

Book for Reference:

1. Schaum's Outlines: Byron S. Gottfried, *Programming with C*, 4th Edition, Tata McGraw Hill Pub. Co Ltd., New Delhi, 2018.
2. YashvantKanetkar, *Programming with C*, 2ndEdition, Tata McGraw Hill, New Delhi, 1998.
3. SciPy community, *SciPy Reference Guide Release 1.0.0*, October 25, 2017

Web References:

1. https://www.quora.com/What-is-the-use-of-learning-python-for-electronics-engineer
2. https://lms.decibelslab.com/courses/PythonforECEE
3. https://opensource.com/life/16/8/python-vs-cc-embedded-systems

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course					Hours	Credit			
V	**21UEL53ES02A**	**DSE-2: C AND PYTHON PROGRAMMING**					**5**	**3**			
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	3	3	2	3	2	3	2	2	2.6
CO-2	3	3	2	3	2	2	3	3	2	2	2.5
CO-3	3	3	2	3	2	3	3	2	3	2	2.5
CO-4	3	3	2	2	2	3	3	2	2	2	2.4
CO-5	3	3	3	2	2	3	2	3	2	2	2.5
Mean Overall Score											**2.5**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53ES02B	DSE-2: COMPUTER HARDWARE AND NETWORKS	5	3

CO.No.	CO statements	Cognitive Levels (K- level)
On completion of this course, students would be able to		
CO-1	describe the fundamentals of Computer Hardware	K1
CO-2	outline the hardware problems encountered in Computer	K2
CO-3	solve various issues in computers	K3
CO-4	analyze computer hardware and Networks with the knowledge of protocols	K4
CO-5	develop troubleshooting skills simulate to become an entrepreneur	K5, K6

UNIT I: MOTHERBOARDS (15 Hours)

Motherboard Types and Features - Configuring a Motherboard - Maintaining a Motherboard - Installing a Motherboard - Types and Characteristics of Processors – Selecting and Installing a Processor - Memory Technologies - Upgrading Memory

UNIT II: POWER SUPPLY AND TROUBLESHOOTING HARDWARE (15 Hours)

Cooling Methods and Devices – Selecting a Power Supply – Approaching Hardware Problem- Troubleshooting the Electrical System – Troubleshooting the Motherboard, Processor and RAM - Selection and Installation of Hard Drives – Troubleshooting Hard Drives.

UNIT III: INSTALLATION AND SERVICING (15 Hours)

Windows Installation – Installing I/O Devices – Troubleshooting I/O Devices – Backup Procedures – Managing Files, Folders, and Storage Devices - Understanding the Boot Process – Tools to Troubleshooting Windows Startup Problems – Understanding the Boot Process – Troubleshooting Windows Startup.

UNITIV: COMPUTER NETWORKS (15 Hours)

Basic Networking Concepts-Physical and Logical Topologies - Network Topologies: Bus, Star, Ring and Mesh Topologies - Types of Network: LAN, WAN, MAN, PAN, CAN – Networking Model-TheOSIModel-TCP/IPModel -NetworkAdapters.-Protocols.-Network Switching Technologies

UNIT V: TROUBLE SHOOTING NETWORKS (15 Hours)

Concept of Server – Client - Node – Segment - Backbone – Host - Network Interface Card - Crimping Tools and Color Standards for Straight Crimping and Cross Crimping Functions of NIC– Repeaters – Hub – Switches – Routers – Bridges - Transmission Media and Topologies – Media Types: STP Cable - UTP Cable - Coaxial Cable – Fiber Cable - Base Band and Broad band Transmission – Cables and Connectors- Cabling and Troubleshooting.

Book for Study

1. Jean Andrews, *A+ Guide to Hardware, Managing, Maintaining and Troubleshooting*, 6th Edition, Course Technology Inc, 2002.
2. Mueller Scott, *Upgrading and Repairing PCs*, 22nd Edition, QUE, 2015.
3. Andrew S. Tanenbaum, David J. Wetherall, *Computer Networks*, 5th Edition, Pearson, 2013.
4. Study Material prepared by the department

Unit	Book	Chapter	Sections
I	1	3,4	All
II	1	5,6	All
III	1	3, 7, 8, 9	All
IV	3	1	1.2 – 1.5
V	1 4	7	All All

Book for Reference

1. Irv Englander and Wilson Wong, *the Architecture of Computer Hardware, Systems Software and Networking*, 6th Edition, Wiley, 2021.
2. Ajit Mittal and Ajay Rana, *Mastering PC Hardware and Networking*, 1st Edition, Khanna Book Publishing Company, 2014.
3. I. Chandra Mohan, Fundamentals of Computer Networks, 1st Edition, International Publishing House Pvt. Ltd., 2019.

Web References:

1. https://en.wikipedia.org/wiki/Networking_hardware
2. https://en.wikiversity.org/wiki/Basic_computer_network_components
3. https://www.tutorialspoint.com/Basic-Network-Hardware

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course					Hours	Credit			
V	**21UEL53ES02B**	**DSE-2: COMPUTER HARDWARE AND NETWORKS**					**5**	**3**			
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	3	2	2	3	2	3	2	2	2.4
CO-2	3	3	3	2	2	3	2	3	2	2	2.5
CO-3	2	3	3	2	2	2	3	3	2	2	2.4
CO-4	3	3	3	2	2	3	3	3	2	2	2.6
CO-5	3	3	3	2	2	2	3	3	2	2	2.5
Mean Overall Score											**2.48**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53SP01A	Self Paced Learning: RF, MICROWAVE AND OPTICAL COMMUNICATION	-	2

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	list the principle and fundamental of Microwaves and RF	K1
CO-2	outline the concepts of Laser Fundamentals	K2
CO-3	illustrate and use the operations of Optoelectronic Detector	K3
CO-4	examine and analyze the Laser Applications	K4
CO-5	asses and recommend the optical and laser instrumentation system	K5

UNIT I: INTRODUCTION TO MICROWAVES AND RF

Microwave and RF Engineering - General Applications- Frequency Band Definitions- Overview of the RF and Microwave - Microwave Engineering: Semiconductor Materials for RF and Microwave Applications - Propagation and Attenuation in the Atmosphere - Systems Applications – Communications – Navigation - Sensors (Radar) – Heating - Measurements - Circuits and Circuit Technologies - Low Noise Amplifier - Power Amplifier – Mixer - RF Switch – Filter - Oscillator.

UNIT II: MICROWAVE MEASUREMENTS

Measuring Instruments - VSWR meter - Power meter - Spectrum analyzer - Network analyzer – Impedance Measurement – Frequency – Power – Q-factor - Dielectric Constant - Scattering Coefficients – Attenuation - S-parameters.

UNIT III: BASICS OF OPTICAL FIBER

Block Diagram of Optical Communication System - Advantages of Fibre Optic Communication - Snell's Law – Critical Angle and Total Internal Reflection – Step and Graded Index Fibers - Meridional and Skew Rays in Optical Fiber– Acceptance Angle and Numerical Aperture –Monomode and Multimode Fibers – Mode Number – Glass and Plastic Fibers – Signal Attenuation and Dispersion.

UNIT IV: OPTICAL SOURCES AND DETECTORS

LEDs – DH Structures – Materials – Internal, External and Coupling Quantum Efficiencies – Semiconductor Materials for Optical Sources – Surface Emitting LED – Edge Emitting LED –Modulation Capability – Electrical and Optical Bandwidth – LASER Principle – FP, DFB Laser Diode Structures – Optical Detectors – PIN Diode – APD.

UNIT V: TRANSMISSION AND RECEPTION

Source to FiberPower Launching and Lensing Schemes - FiberJoints - Splicing Techniques Connectors and Optical Couplers – Semiconductor Optical Amplifiers – EDFA Operation - Modulation: Analog and Digital Modulation – Receiver Block Diagram – Power Budget and Bandwidth Budget Calculation.

Book for Study

1. Mike Golio and Janet Golio, *RF and Microwave Circuits, Measurements, and Modeling*, 2nd Edition, CRC Press, 2008.
2. Gerd Keiser, *Optical Fiber Communications*, 3rd Edition, McGraw Hill Education, 2007.
3. Giovanni Ghione, Politecnico di Torino, *Semiconductor Devices for High-Speed Optoelectronics*, 1st Edition, Cambridge University Press, Italy, 2009.

Unit	Book	Chapter	Sections
I	1	1	1.1 -1.8
II	1	2	2.1-2.3.4, notes
III	2	1,2	1.1-1.4,2.1-2.7
IV	3	4,5	4.1,4.6-4.9,4.11-4.16,5.1 - 5.8,
V	2	5,7	5.1-5.6, 7.1

Book for Reference

1. Samuel Y. Liao, *Microwave Devices and Circuits*, 3rd Edition, Pearson Education, 2003.
2. Kulkarni M, *Microwave and Radar Engineering*, 4th Edition, Umesh Publications, 2012.
3. Robert E. Collin, *Foundation of Microwave Engineering*, 2nd Edition, Wiley India, 2012.

Web References

1. https://eecs.oregonstate.edu/rf-micro-optics
2. http://ieeexplore.ieee.org/document/7173150/
3. https://www.york.ac.uk/electronic-engineering/research/communication-technologies/applied-electromagnetics-devices/microwave-optic/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
V	**21UEL53SP01A**	**Self Paced Learning: RF, MICROWAVE AND OPTO ELECTRONICS**	**-**	**2**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	3	3	2	2	3	3	2	2.4
CO-2	2	2	2	2	2	2	2	2	2	3	2.1
CO-3	2	2	2	2	3	3	2	2	2	2	2.2
CO-4	2	2	3	2	2	2	2	3	3	3	2.2
CO-5	2	2	3	2	2	3	2	2	2	2	2.2
										Mean Overall Score	**2.2**
										Result	**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL53SP01B	Self Paced Learning: PCB DESIGN AND FABRICATION	-	2

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	appreciate, list out the necessity and evolution of PCB, types and classes of PCB.	K1
CO-2	explainthe steps involved in schematic, layout, process of PCB design	K2
CO-3	illustrate the basic fabrication and assembly and thermal issues	K3
CO-4	compare and contrast different PCB designs	K4
CO-5	recommend and design (layout) and fabricate PCB for simple circuits.	K5, K6

UNITI: INTRODUCTION TO PCB

Definition and Need/Relevance of PCB - Background and History of PCB - Types of PCB - Classes of PCB Design - Terminology in PCB Design - Different Electronic Design Automation (EDA) Tools and Comparison - Example Software Tool – Protues/Expres PCB/Eagle/Altium

UNITII: PCB DESIGN PROCESS

PCB Design Flow - Placement and Routing - Steps Involved in Layout Design - Artwork Generation Methods - Manual and CAD - General Design Factor for Digital and Analog Circuits - Layout and Artwork Making for Single - Side, Double-Side and Multilayer Boards - Design for Manufacturability

UNITIII: PCB FABRICATION AND ASSEMBLY

Steps Involved in Fabrication of PCB - PCB Fabrication Techniques - Single, Double Sided and Multilayer - Etching: Chemical Principles and Mechanisms - Post Operations – Stripping - Black Oxide Coating - Solder Masking - PCB Component Assembly Processes - Crosstalk and Thermal Issues

UNITIV: **SCHEMATIC CAPTURE**

Placing Schematic Component from Various Integrated Libraries into Protues/Eagle/Altium-Designer Schematics - Connection of Components using Wire, Bus, Net-Label, Harness-Connector or a Port Compiling- Checking the Schematic Design against Warnings, Errors and Faults - Creating Output Reports -BOM (Bill of Material) - Exporting and Importing Schematic Data

UNITV: PCB LAYOUT

PCB Board Profile - Number of Signal - Layers and Power - Fabrication Outputs: Generation of GERBER File - Design Considerations: Optimizing The Copper - Tracks Width - Design

Rule Check (DRC) - Design PCB (Schematic And Layout) – Design a Regulator Circuit Using 7805 PCB - Design a Dual And Variable Power Supply PCB.

Book for Study

1. Kraig Mitzner, *Complete PCB Design Using or CAD Capture and PCB Editor,* 1st Edition, Newnes, 2009.

Unit	Book	Chapter	Sections
I	1	1	Relevant sections
II	1	2	Relevant sections
III	1	3	Relevant sections
IV	1	4	Relevant sections
V	1	5	Relevant sections

Book for Reference

1. RS Khandpur, *Printed Circuit Board*, 1st Edition, Tata McGraw Hill Education Pvt Ltd., New Delhi, 2017.
2. S D Mehta, *Electronic Product Design Volume-I*,1st Edition, S Chand Publications, 2011.
3. B.A. Gregory, *An Introduction To Electrical Instrumentation And Measurement Systems*, 1st Edition, Macmillan Education Ltd, 1985

Web References:

1. https://resources.pcb.cadence.com/blog/2019-what-is-the-pcb-fabrication-process-an-introduction
2. https://www.vse.com/what-is-the-pcb-fabrication-process/
3. https://www.pcbcart.com/article/content/PCB-manufacturing-process.html

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
V	**21UEL53SP01B**	**Self Paced Learning: PCB DESIGN AND FABRICATION**	**-**	**2**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	2	2	2	2	2	3	3	2.2
CO-2	3	2	3	3	2	2	3	3	3	2	2.6
CO-3	2	3	2	2	2	2	3	3	3	3	2.5
CO-4	2	2	3	2	3	3	2	2	2	2	2.3
CO-5	3	2	2	2	2	2	2	2	2	2	2.1
										Mean Overall Score	**2.3**
										Result	**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
V	21USS54SE03	SEC-3: SOFT SKILLS	2	1

POs (Programme outcomes)

- To provide a focused training on soft skills for students in colleges for better job prospects
- To create and interface between industries and educational institutions in order to match the expectations of employers and abilities of the employees
- To bring a transformation in interpersonal and societal living guided by value laden principals
- To explore and analyze personal attributes that enhance the individual's Interactions, Job Performance and Career Prospects
- To foster teamwork (synergy) that increases productivity and brings benefits to the individuals and the society

PSOs (Programme Specific Outcomes)

After the successful completion of the course, students will learn:

- The various concepts of communication skills as job seekers
- To write a Professional resume as required by the employers
- to demonstrate interview skills and actively participate in GD preparations and presentations in peer groups
- to discover various aspects of self and set short tem and long term goals for successful career and creates a congenial atmosphere
- to have access to solve simple and day to day Arithmetic problems and Verbal and Non- verbal reasoning formulas

Cos (Course Outcomes)

Upon completion of the course, Students will:

- be keen on developing and sustaining Soft Skills required of an educated youth
- be trained to present the best of themselves as job seekers to deal with any problem and conflict situations
- be able to transfer the skills learnt for concrete outcomes and increased productivity of companies
- be able to develop people skills, life skills that are required to be a good human in the long run and set a living standard
- be embedded with Employability skills such as "communication", "teamwork" , "initiative , "enterprise" , the attributes of "reliability", "balance between work -life", "commitment" and continuous learning

Module 1**: Effective Communication**

Definition of communication, Barriers of Communication, Verbal and Non-verbal Communication; Self introduction matrix, Conversation Techniques, Good manners and Etiquettes, Introduction to Professional Communication, Professional Grooming and Presentation Skills and exercises

Module II: **Resume Writing & Interview skills**
Resume Writing: Basic Resume Formats. Types of Resume - Chronological, Functional and Mixed Resume**,** Steps in preparation of Resume, Sample objectives, Model Resumes. **Interview Skills:** Preparation for interview, Common interview questions, Attitude, Body Language, Mock interviews and Practicum, Figuring out common interview questions and answers

Module III: **Group Discussion:** Definition of GD. The salient features of GD, Factors that influence GD, Outcome of GD, Tips for success in GD, Parameters of GD, Essential Points for GD preparation, GD Topics, Model GD and Practicum.

Module IV: **Personal Effectiveness:** Self Discovery: Personality, Traits of Personality; Personality Tests; Intelligence and Skill Assessment Form. **Goal Setting**: Goal setting Process, Questioneers & Presentations

Module V: **Numerical Ability:** Average, Percentage; Profit and Loss**,** Area, Volume and Surface Area. (Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance**,** Problems on Trains**,** Illustrations, Boats and Streams; Illustrations-Optional)

Module VI: **Test of Reasoning - Verbal Reasoning:** Series Completion, Analogy. **Non-Verbal**
Reasoning

Text Book
Melchias G, Balaiah John, John Love Joy (Eds), 2018. Straight from the Traits: Securing Soft Skills, SJC, Trichy.
References
Aggarwal, R.S. 2010. *A Modern Approach to Verbal and Non Verbal Reasoning*. S.Chand, New Delhi. Covey, Stephen. 2004. *7 Habits of Highly effective people,* Free Press. Egan, Gerard. (1994).
The Skilled Helper (5th Ed). Pacific Grove, Brooks/Cole.
Khera, Shiv 2003. *You Can Win.* Macmillan Books, Revised Edition.
Melchias G, Balaiah John, John Love Joy (Eds), 2018. Winners in the Making: A primer on soft skills. SJC, Trichy.
Other books
Murphy, Raymond. 1998. *Essential English Grammar*. 2nd ed., Cambridge University Press.
Sankaran, K., & Kumar, M. *Group Discussion and Public Speaking*. M.I. Pub, Agra, 5th ed., Adams, Media.
Trishna's 2006. *How to do well in GDs & Interviews*, Trishna Knowledge Systems.
Yate, Martin. 2005. H*iring the Best: A Manager's Guide to Effective Interviewing and Recruiting**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL54EG01A	GE-1: EVERYDAY ELECTRONICS	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the concepts of real time electronic gadgets	K1
CO-2	compare the functions and uses of electronic gadgets	K2
CO-3	use every day electronic circuits	K3
CO-4	troubleshoot the real time electronic appliances	K4
CO-5	asses and recommend the precautions and maintain the modern electronics appliances	K5

UNIT I: MICROWAVE OVENS (12 Hours)

Introduction to Microwave Ovens – Block Diagram – LCD Timer with Alarm – Types – Features Diagram - Wiring Instructions – Safety Instruction – Operating Problems – Maintenance

UNIT II: PRINTER AND XEROGRAPHY (12 Hours)

Printers: Introduction – Operation - Types of Printers – Laser Printer – Inkjet Printers – Home Inkjet Printer – Dot Matrix Printers – 3D Printers – Printer with Scanner - Xerographic Process – Extension to A Dynamic Copier

UNIT III: MULTIPLE HOME ACCESS DEVICES (12Hours)

LED TV – Smart TV – Smart Watch – Smart Phones – Tablets – Bread Toaster – Induction Stove – Electric Rice Cooker – Electronic Wheel Chair - Digital Clock – LSI Digital Clock – Working Principle – Types – Specification

UNIT IV: HEADPHONES AND HEARING AIDS (12 Hours)

Introduction – Types - Headphones and Headsets - Types of Headphones - Moving-Iron Headphones - Crystal Headphones - Dynamic Headphones - Electrostatic Phones – Electret - Electrostatic Headphones - Hearing Impairments - Hearing Aids - User Operated Controls – Blue Tooth Headphones

UNIT V: DAILY ACCESS DEVICES (12 Hours)

Airline Reservation: Objectives – Functions – Bar Codes: Coder – Scanner - Decoder – ATMs – Set Top Boxes: Digital Cable TV – Dishwashers - Refrigerator – Air Conditioners

Book for Study:

1. S.P Bali, *Consumer Electronics*, 1st Edition, Pearson Education Asia Pvt., Ltd., 2004.
2. Study Material Prepared by the Department.

Unit	Book	Chapter	Sections
I	1	50	All
II	1	45	All
III	2	2	All
IV	1	3	All
V	1	52, 53	All

Book for Reference:

1. Stan Gibilisco, *Making Everyday Electronics Work A Do-It-Yourself Guide*, 1st Edition, Mc Graw Hill Education, 2014.
2. Michael Geier, *How to Diagnose and Fix Everything Electronic*, 2nd Edition, McGraw Hill Education, 2015.
3. Charles Platt, *Make Electronics: Learn Through Discovery*, 2nd Edition, Make Community, LLC, 2015.

Web References:

1. https://worldradiohistory.com/Everyday_Electronics.htm
2. https://www.everydayelectronics.in/
3. https://en.wikipedia.org/wiki/Everyday_Practical_Electronics

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	**Course Code**			**Title of the Course**			**Hours**			Credit
V	**21UEL54EG01A**			**GE-1: EVERYDAY ELECTRONICS**			**4**			**3**
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	2	3	2	2	3	3	2	2	2	2.3
CO-2	3	3	2	2	2	2	3	3	2	2	2.4
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	2	3	2	2	2	3	3	3	2	2	2.4
CO-5	2	3	2	2	2	3	3	2	2	2	2.3
Mean Overall Score											2.36
Result											HIGH

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEL54EG01B	GE-1: WIRELESS COMMUNICATION	4	3

CO No	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe wireless communication and distinguish various wireless networks	**K1**
CO-2	interpret and integrate various wireless techniques for green communication	**K2**
CO-3	focus and validate wireless and mobile communication systems for real time needs	**K3**
CO-4	apply and analyze various mobile generations and troubleshoot them	**K3, K4**
CO-5	estimate and employ mobile communication concepts for Entrepreneurship	**K4, K5**

UNIT I: INTRODUCTION TO WIRELESS COMMUNICATION (12 Hours)

Evolution of Wireless Communication- Examples of Wireless Communication Systems - Comparison of Wireless Communication Systems - Cellular Concept: System Design Fundamentals - Coverage and Capacity Improvement in Cellular System - Technical Challenges - Modern Wireless Communication Systems: Second Generation (2G) Cellular Networks - Third Generation (3G) Cellular Networks - 4G (LTE), 5G.

UNIT II: MOBILE RADIO PROPAGATION (12 Hours)

Introduction to Radio Wave Propagation - Multipath Propagation - Statistical Characterization of Multipath Fading - Diversity Techniques- Practical Link Budget Design Using Path Loss Models - Design Parameters at Base Station - MIMO Channels - Multi Antenna Techniques: Diversity and Selective Combining – Multi-carrier Techniques: OFDM

UNIT III: MULTIPLE ACCESS FOR WIRELESS COMMUNICATION (12 Hours)

Introduction to Multiple Access Techniques - FDMA - TDMA – Spread Spectrum Communication: FHMA – CDMA – WCDMA – SDMA – ALOHA –CSMA - PRMA

UNIT IV: WIRELESS NETWORKS (12 Hours)

Introduction – Development of Wireless Networks – Traffic Routing in Wireless Networks - Wireless Data Service - Common Channel Signaling - ISDN - NFC Systems - WLAN Technology – WLL - Hyper LAN - Ad Hoc Networks

UNIT V: CELLULAR SYSTEM (12 Hours)

Introduction – Frequency Reuse - Channel Assignment Strategies - Handoff Strategies - Interference and System Capacity - Trunking and Grade of Service- Improving Coverage and Capacity in Cellular Systems

Book for Study

1. T.S.Rappaport, *Wireless Communication Principles*, 2nd Edition, Pearson, 2010.
2. Gordon L.Stuber, *Principles of Mobile Communication*, 3rd Edition, Springer, 2013.

Unit	Book	Chapter	Sections
I	1 2	1 1	1.1, 1.4, 1.4.3, 1.4.4, 2 1.1,1.2,1.3,1.4
II	1 2	4,5,7 2,6,10	4.1,4.2,4.9,5.7,7.10 2.3.1, 6.1,6.2, 10.1
III	1	9	9.1,9.2,9.3,9.4,9.5,9.6
IV	1	2,10	2.4,10.1,10.3,10.5,10.6,10.7,10.8
V	1	3	3.1,3.2,3.3,3.4,3.5,3.6,3.7

Book for Reference

1. Jochen Schiller, *Mobile Communication*, 2ndEdition (Reprint), Pearson Education, 2010.
2. A.F.Molisch, *Wireless Communications*, 2nd Edition, Wiley, 2005.
3. Goldsmith Andrea, *Wireless Communication*, 1st Edition, Cambridge University Press, 2009.

Web References

1. https://feit.ukim.edu.mk/wireless-and-mobile-communications-wmc/
2. https://www.broadcom.com/solutions/wireless-mobile-communications
3. https://www.tutorialspoint.com/wireless_communication/wireless_communication_overview.htm

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
V	**21UEL54EG01B**	**GE-1: WIRELESS COMMUNICATION**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	3	1	3	2	2	3	2	2.2
CO-2	3	3	2	2	1	3	2	2	3	2	2.3
CO-3	3	1	2	2	3	3	1	3	3	2	2.4
CO-4	2	2	2	3	2	2	3	3	2	2	2.3
CO-5	3	3	2	2	2	3	2	2	2	3	2.4
Mean Overall Score											**2.32**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL63CC09	CORE -9: MICROCONTROLLERS AND EMBEDDED SYSTEM	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the architecture and different modes of operations of a microcontroller and Cortex-M processor	K1
CO-2	Outline and restate the microcontroller programs	K2
CO-3	analyze and use the Microcontrollers in various applications	K3, K4
CO-4	identify and solve RTOS and IoT applications	K3, K4
CO-5	asses, develop programming skill, design and construct circuits with 8051 microcontroller, Cortex-M Processor and IoT	K5, K6

UNITI: INTRODUCTION TO 8051 MICROCONTROLLER (12 Hours)

Introduction to Microcontroller - Comparison of Microcontrollers and Microprocessor - Overview Of 8051- Pin Description Of 8051 - Registers - Program Counters - ROM and RAM Space - Data Types and Directive – Stack and PSW - SFR - Programming 8051 Addressing Modes: Immediate - Register - Direct – Indirect – Interrupt.

UNITII: APPLICATIONS OF MICROCONTROLLER (12 Hours)

Counters/Timers - Counter Programming - Basics of Serial Communication - RS232 and MAX 232 IC Connection – Serial Communication Programming - Interfacing: Matrix Keyboard - LCD - ADC - DAC - Temperature Monitoring System – Relays and Opto Isolators - Stepper Motor and DC Motor Interfacing and PWM (Only Embedded C Programming).

UNITIII: CORTEX-M MICROCONTROLLERS (12 Hours)

Cortex-M Processor Architecture –Registers – Stack - Operating Modes – Reset - Clock System- Texas Instruments TM4C123 Launchpad I/O Pins - TM4C1294 - MSP432 - Interfacing to a Launchpad - Microcontroller Input/Output - TM4C I/O programming - MSP432 I/O programming – Interrupts - First in First Out (FIFO) Queues - Edge-triggered Interrupts - Input Capture or Input Edge Time Mode

UNITIV: EMBEDDED SYSTEMS (12 Hours)

Introduction – Definition – Characteristics- Embedded Processors in a System – Single Purpose Processors – Embedded Software in a System–Examples of Embedded Systems- Classification of Embedded System- Design process in Embedded System – Arduino Architecture and Programming

UNITV: RTOS AND IoT **(12 Hours)**

Introduction to Real-Time Operating Systems - Introductionto Threads -States of A Main Thread -Real-Time Systems – Scheduler -Function Pointers - Thread Management– Semaphores - Thread Synchronization - Process Management - Time Management - RTOS: Data Acquisition - Running Event Threads as High Priority Main Threads Systems - Available RTOS - Embedded Internet - Internet of Things (IoT) - Network Processor Interface (NPI) - Application Layer Protocols for Embedded Systems(COAP, MQTT)

Book for Study:

1. Muhammad Ali Mazidi, J.G. Mazidi and R.D. McKinlay, *the 8051 Microcontroller and Embedded Systems: Using Assembly and C*, 2nd edition, Pearson education, 2006.
2. RajKamal, *Embedded Systems- Architecture, Programming and Design*, 2nd Edition, Tata McGraw Hill, 2008.
3. Jonathan W. Valvano,*RealtimeOperatingsystems For Arm Cortex-MMicrocontrollers Volume 3*, 4thEdition,Jonathan Valvano, January 2017

Unit	Book	Chapter	Sections
I	1	2,5,8	2.1-2.7,5.1,8.1
II	1	9,10,12,13,17	9.1-9.3,10.1-10.3.12.1-12.2,13.1-13.2,17.2, 17.3
III	3	1,2	1.3,1.4,2.1,2.3,2.4
IV	2	1	1.1, 1.2, 1.4, 1.5, 1.8, 1.11
V	3	3, 4, 5,9	3.1-3.3,4.1,5.1,9.3,9.4,9.6,9.7

Book for Reference:

1. Kai Qian, David Den Haring, Li Cao, *Embedded Software Developmentwith C*, 1st Edition, Springer, 2009
2. **David Calcutt, Frederick Cowan, and G. Hassan Parchizadeh, 8051 *Microcontrollers: an Applications Based Introduction*, 1st Edition, Newnes, 2003.**
3. **Kenneth Ayala, *the 8051 Micro controller*, 3rdEdition, Cenage Learning, 2007.**

Web References:

1. https://www.tutorialspoint.com/embedded_systems/es_microcontroller.htm
2. https://www.omnisci.com/technical-glossary/embedded-systems
3. https://www.eit.edu.au/resources/types-and-applications-of-microcontrollers/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL63CC09**	**CORE -9: MICROCONTROLLERS AND EMBEDDED SYSTEM**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	2	3	2	3	3	3	3	2.5
CO-2	2	2	2	3	3	2	2	2	2	3	2.3
CO-3	2	2	3	2	2	2	3	2	2	3	2.3
CO-4	2	2	2	2	3	2	3	2	3	2	2.3
CO-5	2	2	2	3	2	2	2	3	3	3	2.4
Mean Overall Score											**2.4**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL63CC10	CORE 10: POWER ELECTRONICS	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe and discuss the concepts of Power Electronics	K1, K2
CO-2	explain and illustrate power electronic devices.	K2, K3
CO-3	analyze and solve real time problems and by employing modern tools	K3, K4
CO-4	investigate power electronic circuit problems and solve the same	K3, K4
CO-5	design and construct the power electronics projects	K5, K6

UNIT I: POWER ELECTRONIC SWITCHES AND SYSTEMS (12 Hours)

Power Electronic Systems - Switching Characteristics - Ideal Switch - Practical Switch - Switching Functions and Matrix Representation - Types of Switches - Bipolar and Unipolar Devices –Thyristor-based Devices - Snubber Circuits - Switching Diode Circuits - Controlled Switching Circuits

UNIT II: POWER CONVERTERS (12 Hours)

Converters - Non-Isolated Switch Mode DC-DC Converters - Isolated Switch-Mode DC-DC Converters - Weinberg Converter - Multi-output Converter - Problems - Soft-Switching DC-DC Converters - Classification of Soft - Switching Resonant Converters - Advantages and Disadvantages of ZCS and ZVS - Problems

UNIT III: CONTROLLED RECTIFIERS (12Hours)

Rectifiers - Uncontrolled Diode Rectifier Circuits - Single-Phase Rectifier Circuits - Three-Phase Rectifier Circuits - Half-Wave Rectifiers - Full-Wave Bridge Rectifiers - Phase-controlled Converters - Full-Wave Phase-controlled Rectifiers - Three-Phase Phase-Controlled Converters - Half-Wave Converters - Full-Wave Converters

UNIT IV: INVERTERS (12 Hours)

Inverters - Full-Bridge Inverters - Harmonic Reduction - Pulse Width Modulation - Equal-Pulse (Uniform) PWM -Sinusoidal PWM -Three-phase Inverters - Current-Source Inverters - Problems

UNIT V: POWER DRIVERS (12Hours)

Motor Drive Applications Introduction - Dc Motor Drives – Induction Motor Drives - Synchronous Motor Drives – Other Applications - Residential and Industrial Applications - Design and Construction of Dual Converter Using Thyristor – PWM Converter with High Efficiency

Book for Study

1. Issa Batarseh and Ahmad Harb, *Power Electronics Circuit Analysis and Design*, 2nd Edition, Springer, 2018.
2. Dr. P. S. Bimbhra, *Power Electronics*, 3rd Edition, Khanna Publishers, 2002.
3. Ned Mohan Tore. M Undeland and William P Robbins, *Power Electronics Converters, Applications, and Design*, 3rd Edition John Wiley and Sons' Inc, 2007.

Unit	Book	Chapter	Sections
I	1	1, 2, 3	1.5, 2.3 – 2.6, 2.9, 3.2-3.5
II	1	4, 5, 6	4.3,5.3, 5.5,6.1,6.2,6.3
III	2	6	6.1-6.6
IV	2	8	8.1,8.4,8.6,8.7,8.8
V	3	13, 14, 16	13.2-13.6, 14.4-14.7, 16.1-16.3

Book for Reference

1. Branko L. Dokić and Branko Blanuša, *Power Electronics Converters and Regulators*, 3rd Edition, Springer, 2015.
2. Keith H. Sueker, *Power Electronics Design A Practitioners Guide*, 1st Edition, Newnes, 2005.
3. Muhammad H. Rashid, *Power Electronics*, 4th Edition, Pearson, 2017.

Web References

1. http://ieeexplore.ieee.org/document/515001
2. https://www.powerelectronics.com/
3. https://www.tutorialspoint.com/power_electronics/index.htm

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL63CC10**	**CORE 10: POWER ELECTRONICS**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	3	2	2	2	3	3	3	2	2	2.5
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	3	3	2	2	2	3	3	2	2	2	2.4
CO-5	3	3	2	2	2	3	3	2	2	2	2.4
									Mean Overall Score		**2.45**
									Result		**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL63CP04	CP 04: ELECTRONICS PRACTICAL - IV	6	3

List of experiments

any sixteen - Microcontroller, Power electronics

1. Writing C program for 8051 and to study its equivalent disassembly codes in ASM using KeilSoftware.
2. Microcontroller program I {Data transfer}
3. Microcontroller program II {Arithmetic and Logical}
4. Microcontroller program III {Code conversion}
5. Interfacing microcontroller with LED {blinking LED, Bi-colour& RGB}
6. Interfacing matrix keypad with a microcontroller.
7. Study of Timers in 8051 microcontroller.
8. Study of Counters in 8051 microcontroller.
9. Study of interrupts in 8051 microcontroller.
10. Study of serial communication in 8051 microcontroller.
11. Interfacing ADC with 8051 microcontroller.
12. Interfacing LCD with 8051 microcontroller.
13. Interfacing GSM with 8051 microcontroller
14. Interfacing printer with 8051 microcontroller.
15. Frequency measurement using 8051.
16. Full Wave Control of rectifier output using SCR, TRIAC and UJT
17. Construction and study of step up and step down choppers
18. PWM based motor speed control using IGBT.
19. Construction and study of voltage fed inverters using IGBT/SCR.
20. Construction and study of static circuit breakers.
21. Study of DC motor control using PWM with 8051 microcontroller (L293 motor driver)
22. Interfacing stepper motor with 8051 microcontroller
23. Interfacing LED dot matrix display with 8051 microcontroller
24. Interfacing seven segment display with 8051 microcontroller
25. Study of charge controller for solar panel
26. DHT11 sensor interfacing with 8051 microcontroller (temperature and humidity sensor)
27. Ultrasonic sensor interfacing with 8051 microcontroller
28. RTC interfacing with 8051 microcontroller
29. Interfacing Relay with 8051 microcontroller
30. AC voltage controller using TRIAC with UJT triggering.
31. MSP432 Programs
32. Arduino Programs
33. Lamp dimmer using TRIAC and Diac

Book for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL63ES03A	DSE-3: CONTROL SYSTEM	5	3

CO. No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe various types and concepts control system	K1
CO-2	explain and examine the mathematical models of control system with the analytical knowledge of time, frequency response as well as the control system errors.	K2, K3
CO-3	solve control applications problems by employing mathematical tools.	K3
CO-4	investigate the real time problems and recommend the solutions with control systems	K4
CO-5	justify the need,design and construct control system projects using controller and motors	K5, K6

UNIT I: MATHAMETICAL MODELS AND COMPONENTS (15Hours)

Control System Introduction – Examples of Control System - Mathematical Models of Control System - Mechanical Translational System – Mechanical Rotational System - Electrical System – Transfer Function of Armature-controlled DC Motor - Transfer Function of Field-Controlled DC Motor - Block Diagrams - Block Diagram Reduction Techniques – Signal Flow Graph Reduction Using Mason's Gain Formula

UNIT II: COMPONENTS OF CONTROL SYSTEM (15 Hours)

Components of Automatic Control System – Potentiometer – Synchros – Controllers – Tacho Generators – Servomotors.

UNIT III: TIME RESPONSE ANALYSIS (15 Hours)

Time Response – Test Signals – Order of a System - Transfer Function – Laplace Transform Review Response of First Order System for Unit Step Input - Second Order System Response: Under Damped – Over Damped – Over Damped – Critically Damped - Time Domain Specifications - Response With P, PI, PD And PID Controllers - Steady State Error - Static Error Constants - Unit Step Steady State Error - Unit Ramp and Unit Parabolic Signal - Generalized Error Coefficients.

UNIT IV: FREQUENCY RESPONSE ANALYSIS (15 Hours)

Frequency Domain Specifications - Estimation of Frequency Domain Specifications for II Order System – Correlation Between Time and Frequency Response – Frequency Response Plots - Bode Plots - Polar Plot - Nichol's Plot - M and N Circles

UNITV: CONCEPTS OF STAGILITY AND ROOT LOCUS (15 Hours)

Stability - Location of Roots on the S-Plane for Stability - Routh Hurwitz Criterion - Mathematical Preliminaries for Nyquist Stability Criterion – Relative Stability – Gain Margin Root Locus.

Book for Study

1. A.NagoorKani, *ControlSystem*, 3rd Edition, RBA publications, 2017.

Unit	Book	Chapter	Sections
I	1	1	1.1-1.6,1.9-1.12
II	1	3	3.1-3.7
III	1	2, 4	2.1-2.8,4.1-4.5
IV	1	4	4.1-4.8,4.10,4.11
V	1	5	5.1-5.4,5.6-5.8

Book for Reference

1. R.Anandanatarajan and P.RameshBabu, *Control Systems Engineering*, 2nd Edition, Scitech Publications, 2010.
2. M.Gopal, *Control System Principles and Design*, 4th Edition, McGraw Hill Education, 2012.
3. StamatiosMenesis, GeorgeNikolakopoulos, Introduction *to industrial Automation*, CRC Press, 2018.

Web References

1. https://www.tutorialspoint.com/control_systems/control_systems_introduction.htm
2. https://electronicscoach.com/control-system.html
3. https://www.theengineeringprojects.com/2020/04/introduction-to-control-systems.html

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL63ES03A**	**DSE-3: CONTROL SYSTEM**	**5**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	1	3	3	2	1	2	2.2
CO-2	3	3	2	1	1	3	3	3	2	1	2.2
CO-3	3	3	3	2	1	3	2	2	2	1	2.2
CO-4	3	2	2	2	1	3	3	2	2	3	2.3
CO-5	3	2	3	2	1	3	3	2	2	2	2.3
Mean Overall Score											**2.46**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	**21UEL63ES03B**	**DSE-3: VIRTUAL INSTRUMENTATION**	**5**	**3**

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the basics of Virtual Instrumentation and LabVIEW	**K1**
CO-2	explain the working of Virtual Instruments	**K2**
CO-3	use the Virtual Instruments	**K3**
CO-4	analyze the present data effectively, thus resulting in improved concepts and products	**K4**
CO-5	use LabVIEW to control and acquire data from instruments and construct a modern tool by interfacing.	**K5, K6**

UNIT I: GRAPHICAL SYSTEM DESIGN (15 Hours)

Graphical System Design (GSD) Model - Design Flow with GSD - Virtual Instrumentation - Virtual Instrument and Traditional Instrument - Hardware and Software in Virtual Instrumentation - Virtual Instrumentation for Test, Control and Design - Virtual Instrumentation in the Engineering Process.

UNIT II: INTRODUCTION TO Lab VIEW (15 Hours)

Lab VIEW - Software Environment - Advantages of Lab VIEW - Software Environment - Creating and Saving A VI - Front Panel Toolbar - Block Diagram Toolbar - Palettes - Shortcut Menus -Property Dialog Boxes - Front Panel Controls and Indicators - Block Diagram - Data Types - Data Flow Program - Lab VIEW Documentation Recourses - Keyboard Shortcuts

UNIT III: MODULAR PROGRAMMING (15 Hours)

Modular Programming in Lab VIEW - Build A VI Front Panel and Block Diagram - Icon and Connector Pane - Creating an Icon - Building A Connector Pane - Displaying SubVIs And Express VIs as Icons or Expandable Nodes - Creating SubVIs From Sections of a VI - Opening and Editing SubVIs - Placing SubVIs on Block Diagrams - Saving SubVIs - Creating a Stand-alone Application.

UNIT IV: INSTRUMENT CONTROL (15 Hours)

GPIB Communication - Hardware Specifications - Software Architecture - Instrument I/O Assistant – VISA - Instrument Drivers - Serial Port Communications - Using other Interfaces

UNIT V: DATA ACQUISITION (15 Hours)

Transducers – Signals - Signal Conditioning - DAQ Hardware Configuration - DAQ Hardware - Analog Inputs - Analog Outputs - Counters - Digital I/O (DIO) - DAQ Software Architecture - DAQ Assistant - Channels and Task Configuration - Selecting and Configuring a Data Acquisition Device - Components of Computer-based Measurement System.

Book for Study

1. Jovitha Jerome, *Virtual instrumentation using LabVIEW*, 1st Edition, PHI Learning Private Limited, 2010.

Unit	Book	Chapter	Sections
I	1	1	1.1 to 1.11
II	1	2	2.1 to 2.15
III	1	3	3.1 to 3.12
IV	1	4, 10	4.2, 4.3,5.2, 5.3, 5.4, 5.4, 10.1 to 10.9
V	1	11	11.1 to 11.15

Book for Reference

1. S. Sumathi and P. Surekha, *LabVIEW based Advanced Instrumentation Systems*, 1st Edition, Springer, 2018.
2. National Instruments, *Lab VIEW Basics I and II Course Manual*, 2000 Edition, National Instruments, 2016.
3. Gray W. Johnson and Richard Jennings, *LabVIEW Graphical Programming*, 4th Edition, McGraw Hill Education, 2017.

Web References

1. https://www.ni.com/en-vn/innovations/white-papers/06/virtual-instrumentation.html
2. https://www.wirerealm.com/guides/top-10-best-vst-plugin-software
3. https://en.wikipedia.org/wiki/Virtual_instrumentation

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL63ES03B**	**DSE-3: VIRTUAL INSTRUMENTATION**	**5**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	2	2	3	3	3	2	2	2.5
CO-2	3	3	3	2	2	3	3	3	2	2	2.6
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	3	3	3	2	2	3	3	3	2	2	2.6
CO-5	3	2	2	2	2	3	2	2	2	2	2.2
Mean Overall Score											**2.5**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL63ES04A	DSE-4: ROBOTICS AND INDUSTRIAL AUTOMATION	5	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe and discuss the concepts of robotics and industrial automation	K1, K2
CO-2	explain and solve the functioning of robot end effectors, stepper motors and actuators in Automation	K2, K3,
CO-3	examine and solve issues by employing robot programming techniques and Automation.	K3, K4
CO-4	identify and recommend the components to automate an industry	K4, K5
CO-5	design and construct the basic robotprojects using stepper motor and other tools.	K6

UNIT I: ROBOTICS (15 Hours)

Definition of A Robot - Laws of Robotics - Comparison of Human and Robot Manipulator - Robot Writs T and End of Arm Tools - Robot Terminology – Robotic Joints – Classification of Robots — Robot Classification on the basis of Co-Ordinate Systems - Robot Classification on the basis of Power Source - Robot Classification on the basis Method of Control - Robot Classification on the basis of Programming Method - Robot Selection.

UNIT II: ROBOT END EFFECTORS AND ROBOT PROGRAMMING. (15 Hours)

End Effectors - Classification of End Effectors - Grippers – Selection of Gripper - Gripping Mechanisms - Tools – Types Tools - Element of End of Arm Tooling –Types of Grippers – Finger Grippers –Mechanical Grippers – Vacuum Grippers - Magnetic Grippers-Robot Programming –Robot Programming Techniques-Online Programming-Lead –Through Programming – Walk- Through Programming –Motion Programming-Over View of Robot Programming Language.

UNIT III: AUTOMATION (15 Hours)

Definition of Automation – Mechanization vs Automation – Advantages of Automation – Types of Automation – Issues of Automation in Factory Operations – Fluid Properties: Pressure, Flow Rate, Gas, Viscosity – Introduction to Fluid Power - Basic Elements of Fluid Power System-Applications of Fluid Power - Application of Pneumatics – Application of Hydraulics - Basic Pneumatics System - Basic Hydraulic System - Hydraulic System Design.

UNIT IV: PUMPS AND COMPRESSORS (15 Hours)

Pumps vs Compressors - Classification of Hydraulic Pumps – Air Compressors - Types of Air Compressors - Specification of Compressors- Cylinders - Classification of Cylinders on the Basis of Construction - Other Types of Cylinders - Introduction to Motors - Hydraulic and Pneumatic Motors - Symbol of Motors - Application of Motors - Classification of Valves

Symbols for Valve Actuators - Classification DC Valves on the Basis of Construction– Speed Control Circuits - Time Delay Circuits - Bleed Off Circuit – Pressure Reduction Circuit

UNIT V: CYLINDERS MOTORS AND VALVES (15 Hours)

Introduction to PLC - PLC vs Microcontroller - Basic Components and Their Symbols - Control

Transformers - Fuses - Switches - Relays - Time Delay Relays - Fundamentals of Ladder Diagram - Basic Diagram Framework - Wiring Reference Designators - Boolean Logic and Relay Logic - AND-OR And OR-AND - Ground Test - Latch - Two Handed Anti-Tie Down-Anti-Repeat - Combined Circuit - Machine Control Terminology - PLC Configurations - System Block Diagram - Update - Solve Ladder Physical Components vs Program Components - Light Control - Internal Relays - Disagreement Circuit - Majority Circuits -- Oscillators - Holding Contacts - Always ON And OFF Contacts - Ladder Diagrams Having Complex Rung

Books for study

1. A. K Gupta, S.K. Arora, Jean Riescher Westcott, *Industrial Automation and Robotics*, 1st Edition, Mercury Learning Information. Boston, New Delhi, 2017.
2. John. W.Webb, Renoald A. Rein, *Programmable Logic Controller Principles and Application*, 5th Edition, Prentice Hall India, 2002.

Unit	Book	Chapter	Sections
I	1	13	Relevant sections
II	1	15,16	Relevant sections
III	1	1,3	Relevant sections
IV	1	4,6,7,8	Relevant sections
V	2	1,2,3	1.1 - 1.3, 2.2 - 2.6, 3.1 - 3.9

Book for Reference

1. P.Jaganathan, *Robotics (Industrial Robotics),* 1st Edition, Lakshmi Publications, 2013.
2. StamatiosMenesis, GeorgeNikolakopoulos, Introductionto *Industrial Automation*, 1st Edition, CRC Press, 2018.
3. Rajput R K, *Robotics and Industrial Automation*, 1st Edition, S Chand, 2008.

Web References:

1. https://www.conestogac.on.ca/fulltime/robotics-and-industrial-automation
2. https://www.robots.com/articles/advantages-of-industrial-automation-with-robots
3. https://blog.robotiq.com/bid/53266/Robot-End-Effector-Definition-and-Examples

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	21UEL63ES04A	DSE-4: ROBOTICS AND INDUSTRIAL AUTOMATION	5	3

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	1	3	2	3	1	2	2.2
CO-2	3	3	2	1	1	3	3	3	2	1	2.2
CO-3	3	3	3	2	1	3	2	2	2	1	2.2
CO-4	3	2	2	2	1	3	2	2	2	3	2.2
CO-5	3	2	1	2	1	3	2	3	2	2	2.3
									Mean Overall Score		2.22
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL63ES04B	DSE-4: DIGITAL IMAGE PROCESSING	5	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the techniques of image processing	K1
CO-2	examine the images by digital techniques	K2
CO-3	apply image restoration to reduce the noise in digital images.	K3
CO-4	analyze the image by modern software	K4
CO-5	rate and design an algorithm for image processing	K5, K6

UNIT I: INTRODUCTION OF IMAGE PROCESSING (15 Hours)

Image Processing Notation and Data Formats - 8-Bit Level Images - 24-Bit Color Images - 8-Bit Color Images - Intensity Images – Red, Green and Blue Components and Grayscale Conversion -Image Histogram and Equalization - Grayscale Histogram and Equalization - 24-Bit Color Image Equalization - 8-Bit Indexed Color Image Equalization - Image Level Adjustment and Contrast - Linear Level Adjustment.

UNIT II: MORPHOLOGICAL IMAGE PROCESSING (15 Hours)

Basic Concepts from Set Theory - Binary Images, Sets, and Logical Operators - Dilation and Erosion- Dilation -Structuring Element Decomposition - The StrelFunction – Erosion - Combining Dilation and Erosion - Opening and Closing - The Hit-Or-Miss Transformation - Using Lookup Tables - Function BW Morph - Labeling Connected Components - Morphological Reconstruction - Opening by Reconstruction - Filling Holes - Clearing Border Objects – Gray -Scale Morphology - Dilation and Erosion - Opening and Closing.

UNIT III: IMAGE RESTORATION AND HISTOGRAM PROCESSING (15 Hours)

Image Restoration - Noise Models - Salt and Pepper Noise - Median and Mean Filter - Image Histogram: Definition and Example - Computing Image Histograms - Interpreting Image Histograms - Histogram Equalization - Direct Histogram Specification -Other Histogram Modification Techniques - Histogram Sliding - Histogram Stretching - Histogram Shrinking.

UNIT IV: EDGE DETECTION AND IMAGE SEGMENTATION (15 Hours)

Basic Concepts - First-Order Derivative Edge Detection - Second-Order Derivative Edge Detection - Laplacian Of Gaussian - The Canny Edge Detector - Edge Linking and Boundary Detection - The Hough Transform - Image Segmentation - Image Thresholding- Region Growing Segmentation - Watershed Segmentation.

UNIT V: APPLICATION OF IMAGE PROCESSING USING MATLAB (15 Hours)

Read an Image - Creating Red, Green, Blue Color Separately in an Image- Example of Image Segmentation- Image Conversion-Removal of Salt and Pepper Noise Using Median and Mean Filter- Separation of Higher Intensity from An Image- Use of Histogram Equalization to Improve the Image Contrast –Application of Image Erosion and Dilation on Binary Image.

Book for Study:

1. Li Tan and Jean Jiang, *Digital Signal Processing Fundamentals and Applications*, 2nd Edition, Elsevier, 2013.
2. Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing using MATLAB*, 3rdEdition, Gatesmark Publishing, 2009.
3. Oge Marques, *Practical Image and Video Processing Using MATLAB*, 1st Edition, A John Wiley and Sons, Inc., Publication, 2011.
4. Study material by the department

Unit	Book	Chapter	Sections
I	1	14	14.1 to 14.3
II	2	10	10.1 to 10.6
III	3	9, 12	9.1 to 9.6, 12.1 to 12.3
IV	3	14, 15	14.1 to 14.6, 15.1, 15.2.1, 15.3.1, 15.4
V	4		all

Book for Reference:

1. Gerard Bianchet and Maurice Charbit, *Digital Signal and Image Processing using MATLAB*, 1st Edition, ISTE Ltd, 2006.
2. S. Sridhar, *Digital Image Processing*, 2nd Edition, Oxford University Press, 2016.
3. Kenneth R. Castleman, *Digital Image Processing*, 1st Edition, Pearson Education India, 2007.

Web References:

1. https://www.tutorialspoint.com/dip/index.htm
2. https://www.geeksforgeeks.org/digital-image-processing-basics/
3. https://www.mygreatlearning.com/blog/digital-image-processing-explained/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course					Hours	Credit			
VI	21UEL63ES04B	DSE-4: DIGITAL IMAGE PROCESSING					5	3			
Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	2	2	2	2	3	3	2	2	2	2.3
CO-3	3	3	2	2	2	3	3	2	2	2	2.4
CO-4	3	3	2	2	2	3	2	2	2	2	2.3
CO-5	3	3	2	2	2	3	3	2	2	2	2.4
									Mean Overall Score		2.36
									Result		HIGH

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL64SE04A	SEC-4 (WS): CONSUMER ELECTRONICS	2	1

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the electronic concepts used in consumer electronics systems.	K1
CO-2	compare the preventive maintenance in various electronic appliances.	K2
CO-3	use different product safety, compliance standards and techniques associated with electronic products.	K3
CO-4	evaluate and analyze different electronic products and systems based on specifications	K4
CO-5	troubleshoot the modern electronic consumer appliances	K5

UNIT I: AUDIO SYSTEM (6 Hours)

Moving Coil Microphones - Capacitor Microphones - Wireless Microphones - Anatomy of a Hi-Fi system - Source Units - Signal Propagation - Stereo Multiplex – Compatibility - Theatre Sound System: DTS – DolbySound

UNIT II: SMART DEVICES (6 Hours)

Tab – Smart Watch – Smart TV – DTH System – LCD Projector – Smart Door Lock – Smart LED Light.

UNIT III: REMOTE CONTROLS (6 Hours)

Ultrasonic Transducers - Remote Control Transmitter – Remote Control System - Remote Control Operation – NFC - Troubleshooting Remote Control Systems

UNIT IV: CCTV AND SMART DEVICES (6 Hours)

CCTV Camera -Digital Video Recorder - Network Video Recorder- CCTV Installation- Digital Voice Assistants - Google Assistants– Managing Smart Home Devices - Smart Security

UNIT V: WASHING MACHINES (6 Hours)

Electronic Controller for Washing Machines - Washing Machine Hardware - Hardware and Software Development – Types - Fuzzy Logic Washing Machines - Miscellaneous Features.

Book for Study:

1. Study material by the department

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	3	All
IV	1	4	All
V	1	5	All

Book for Reference:

1. J.S. Chitode, *Consumer Electronics*, 1st Edition, Technical Publications, Pune. 2007.
2. S.P Bali, *Consumer Electronics*, 1st Edition, Pearson Education Asia Pvt., Ltd., 2008.
3. Homer L. Davidson, *Consumer Electronics Troubleshooting and Repair Hand Book*, 1st Edition, McGraw Hill, 2000.

Web References:

1. https://www.sciencedirect.com/topics/engineering/consumer-electronics
2. https://www.pcmag.com/encyclopedia/term/consumer-electronics
3. https://www.ltts.com/industry/consumer-electronics

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	**Course Code**			**Title of the Course**				**Hours**		**Credit**
VI	**21UEL64SE04A**			**SEC-4 (WS): CONSUMER ELECTRONICS**				**2**		**1**
Course Outcomes ↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	3	2	2	2	3	3	2	2	2	2.4
CO-3	3	3	2	2	2	3	3	2	2	2	2.4
CO-4	3	2	3	2	2	3	3	2	2	2	2.4
CO-5	3	2	3	2	2	3	2	2	2	2	2.3
									Mean Overall Score		**2.38**
									Result		**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL64SE04B	SEC-4 (WS): INDUSTRIAL ELECTRONICS	2	1

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	describe the power devices and explain its characteristics	K1, K2
CO-2	compare and illustrate various types of converter and choppers	K2, K3
CO-3	solve circuit issues by employing protection devices circuits and identify the problems in control applications.	K3, K4
CO-4	analyze the working of industrial control systems	K4
CO-5	assess the functions of control circuits and recommend a design and construct the circuits of industrial control system	K5, K6

UNITI: POWER SEMICONDUCTOR DEVICES (6 Hours)

Power Semiconductor Devices: Basic Structure – Power Diode - Power Transistors - Power MOSFET – SCR - IGBT – Characteristics - Thyristor: Principle of Operation – Two Transistor Analogy - Turn ON and OFF Methods of Thyristors - Gate Triggering Circuits – Series and Parallel Operation of Thyristors

UNITII: CONVERTERS, INVERTERS AND CHOPPERS (6 Hours)

Classification of Converters - Single Phase Half Wave Fully Controlled Converter - Freewheeling Diode - Single Phase Fully Controlled Converter - Three Phase Half Wave and Three Phase Full Wave-Controlled Converter - Battery Charger – Choppers - Step Up Chopper - Operation – Applications - Single Phase Voltage Inverters - Bridge Inverters - Voltage Control in Single Phase Inverters - External Control of DC in Put Voltage Inverter.

UNITIII: PROTECTION OF DEVICES AND CIRCUITS (6 Hours)

Cooling and Heat Sinks - Thermal Modeling of Power Switching Devices -Snubber Circuits - Reverse Recovery Transients –Supply and Load-side Transients - Voltage Protection - Current Protections -Electromagnetic Interference.

UNIT IV: CONTROL SYSTEM (6 Hours)

Open Loop and Closed Loop Control System - Examples of Control System - Mathematical Models of Control System - Mechanical Translational System - Block Diagrams - Block Diagram Reduction Techniques – Components of Automatic Control System – Potentiometer – Synchros– Controllers– TachoGenerators –Servomotors - Stepper Motor.

UNITV: DISTRIBUTED CONTROL SYSTEM (6 Hours)

Distributed Control Systems (DCS) - Architecture - LCU Languages - Supervisory Control and Optimization - Production Monitoring and Control – Power Factor Control – Motor Control - Induction Heating - Resistance Welding

Book for Study:

1. Dr.P.S.Bimbhra, *Power Electronics*,2nd Editon, Khanna Publishers, 1999
2. A.NagoorKani, *Control System*, 2nd Edition, RBA Publications, 2017.
3. Study Material Prepared by the Department.

Unit	Book	Chapter	Sections
I	1	2,4	2.1,21,2.5,2.5.1,2.6,2.6.1-2.6.3,2.7-2.7.5,4.1,4.1.1,4.5,4.10- 4.10.2
II	1	6,7,8	6.2,6.3,6.3.2,6.7.1,6.7.2,7.1,7.3,7.4.1,7.4.2,8.1,8.4
III	3	1	all
IV	2	2,4	2.1-2.8,4.1-4.5
V	3	2	all

Book for Reference:

1. M.S. JamilAsghar, *Power Electronics*, 8th Printing, PHI Learning, 2011.
2. H. Rashid, *Power Electronics*, 3rd Edition, Pearson Education, 2014.
3. Biswanath Paul, *Industrial Electronics and Control*, 2nd Edition, PHI Publications, 2010.

Web References:

1. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.html
2. https://www.sciencedirect.com/topics/engineering/industrial-electronics
3. https://www.industrial-electronics.com/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL64SE04B**	**SEC-4 (WS): INDUSTRIAL ELECTRONICS**	**2**	**1**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	3	2	1	3	2	3	1	2	2.3
CO-2	3	3	2	1	1	3	3	3	2	1	2.2
CO-3	3	3	3	2	1	3	2	2	2	1	2.2
CO-4	3	3	2	1	2	3	2	2	2	2	2.2
CO-5	3	2	2	2	1	3	3	2	2	2	2.2
Mean Overall Score											**2.22**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL64EG02A	GE-2: CCTV AND SMART SECURITY SYSTEMS	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	outline and explain CCTV and Smart Security System	K1, K2
CO-2	compose an end-to-end technical knowledge to execute CCTV installation.	K3, K4
CO-3	install and maintain CCTV and smart security systems	K4
CO-4	synthesize technical and troubleshooting skill	K5
CO-5	design Smart Security System in real time and become entrepreneurs who can work with confidence	K6

UNIT I: HARDWARE BASICS (12 Hours)

CCTV Camera - Cables - Network Cables Colour Coding - Connectors - Convertors - Splitters - Monitors - Storage Devices - Power Supply – DVR Camera Connections.

UNIT II: RECORDERS (12 Hours)

DVR (DIGITAL VIDEO RECORDER) and NVR (Network Video Recorder) systems - Types - Function and Operation of DVR and NVR - Configuration of DVR and NVR systems - Troubleshooting Basic DVR and NVR Problems - Application Software - Difference between DVR and NVR - Ports of DVR and NVR

UNIT III: CCTV INSTALLATION & TROUBLESHOOTING (12 Hours)

CCTV Installation - Camera, DVR, NVR and Monitor -Installation of IP Camera -Connect Single andMulti-Camera-Multiple DVR Adding with Networking -Network Cables Colour Coding - LAN Network Setup - Network Cables Colour Coding - WAN Setup - Modem Configuration for DVR andNVR- IP Camera - Installation of IP Camera - Mobile Phone Application for DVR andNVR- Remote Video Surveillance

UNIT IV: SMART SECURITY SYETEM (12 Hours)

Smart Homes – Controlling Smart Devices – Connectivity for Devices – Day in the Life of aSmart Home – Security Issues - Digital Voice Assistants – Functionality – Using IFTTT – Digital Voice Assistant Types- Google Assistants and Google Home: Setting Up -Device Setting – Using and Creating Routines – Linking Smart Home Devices – Managing Home Devices - Smart Lighting - Smart Security

UNIT V: SMART HOME AUTOMATION SECURITY (12 Hours)

The Concept of Security – Challenges in Home Automation Security – Various Home Automation Methodologies – Central Controller Based HAS – Bluetooth Based HAS – GSM Based HAS – SMS Based HAS – GBRS Based HAS – Internet Based HAS.

Book for Study:

1. Study Material Prepared by the Department.

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	3	All
IV	1	4	All
V	1	5	All

Book for Reference:

1. *Herman Kruegle, CCTV Surveillance, 2nd edition, Elsevier, 2007.*
2. Thomas Hill, *CCTV Handbook*, 3rd Edition, Thomas Hill, 2019.
3. *CCTV Technology Handbook*, National Urban Security Technology Laboratory, New York.
4. Nick Vandome,*Smart Homes*, In Easy Steps Limited

Web References:

1. https://www.safewise.com/home-security-faq/how-do-security-systems-work/
2. https://supremealarm.com/5-benefits-home-security-cameras/
3. https://en.wikipedia.org/wiki/Home_security

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL64EG02A**	**GE-2:CCTV AND SMART SECURITY SYSTEMS**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	3	2	2	2.5
CO-2	3	3	2	2	2	3	3	3	2	2	2.5
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	3	3	2	2	2	3	3	3	2	2	2.5
CO-5	3	3	2	2	2	3	2	3	2	2	2.4
Mean Overall Score											**2.48**
Result											**HIGH**

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEL64EG02B	GE-2: ENTREPRENEURIAL ELECTRONICS	4	3

CO.No.	CO statements	Cognitive Level (K- level)
On completion of this course, students would be able to		
CO-1	list the basics of electrical technology.	**K1**
CO-2	explain the working principle of measuring instruments	**K2**
CO-3	distinguish passive and active components	**K3**
CO-4	investigate and rate the use of electronics by the society	**K4**
CO-5	analyze and design hobby circuit and simple projects.	**K5**

UNITI: ELECTRICAL TECHNOLOGY (12 Hours)

Introduction to Electricity – Alternating Current Based System - Single Phase - 3 Phases - DC Signal - DC Source – Fundamentals: Voltage, Current and Power - Power Factor – Passive Components.

UNITII: MEASURING INSTRUMENTS (12 Hours)

Introduction to Multimeter– Analog Multimeter– Digital Multimeter– Voltage Measurement – Current Measurement – Resistance Measurement – Cathode Ray Oscilloscope – Frequency Calculation - Function Generator – Calibration.

UNITIII: PASSIVE AND ACTIVE COMPONENTS (12 Hours)

Resistors – Types – ColourCode – Wattage – Tolerance – Capacitors – Types – Inductors – Transformer – Step-up and Step-down – Diode – Ratings – Operation – Transistor – NPN and PNP – Switching – Amplifier – Diode and Transistor Testing – MOSFET – Types – Testing MOSFET.

UNITIV: SERVICING AND TROUBLE SHOOTING (12 Hours)

Trouble Shooting Techniques – Soldering and De-Soldering Techniques – Pretreatment - Precautions during Soldering and De-soldering- DC Power Supply Troubleshooting - Single – Dual - Variable Voltage - Printed Circuit Board - Layout Drawing.

UNITV: HOBBY CIRCUITS (12 Hours)

Electronic Street Light Switch – Smart Emergency Light – Battery Charger with Automatic Switch-OFF-Relay Based Circuits – Opto-Coupler Based Circuits - 5V Regulated Power Supply

Book for Study

1. Study Material Prepared by the department

Unit	Book	Chapter	Sections
I	1	1	All
II	1	2	All
III	1	3	All
IV	1	4	All
V	1	5	All

Book for Reference

1. Robert D. Hisrich, VelandRamadani, *Effective Entrepreneurial Management*, 1st Edition, Springer, 2017.
2. DhruvNath and SushantoMitra, *Funding Your Startup*, 1st Edition, Penguin Portfolio, 2020.
3. Harpreet Grover and VibhoreGoyal, Let's Build a Company, 1st Edition, Penguin, 2020.

Web References:

1. https://www.engineersgarage.com/egblog/tips-and-business-ideas-for-electronic-engineers-who-aspire-to-become-entrepreneurs/
2. https://www.ecs.soton.ac.uk/entrepreneurship
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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
VI	**21UEL64EG02B**	**GE2: ENTREPRENEURIAL ELECTRONICS**	**4**	**3**

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	2	3	3	2	2	2	2.4
CO-2	3	3	2	2	2	3	3	2	2	2	2.4
CO-3	3	3	2	2	2	3	3	2	2	2	2.4
CO-4	3	3	2	2	2	3	3	2	2	2	2.4
CO-5	3	3	2	2	2	3	3	2	2	2	2.4
									Mean Overall Score		**2.4**
									Result		**High**

B.Sc. ELECTRONICS

SYLLABUS - 2017

SCHOOLS OF EXCELLENCE
with
CHOICE BASED CREDIT SYSTEM (CBCS)

SCHOOL OF PHYSICAL SCIENCES
St. JOSEPH'S COLLEGE (Autonomous)
Special Heritage Status Awarded by UGC
Accredited at 'A' Grade (3rd cycle) by NAAC
College with Potential for Excellence Conferred by UGC
DBT-STAR & DST-FIST Sponsored College
TIRUCHIRAPPALLI - 620 002, INDIA

SCHOOLS OF EXCELLENCE
WITH CHOICE BASED CREDIT SYSTEM
(CBCS)

UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to work towards the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014 – 15, to standup to the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system allows the enhanced academic mobility and enriched employability of the students. At the same time this system preserves the identity, autonomy and uniqueness of every department and reinforces their efforts to be student centric in curriculum designing and skill imparting. These five schools will work concertedly to achieve and accomplish the following objectives:

- Optimal utilization of resources both human and material for the academic flexibility leading to excellence.
- Students experience or enjoy their choice of courses and credits for their horizontal mobility.
- The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.
- Human excellence in specialized areas
- Thrust in internship and / or projects as a lead towards research and
- The multi-discipline nature of the newly evolved structure (School System) caters to the needs of stake-holders, especially the employers.

What is Credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The following Table shows the correlation between credits and hours. However, there could be some flexibility because of practicals, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 150 credits as mentioned in the table below. The total number of minimum courses offered by a department are given in the course pattern.

SUMMARY OF HOURS AND CREDITS
UG COURSES

Part	Semester	Specification	No. of Courses	Hours	Credits	Total Credits
I	I-IV	**Languages** (Tamil/Hindi/French/Sanskrit)	4	16	12	**12**
II	I-IV	**General English**	4	20	12	**12**
III	I-VI	**Core**				
		Theory	11-16			
		Practicals	3-6			
	V-VI	Project Work	1	90	60	
	IV-VI	**Core Electives**	3	12	12	
	V	Self-paced Learning (Partial Online Course)	1	-	2	
	VI	Comprehensive Examination	1	-	2	
	I-VI	**Allied**	4/6	24	20	
	III & V	**Extra Credit Courses**	**2**	**-**	**(4)**	
	VI	**Internship**	1	-	2	**98**
1V		**Skilled Based Electives:**				
	V	Between Schools (BS)	1	2	2	
	VI	Within School (WS)	1	2	2	
	V	**Inter Departmental Courses (IDC)**				
		Soft Skills / NCC	1	2	2	
		Non-Major Courses (NMC)				
	I	Communicative English	1	-	5	
	II	Computer Literacy	1	2	2	
	III	Environmental Studies (Partial Online Course)	1	2	2	
	I-IV	**Value Education**	4	8	8	**23**
V	I-V	**SHEPHERD & Gender Studies**	-	-		
	I-V	**AICUF, Fine Arts, Nature Club, NCC, NSS**	-	-	-	
	V	**Career Guidance & Training**	**-**	**-**	**-**	**5**
		TOTAL		**180**	**150**	**150 (+4 extra credits)**

Course Pattern

The Undergraduate degree course consists of five vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)
Part-II : General English
Part-III : Core Course (Theory, Practical, Core Electives, Allied, Project, Internship and Comprehensive Examinations)
Part-IV : SBE, NMC, Value Education, Soft Skills/National Cadet Corps and Environmental Studies (EVS)
Part-V : Community Service (SHEPHERD) and Gender Studies, AICUF, Fine Arts, Nature Club, NCC, NSS, etc.

Non-Major Courses (NMC)

There are three NMC's – Communicative English, Computer Literacy and Environmental Studies offered in the I, II & III Semesters respectively.

Extra Credit Courses

In order to facilitate the students gaining extra credits, the extra credit courses are given. There are two extra credit courses – Massive Open Online Courses (MOOC) and Skill-based Course – offered in the III and V Semesters respectively.

According to the guidelines of UGC, the students are encouraged to avail this option of enriching by enrolling themselves in the MOOC provided by various portals such as SWAYAM, NPTEL, etc. Skill based course is offered by the department apart from their regular class hours.

Value Education Courses

There are four courses offered in the first four semesters for the First & Second UG students.

Non-Major Elective / Skill Based Elective

These courses are offered in two perspectives as electives "Within School" (WS) and "Between School" (BS).

Subject Code Fixation

The following code system (11 characters) is adopted for Under Graduate courses:

Year of Revision	UG Code of the Dept	Semester	Specification of the Part	Subject Category	Running no. in that part
↓	↓	↓	↓	↓	↓
17	U##	*x*	*x*	*xx*	*xx*
17	**UEL**	**1**	**3**	**2**	**1**

For Example :

I B.Sc. Electronics, first semester **Basic Electronics**
The code of the paper is 17UEL130201.
Thus, the subject code is fixed for other subjects.

Subject Category

00 - Languages (Tamil / Hindi / French / Sanskrit)
01 - General English
02 - Core (Theory, Practical, Comprehensive Exams, Internship and Project)
03 - Core Electives
04 - Allied
05 - Extra Credit Courses
06 - Skill Based Electives (BS) & (WS)
07 - Soft Skill
08 - NMC (Communicative English, Computer Literacy/SAP)
09 - EVS (Environmental Studies)
10 - Value Education
11 - Community Service (SHEPHERD) and Gender Studies
12 - AICUF / Nature Club / Fine Arts / NCC / NSS etc.

EXAMINATION: Continuous Internal Assessment (CIA)

UG - Distribution of CIA Marks	
Passing Minimum: 40 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
CIA	**100**

MID-SEM & END–SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective + Descriptive elements; with the existing question pattern PART-A, PART-B, and PART-C.
2. CIA Component III for UG & PG will be of 15 marks and compulsorily objective multiple choice question type.
3. The CIA Component III must be conducted by the department / faculty concerned at a suitable computer centres.
4. The 10 marks of Part-A of Mid-Sem and End-Sem Tests will comprise only: **Objective Multiple Choice Questions**; **True / False**; and **Fill-in the Blanks**.
5. The number of hours for the 5 marks allotted for Library Referencing work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses of the semester.
6. English Composition once a fortnight will form one of the components for UG General English.

SEMESTER EXAMINATION

Testing with Objective and Descriptive questions

Part-A: Objective MCQs only (30 Marks)

Answers are to be marked on OMR score-sheet. The OMR score-sheets will be supplied along with the Main Answer Book. 40 minutes after the start of the examination the OMR score-sheets will be collected

Part-B & C: Descriptive (70 Marks)

Part-B: 5 x 5 = 25 marks (Inbuilt Choice);
Part-C: 3 x 15 = 45 marks; 3 out of 5 questions (Open Choice).

The Accounts Paper of Commerce will have
Part-A: Objective = 25
Part-B: Descriptive 3 x 25 = 75 marks.

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

Grading System

1. Grading

The total marks will be calculated by adding both CIA and the end-semester examinations for each of the courses. The total marks thus obtained will then be graded as per details provided in the following Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester **Grade Point Average (GPA)** and **Cumulative Grade Point Average (CGPA)** respectively. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}, \qquad \text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$$

where, 'C_i' is the Credit earned for the Course-*i,*
'G_i' is the Grade Point obtained by the student for the Course '*i*',
'M' is the marks obtained for the course '*i*', and
'*n*' is the number of Courses **Passed** in that semester.

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

2. Classification of Final Results

i) For each of the three parts, there shall be separate classification on the basis of the CGPA, as indicated in the following Table-2.

ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/Excellent/Very Good/Good/Above average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided he/she has secured the prescribed passing minimum in the LCs and the ELCs.

iii) Grade in Part-IV and Part-V shall be shown separately and it shall not be taken into account for classification.

iv) Absence from an examination shall not be taken as an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above but below 90	9	A+
70 and above but below 80	8	A
60 and above but below 70	7	B+
50 and above but below 60	6	B
40 and above but below 50	5	C
Below 40	0	RA

Table-2: Final Result

CGPA	Classification of Final Results	Corresponding Grade
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

Credit based weighted Mark System isadopted for individual semesters and cumulative semesters in the column 'Marks Secured' (for 100).
A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.

Declaration of Result:

Mr./Ms. _____ has successfully completed the Under Grduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) in Part-III is _____ and the class secured is _____ by completing the minimum of 150 credits. The candidate has acquired _____ (if any) more credits from SHEPHERD / AICUF/ Fine Arts / Sports & Games / NCC / NSS / Nature Club etc. The candidate has also acquired _____ (if any) extra credits offered by the parent department courses.

B. Sc. Electronics

Course Pattern - 2017 Set

Sem	Part		Code	Subject Title	Hr	Cr
I	I	Language	17UGT110001	Language - I (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE120101	General English –I	5	3
	III	Core	17UEL130201	Basic Electronics	6	4
			@	Electronics Practical –I	3	-
			@	Workshop Practice –I	3	-
	III	Allied	17UEL130401	Mathematics –I	6	5
	IV	NMC	17UCE140801	Communicative English	-	5
	IV	V. Edn	17UFC141001	Essentials of humanity	2	2
				Problem Solving & Discussion	1	-
				Total Credits for Semester 1	**30**	**22**
II	I	Language	17UGT210002	Language - II (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE220102	General English – II	5	3
	III	Core	17UEL230202	Electric Circuit Analysis	5	4
			17UEL230203	Electronics Practical –I	3	4
			17UEL230204	Workshop Practice –I	3	4
	III	Allied	17UEL230402	Mathematics –II	6	5
	IV	NMC	17UCE240802	Computer Literacy / SAP	2	2
	IV	V. Edn	17UFC241002	Fundamentals of Human Rights	2	2
				Total Credits for Semester 2	**30**	**27**
III	I	Language	17UGT310003	Language - III (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE320103	General English – III	5	3
	III	Core	17UEL330205	Digital Electronics	6	4
			@	Electronics Practical - II	3	-
		Allied	17UEL330403A	Applied Physics - I (OR)	4	4
			17UEL330403B	Applied Computer Science - I		
			@	Applied Physics Practical (OR)	2	@
			@	Applied Computer Science Practical		
		Extra Credit Course	17UEL330501	Massive Open Online Course	-	(2)
	IV	NMC	17UCE340901	Environmental studies (Partial online course)	2	2
	IV	V. Edn	17UFC341003A	Formation of youth- I (OR)	2	2
			17UFC341003B	Religious Doctrine - I		
				Lab equipment servicing	2	
				Total Credits for Semester 3	**30**	**18**
IV	I	Language	17UGT410004	Language -IV (Tamil/Hindi/French/Sanskrit)	4	3
	II	English	17UGE420104	General English – IV	5	3
	III	Core	17UEL430206	Electronic Devices and Circuits	6	4
			17UEL430207	Electronics Practical – II	3	3
		Core Elective (WS)	17UEL430301A	Home Appliances Servicing and Repair (OR)	4	4
			17UEL430301B	Lab Equipments Maintenance and Servicing		
	III	Allied	17UEL430404A	Applied Physics –II (OR)	4	3
			17UEL430404B	Applied Computer Science - II		
			17UEL430405A	Applied Physics Practical (OR)	2	2
			17UEL430405B	Applied Computer Science Practical		
	IV	V. Edu	17UFC441004A	Formation of youth- II (OR)	2	2
			17UFC441004B	Religious Doctrine - II		
				Total Credits for Semester 4	**30**	**24+(2)**

V	III	Core	17UEL530208	Microprocessors and its application	5	4
			17UEL530209	Linear Integrated Circuits	5	4
			17UEL530210	Communication System	6	4
			17UEL530211	Electronics Practical – III	6	4
		Extra Credit Course	17UEL530502	Extra Credit Course	-	(2)
		SPL	17UEL530212A	Programmable Logic Controller (Partial online course) (OR)	-	2
			17UEL530212B	Audio Electronics	-	
	III	Core Elective (WD)	17UEL530302A	Programming in C Language (OR)	4	4
			17UEL530302B	Computer hardware and Networks		
	IV	SBE (BS)	17UEL540601	Entrepreneurial Electronics	2	2
	IV	IDC	17USS540701A	Soft Skills	2	2
			17USS540701A	National Cadet Corps (NCC)		
				Total Credits for Semester 5	**30**	**26**
VI	III	Core	17UEL630213	Microcontroller and its applications	5	4
			17UEL630214	Power Electronics	5	4
			17UEL630215	Sensor Technology	5	3
			17UEL630216	Electronics Practical – IV	6	4
			17UEL630217	Comprehensive Examination	-	2
			17UEL630218	Internship	-	2
			17UEL630219	Project Work	3	3
		Core Elective (WD)	17UEL630303A	Control System (OR)	4	3
			17UEL630303B	Electronic measurement system		
	IV	SBE (WS)	17UEL640602	Troubleshooting Computer hardware	2	2
				Total Credits for Semester 6	**30**	**28**
I-V	V	SHEPHERD	17UCW651101	Community service work (SHEPHERD) & Gender Studies		5
				Total Credits for all Semesters		**150+ (4)**

* Code numbers according to the subject chosen

@ Practical examination in the following even semester.

Programme Outcomes (POs):

1. Undergraduate students are to be passionately engaged in initial learning with an aim to think differently as agents of new knowledge, understanding and applying new ideas in order to acquire employability/ self-employment.
2. Undergraduate students are trained to take up higher learning programmes.
3. Undergraduate students are made to be competent and socially responsible citizen of India.
4. Undergraduate students are to be exposed to technical, analytical and creative skills.
5. Undergraduate students are to be imparted with a broad conceptual background in the Biological sciences / Computing sciences / Languages and culture / Management studies / Physical sciences.

Programme Specific Outcomes (PSOs):

1. Critical and analytical thinking skills
2. Problem solving skills
3. Designing skills
4. Simulating skills
5. Knowledge on basic electronic components and circuits
6. Knowledge on computer hardware and maintenance
7. Entrepreneurial skills
8. Employability Enhancement

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பருவம்: 1 **மணி நேரம்: 4**

17UGT110001 **புள்ளிகள்: 3**

பொதுத்தமிழ்-I

பாடத்தின் விளைவு

- சமூக மாற்றச் சிந்தனைகளை உள்ளடக்கிய தற்கால இலக்கியப்பரப்பை அறிதல்
- புதுக்கவிதை, சிறுகதை, உரைநடை ஆகியவற்றின் இலக்கியத்திறன் கண்டறிதல்.
- சந்திப்பிழையின்றி எழுதும் திறன் பெறுதல்.
- வாழ்க்கை வரலாற்றுக் கட்டுரைகளை வாசிக்கும் திறன் பெறுதல்.
- அன்றாடப் பயன்பாட்டிலுள்ள ஆங்கிலச்சொற்களுக்குப் பொருத்தமான சொற்களை உருவாக்கச்செய்தல்
- அரசுப்போட்டித் தேர்வுகளுக்கேற்ப தமிழ்மொழியில் பயிற்சி அளித்தல்.

அலகு-1 மகாகவி பாரதியார் கவிதைகள்
பாரதிதாசன் கவிதைகள்
நாமக்கல் கவிஞர் கவிதைகள்
உரைநடை - முதல் மூன்று கட்டுரைகள் (12 மணி நேரம்)

அலகு-2 பாவலரேறு பெருஞ்சித்திரனார் பாடல்கள்
கண்ணதாசன் கவிதைகள்
இலக்கிய வரலாறு (பக். 239- 300)
இலக்கணம் -வலிமிகும் இடங்கள் (14 மணி நேரம்)

அலகு-3 சமூகக்கவிதைகள்
இலக்கிய வரலாறு (பக்.300 -362)
சிறுகதை - முதல் ஆறு சிறுகதைகள் (14 மணி நேரம்)

அலகு-4 அரசியல் கவிதைகள்
இலக்கணம் - வலி மிகா இடங்கள் (10 மணி நேரம்)

அலகு-5 மொழிபெயர்ப்புக்கவிதைகள்
சிறுகதை- 7 முதல் 12 முடிய உள்ள சிறுகதைகள்
உரைநடை- 4முதல் 6 முடிய உள்ள கட்டுரைகள்
(10 மணிநேரம்)

பாடநூல்

1. பொதுத்தமிழ்- செய்யுள் திரட்டு- தமிழாய்வுத்துறை வெளியீடு-2017-2020
2. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழாய்வுத்துறை வெளியீடு.
4. சிறுகதைத்தொகுப்பு : (நாட்டுடைமையாக்கப்பட்ட படைப்பாளர்களின் சிறுகதைகள்), தமிழாய்வுத்துறை வெளியீடு.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGT110001					Title of the Paper தொழுநோய்-1								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	4	3	5	5	4	4	4	3	3	4	5	4.2	
CO2	5	5	5	3	4	5	4	5	4	3	3	4	5	4.2	
CO3	4	4	5	4	3	4	3	5	4	3	3	4	5	3.9	
CO4	5	5	4	4	4	5	5	5	4	3	5	5	5	4.5	
CO5	5	5	5	4	4	4	4	5	4	3	4	5	5	4.0	
CO6	5	5	5	3	4	4	4	4	4	5	4	3	5	3.8	
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$ **Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semestre: I **Hours/Week: 4**
17UGH110001 **Credits : 3**

HINDI-I

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* Knowledge and understanding of Hindi Conversations
* Improvement of the writing skills.
* Knowledge of Grammar forms
* Effective communicative skills in Hindi.
* The introduction of socially relevant subjects in Modern Hindi Literature
* Appreciation the features of Modern Hindi Prose.

Unit- I **8 hours**

Dr Abdul Kalam, Ling Badaliye, Vachan Badaliye, Baathcheeth-Aspathal Mein

Unit-II **12 hours**

Hamara Rajchinha, Noun Ling, Kaarak Chinha, Chaar Baayee, Baathcheeth, Dookan Mein

Unit-III **12 hours**

Moun hee mantra hai, Vachan, Kaarak, Vishwamitra Ka yagna, Baathcheeth, Hotel mein

Unit-IV **14 hours**

Veer Shivaji, Pronoun, Danush Yagna, Baathcheeth-Maidaan mein

Unit-V **14 hours**

Rajatilak Kee Thaiyaree, Adjectives, Baathcheeth-Pareeksha ke baare mein

Books Recommended

1. Dakshina Bharathi Hindi Prachar Sabha, Thiagaraya Nagar, Chennai – 600 017, Subhodh Hindi Patamala-2, Bharath Milap, Bharath-1, 2016.
2. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 63, Tagore Nagar, Allahabad 2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGH110001					Title of the Paper Hindi-I					Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	4	4	4	3	4	2	2	2	3	4	4	3.2
CO2	3	3	2	3	2	4	4	4	3	3	2	3.0
CO3	3	2	2	3	4	2	2	2	3	4	4	2.8
CO4	3	2	2	3	2	4	4	4	4	2	2	2.9
CO5	3	3	3	3	3	3	4	4	3	3	3	3.2
CO6	4	4	4	4	3	4	3	2	4	3	3	3.4
										Mean Overall Score		3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: I **Heures /Semaine: 4**
17UGF110001 **Credits: 3**

FRANÇAIS-I

Course Outcomes

* Introduire la langue et la culture française aux étudiants
* Comparer la culture de l'Inde et de la France
* Familiariser l'étudiant avec le vocabulaire
* la grammaire et les conversations se présenter
* Donner des informations en Français
* Conjuguer des verbes, Avoir Etre Aller Faire

Unit-I : Al'aéroport Kamaraj domestic de Chennai **(10 heures)**

Saluer, demander et dire le nom, présenter quelqu'un, se présenter, souhaiter la bienvenue a quelqu'un, demander et dire l'identité de quelqu'un.
Grammaire : Etre, s'appeler, pronoms sujets, interrogation

Unit-II : A l'Université **(10 heures)**

Demander comment on se porte, présenter quel qu'un, prendre congé, exprimer, l'appréciation.
Grammaire : Articles définis et indéfinis, genre des noms, adjectifs, présent de l'indicatif : verbes réguliers en er, être avoir, apprendre, prépositions a, en, au, aux.

Unit-III : Au café **(10 heures)**

Dire ce qu'on aime, donner des informations, exprimer l'admiration, demander des informations sur quelqu'un.
Grammaire : Adjectifs interrogatifs, présent de l'indicatif : avoir, verbes en er , savoir, qu'est ce que c'est?, adjectifs possessifs, négation ,adjectifs irréguliers

Unit-IV : A la plage **(15 heures)**

Proposer une sortie, accepter, refuser la proposition
Grammaire : phrases au singulier et au pluriel, pronom indéfini- on, il y a, adjectifs démonstratifs, négation, interrogation, présent de l'indicatif : faire, voir, aller, sortir, connaitre

Unit-V : Un concert et chez Nalli **(15 heures)**

Inviter, accepter, exprimer son incapacité d'accepter, complimenter, parlé au téléphone, demander le prix, protester contre le prix.

Grammaire : Présent de l'indicatif : verbes en er, venir, pouvoir, vouloir, articles contracte, avec, a chez, le futur, interrogation est ce que, adverbes

interrogatifs, adjectifs possessifs, accord de l'adjectif, adjectifs exclamatifs, très/trop, présent de l'indicatif : acheter-regarder, l'impératif.

Manuel:

1. K.Madanagobalane, **Synchronie-1**, Samhitâ Publication, 2011.

Livre de référence:

1. Annie Berthet /B_atrix Sampsonis/ Catherine Hugot /V_ronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/R_gineM_rieux, Connexions 1, Didier, 2011.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGF110001	Title of the Paper French-I										Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	2	3	4	4	4	2	2	3	3	3.2	
CO2	3	3	3	3	4	4	4	3	3	3	2	3.2	
CO3	3	2	3	2	4	3	2	4	4	3	3	3.0	
CO4	3	3	4	3	4	2	2	3	3	2	2	2.8	
CO5	3	3	4	3	4	3	3	3	4	5	2	3.4	
CO6	3	4	3	3	3	3	3	3	2	4	3	3.1	
									Mean Overall Score			3.1	

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: I **Hours/Week: 4**

17UGS110001 **Credits : 3**

SANSKRIT-I

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* Knowledge and understanding of basic Sanskrit grammar
* Knowledge and understanding of essential Sanskrit vocabulary
* Introduction of the writing skills
* Introduction of Sanskrit Aksharas.
* Introduction of Present tense forms
* Implementation of good thoughts from Subashitani

Unit-I **8 hours**

Akharavivaranam – Svaras & Vyanjanaani – Samyukta Aksharani.

Unit-II **12 hours**

Shabdadayah – Aakaaraanta, ikaar aantah. ukaaraantah.

Shabdadayah – Aakaaraanta, iikaar aantah. uukaaraantah.

Unit-III **12 hours**

Anuvaada Prayogah.

Unit- IV **14 hours**

Lat Lakarh – Parasmai – Pada Prayogah = Vakyarupah.

Unit-V **14 hours**

Subhaashitaani

Books Recommended

1. Kulapathy, K. M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai-400 007, 2014
2. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat-678003, Kerala, SOuth India, Shabdha Manjari, 2014
3. Balasubramaniam R., Samskrita Akshara Siksha, Vangals Publication, 14th Main Road, JP Nagar, Bangalore -78, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGS110001					Title of the Paper Sanskrit-I						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	5	3	5	4	4	3	3	3	3	3	4		3.1
CO2	4	3	4	4	4	4	4	4	4	3	4		3.3
CO3	4	3	3	4	4	3	4	4	3	3	4		3.1
CO4	4	3	3	4	3	3	4	4	3	3	4		3.0
CO5	4	4	4	3	4	4	3	3	3	4	4		3.1
CO6	5	4	4	4	4	3	3	3	3	3	4		3.1
									Mean Overall Score				3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: I **Hours/Week: 5**
17UGE120101 **Credits: 3**

GENERAL ENGLISH-I

Course Outcome

* Introduce themselves to the others
* Narrate simple experiences in a coherent manner
* Understand the underlying meaning in the text
* Describe accurately what he/she observes and experiences
* Converse with friends about their likes and dislikes
* Write leave letters using the appropriate format and language

Unit-I:

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I doing?
09. What was I doing?
10. Unscramble the Past Actions
11. What did I do yesterday?

Unit-II:

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Form of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit-III:

22. Plural Forms of Action Words

23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds
27. Indefinite Articles
28. Un/Countable Practice
29. Listen and Match the Visual
30. Letter Spell - Check
31. Drafting Letter

Non-Detailed:

"The Merchant of Venice" from *Six Tales From Shakespeare*

Unit-IV:

32. Friendship Word Grid
33. Friends' Details
34. Guess the Favourites
35. Guess Your Friend
36. Friends as Guests
37. Introducing Friends
38. What are We Doing?
39. What is (s)he / are they Doing?
40. Yes / No Question
41. What was s/he doing?
42. Names and Actions
43. True Friendship
44. Know your Friends
45. Giving Advice/Suggestions
46. Discussion on Friendship
47. My Best Friend

Non-Detailed:

"The Taming of the Shrew" from *Six Tales From Shakespeare*

Unit-V:

48. Kinship Words
49. The Odd One Out
50. My Family Tree
51. Little Boy's Request

52. Occasions for Message
53. Words denoting Place
54. Words denoting Movement
55. Phrases for Giving Directions
56. Find the Destination
57. Giving Directions Practice
58. SMS Language
59. Converting SMS
60. Writing Short Messages
61. Sending SMS
62. The family debate
63. Family Today

Non-Detailed: **"The Tempest" from *Six Tales From Shakespeare***

Textbook

1. Joy, J.L. & Peter, F.M. *Let's Communicate 1*, New Delhi, Trinity Press, 2014. Print.

Non-Detailed Text

1. Dodd, E F. *Six Tales From Shakespeare*. London: Macmillan, 1987. Print. (First three tales)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UGE120101					Title of the Paper General English-I							Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	3	4	4	4	5	4	4	4	3	3	4	4	3.80
CO2	4	3	4	4	4	5	5	4	4	4	4	4	4	4.10
CO3	4	3	4	4	4	3	3	4	4	3	3	4	4	3.60
CO4	4	3	2	4	4	4	4	3	3	5	5	4	4	3.80
CO5	4	3	4	4	4	4	4	3	3	4	4	5	5	3.90
CO6	5	4	4	3	3	4	4	3	4	4	5	4	4	3.90
													Mean Overall Score	3.85

Result: The Score for this Course is 3.85 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **L P C**
17UEL130201 **6 - 4**

BASIC ELECTRONICS

Course Outcomes

1. Classify various bands in materials and waveforms
2. Demonstrate functioning of passive circuits
3. Demonstrate PN diode based circuit and its function
4. Demonstrate Transistors based circuit and its function
5. Classify various optoelectronics devices
6. Demonstrate FET based circuit and its function

UNIT-I: Electrical Theory (12 Hrs)

The structure of an atom- Classification of materials based on band theory - Intrinsic, extrinsic Semiconductor -The unit of charge - Electric current - Potential difference - Power-signals - AC, DC, Pulsed DC waveform - Triangular waveforms - Saw tooth waveforms -Trigger pulse.

UNIT-II: Resistance, Capacitance, Inductance & Their Circuits (15 Hrs)

Introduction - Ohms law - Resistance - Basic definitions - Resistor color code - Calculating resistor value - Resistor parameters - Connecting resistors together.Capacitance: Capacitance and charge - Dielectric materials of a capacitor-Voltage rating of a capacitor - Energy stored in capacitors -Types of capacitors - Characteristics of capacitors - Charging and Discharging of a capacitor - Capacitor in parallel - Capacitor in series. Construction of Inductor - Inductance-factors affecting inductance -Time constant of an inductor - Power and energy in an inductor -Inductor in series and parallel - self inductance

UNIT-III: Semiconductor Diode (15 Hrs)

Introduction PN - junction - PN junction formation - Depletion region formation - Barrier potential-Biasing of a PN - junction diode -VI characteristics of a diode - Diode resistance-Static and dynamic resistance of a diode-Diode comparison-Diode specification-Type of diodes-Rectifier circuits using diodes -Half wave rectifier - Full wave rectifier.

UNIT-IV: Transistors (15 Hrs)

Introduction- Construction- Transistor biasing -VI characteristics -Operation of NPN transistor in active region- Operation of PNP transistor in active region- Circuit symbol and conventions-transistor configuration-Transistor-Darlington pair of transistor-Transistor specification parameters-

Applications of BJT.Introduction to FET-Classification- Construction-Operation.

UNIT-V: Opto-Electronics (15 Hrs)

LED-construction-operation principle of LED- Calculating an LED resistor value-Application of LED-Advantages and disadvantages of LED-LDR operation-Photodiode: construction – principle - application- PIN Diode - Solar cell -Operation - Phototransistor -construction - Application

BOOKS FOR STUDY:

1. R.Y. Borse, “Basic electronic Devices and circuits”, First edition 2012, Adhyayan publishers & Distributors, New Delhi.
2. R.Y. Borse, “Basic electronic passive components” , First edition 2014, Adhyayan publishers & Distributors -New Delhi

BOOKS FOR REFERENCE:

1. Theraja B.L. “Basic electronics” 3rd edition, 2012, S. Chand & Co.
2. David Bell. “Electronic devices and circuits”2007, PHI
3. Mehta V.K “Principles of Electronics”, S. Chand & Co., 2005
4. Forrest.M.Mims, “Getting Started in Electronics”, E- book, 2000

SECTION :

UNIT	BOOK	SECTIONS
I	1	1.2,1.4 lecture notes
II	2	1.1,1.1.1, 1.11, 1.13, 1.6, 1.6.2, 2.3, 2.5, 2.9, 2.10, 2.13-2.14, 3.2-3.5, 3.7, 3.18-3.19 (lecture notes – self inductance)
III	1	1.5.1-1.5.4.4, table 1.2, 3.1-3.3.1,3.4, 3.5.1
IV	1	4.1 - 4.2.13
V	1	2.3,2.3.3, 2.3.7-2.4.6,(lecture notes- solar cell, operation, phototransistor construction, application)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UEL130201					Title of the Paper: BASIC ELECTRONICS								Hours 6	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	2	4	5	4	4	5	4	4	4	3	2	3.8	
CO2	5	4	2	3	5	4	4	5	4	4	4	3	2	3.8	
CO3	5	4	2	3	5	4	4	5	4	4	4	3	2	3.8	
CO4	5	4	2	3	5	4	4	5	4	4	4	3	2	3.8	
CO5	5	4	2	4	5	4	4	5	4	4	4	3	2	3.8	
CO6	5	4	2	3	5	4	4	5	4	4	4	3	2	3.8	
													Mean Overall Score	3.8	

Result: The Score for this Course is 3.8 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **L P C**
17UEL130401 **6 - 5**

Allied: MATHEMATICS-1

Course Outcomes

1. Applications of matrices and the properties of matrices in their major discipline.
2. Basic concepts of matrices
3. Techniques in differential Equations
4. Application of differential equations in the field of Electronics.
5. Interpretation of data analysis in the field of Electronics.
6. Use of probability in their major discipline.
7. Use of probability distribution techniques in their major discipline.
8. Applications of statistical measures

Unit I: Matrices and Determinants:

Solutions of system of linear equations - Using Cramer's rule- Eigen values and Eigen vectors of a matrix - Cayley Hamilton's Theorem (Without proof). (Chapter I, pages 40-43,131-138,152-156)

Unit II: Differential Equations:

Second order differential equations - all the types of equations including constant coefficients and particular integral when X is of the form x, sinax and cosax. (Chapter V, pages 534-570).

Unit III: Statistics:

Measures of Central tendency: Mean, Median, Mode (Direct method only) - Measures of variation: Range, Standard deviation (Chapter 9, Pages 124-170, Chapter 10- pages 241-245,259-267)

Unit IV: Probability :

Probability - Conditional probability - Baye's theorem (Problems only) (Chapter 18, Pages 737-768)

Unit V: Theoretical of Distribution :

Applications of Binomial distributions, Poisson distributions, Normal distributions. (Problems only) (Chapter 19, Pages 769-802).

Textbook

1. M.K. Venkataraman, Engineering Mathematics (Vol II), Third Edition, The National Publishing Co., Madras, 1988. (Unit I & II)
2. R.S.N. Pillai and Bagavathi, Statistics- Theory and Practice, S. Chand and Co. Ltd., New Delhi 2014. (Unit III,IV & V)

Reference

1. Ancillary Maths, Book II, 1999 Edition, S. Narayanan and T.K. Manickavasagam pillai.
2. P.R. Vittal, Mathematical Statistics, Margham Pub., Chennai, 2004.
3. J.N. Kapur and H.C. Saxena. Mathematical Statistics 20th Edition, S.Chand & Co Ltd. New Delhi, 2010.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UEL130401					Title of the Paper: MATHEMATICS-I								Hours 6	Credits 5
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO2	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO3	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO4	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO5	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO6	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO7	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
CO8	5	4	1	4	5	5	5	4	2	2	4	4	2		3.6
											Mean Overall Score				3.6

Result: The Score for this Course is 3.6 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester I **Hours/Week:2**
17UFC141001 **Credits: 2**

ESSENTIALS OF HUMANITY

Course Outcome

1. To ensure creating awareness among the youth on human values.
2. To ensure educating the youth, the basic principles of value education.
3. To ensure the process of analyzing, appreciating and personalizing values as our own.
4. To ensure that students develop various dimensions of human personality.
5. To ensure the youth empowering the gender sensitization, gender differences and gender roles.
6. To ensure preparing the students for the smooth transfer from the stage of teenage to earlier adulthood.

Unit-I

Principles of Value Education - Introduction - Value Education- Characteristics of Values – Kinds of Values

Unit-II

Development of Human Personality - Personality traits - Theories of Personality - Discovering self- Defense mechanism - Power of positive thinking

Unit-III

Dimensions of Human Development - Physical development – Intellectual development - Emotional development - Social Development – Moral development - Spiritual development

Unit-IV

Responsible Parenthood - Human sexuality - Sex and love - Becoming a spouse - Responsible Parenthood

Unit-V

Gender Equality and Empowerment - Historical perspective - Education & economic development -Crimes against Women-Women's rights

Text Book:

Essentials of Humanity, Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester I	Course Code 17UFC141001					Title of the Paper ESSENTIALS OF HUMANITY								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	1	5	4	3	5	4	5	5	5	5	4	3		4.0
CO2	2	1	5	5	3	5	4	5	5	5	5	4	3		4.0
CO3	2	1	5	5	4	5	4	4	5	5	5	5	3		4.1
CO4	2	2	5	4	2	5	4	4	5	4	5	5	5		4.0
CO5	5	2	5	5	2	5	4	4	5	5	4	4	4		4.2
CO6	2	1	5	5	4	4	4	5	5	4	4	4	3		3.8
												Mean Overall Score			4.0

Result: The Score for this Course is 4.0 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

பருவம்: 2 **மணி நேரம்: 4**

17UGT210002 **புள்ளிகள்: 3**

பொதுத்தமிழ்-II

பாடத்தின் விளைவு

- சமூக மாற்றச் சிந்தனைகளை உள்ளடக்கிய தற்கால இலக்கியப்பரப்பை அறிதல்
- பக்தி இலக்கியங்களின் வழி இறையியல் கோட்பாடுகளை அறிதல்
- உரைநடைக் கட்டுரை எழுதும் திறன் பெறுதல்- இலக்கணமரபுகளை அறிதல்
- பல்வேறு சமயங்களின் வாழ்வியல் கருத்துக்களை அறிந்து பின்பற்றுதல்
- காப்பியங்களில் உள்ள சமுதாயக் கருத்துக்களை அறிந்துகொள்ளுதல்.
- இதிகாசங்கள் உணர்த்தும் நீதிகளை அறியச்செய்தல்.
  அரசுப்போட்டித் தேர்வுகளுக்கேற்ப பொதுக்கட்டுரைகளும் மொழிப்பயிற்சியும் மாணவர்களுக்கு அளித்தல்.

அலகு: 1 **(12 மணி நேரம்)**

சிலப்பதிகாரம் - அந்திமாலைச் சிறப்பு செய்காதை
இலக்கிய வரலாறு - சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.
இலக்கணம் - எழுத்திலக்கணம்

அலகு: 2 **(12 மணி நேரம்)**

மணிமேகலை - உலக அறவி புக்க காதை
பெரியபுராணம் - தடுத்தாட்கொண்ட புராணம்

அலகு: 3 **(12 மணி நேரம்)**

கம்பராமாயணம் - கும்பகர்ணன் வதைப்படலம்
உரைநடை - 7 முதல் 9 முடிய உள்ள கட்டுரைகள்

அலகு: 4 **(12 மணி நேரம்)**

சீறாப்புராணம் - மானுக்குப் பிணை நின்ற படலம்
இலக்கணம் - சொல்லிலக்கணம்
இலக்கிய வரலாறு - தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய.

அலகு: 5 **(12 மணி நேரம்)**

இரட்சணிய யாத்திரிகம் - மரணப்படலம்
உரைநடை - 10 முதல் 12 வரையிலான கட்டுரைகள்

பாடநூல்:

1. செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு, 2017-10
2. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழாய்வுத்துறை வெளியீடு.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGT210002					Title of the Paper பொதுத்தமிழ்-II								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	4	4	4	5	5	5	4	4	2	4	4	4.2	
CO2	4	5	5	4	5	5	5	5	5	4	3	4	3	4.4	
CO3	5	5	4	4	5	5	5	5	4	3	3	4	3	4.3	
CO4	5	5	4	3	4	5	5	5	4	3	3	4	3	4.1	
CO5	5	5	4	3	4	5	5	5	4	3	3	4	3	4.1	
CO6	5	5	5	5	4	5	5	5	4	3	3	4	3	4.1	
													Mean Overall Score		4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: II **Hours/Week: 4**

17UGH210002 **Credits : 3**

HINDI-II

Course Outcomes

At the end of the course, a student should be able to demonstrate…

- their effective communicative skills in Hindi
- the introduction of socially relevant subjects in Modern Hindi Literature
- to appreciate the features of Modern Hindi one act plays and short stories
- the ability to fill in application forms Hindi
- use Hindi vocabulary and grammar patterns in a culturally proper ways.
- the ability to write about famous Hindi authors .

Unit-I **8 hours**

Paeeksha, Lekak Parichaya, Khani kee Basha – Shyli, Verb, Dhathu, Artha likiye ulte Shabda likiye.

Unit- II **12 hours**

Lekak Parichaya Ekanki kee, Basha Shyli, Ander Nagaree, Sankalan Traya, Pareek shaka Khani ke paatra, Kal, Vachya.

Unit-III **12 hours**

Chief Kee daavath, Ekanki ke Paatra, Ekankikaar, Ne ka Prayog, Adverb

Unit- IV **14 hours**

Do Kalakar, Bahoo kee Vidha, Kahaanikaar, Prepositions, conjunctions

Unit-V **14 hours**

Kahani ke paatra, Ekanke ke paatra, lekak parichaya, Interjunctions, Avikari Shabda

Books Recommended

1. Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Chennai - 600 017, Subodh Hindi Patamala-2, Ekanki, Hindi, 2016.
2. Ram Dev Hindi Bhavan, Vyakaran Pradeep, 63, Tagore Nagar, Alahabad, 2, 2013.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGH210002					Title of the Paper Hindi-II						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	4	3	4	3	2	3	4	4	4		3.5
CO2	3	3	2	3	2	4	4	3	3	2	2		2.8
CO3	3	2	2	3	4	2	4	4	2	3	4		3.0
CO4	3	2	2	3	3	4	3	3	4	3	3		3.0
CO5	3	3	3	3	3	3	3	4	3	4	3		3.1
CO6	4	4	4	4	3	4	3	3	3	3	2		3.3
										Mean Overall Score			3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: II **Heures /Semaine: 4**
17UGF210002 **Credits: 3**

FRANÇAIS-II

Course Outcomes

* Faire connaissance des journaux, des courriels, des lettres
* Comprendre les conversations téléphoniques.
* Décrire quelque chose
* Demander son chemin
* Parler des activités du week-end
* Accepter, refuser, exprimer la certitude.

Unit-I: Nouvelles de L'inde **(10 heures)**

Montrer son inquiétude, s'excuser, exprimer son appréciation, décrire quelqu'un, décrire quelque chose

Grammaire: Présent : verbes en er,-ir, le futur, interrogation totale, féminin d'autres adjectifs.

Unit-II: A la gare Central station **(10 heures)**

Réserver des billets, demander des renseignements, donner des renseignements

Grammaire: pronoms compléments d'objet direct, présent l'impératif :payer ,partir/sortir, l'impératif, expression du temps, construction avec infinitif

Unit-III : Un lit dans la Cuisine **(10 heures)**

Donner des ordres, localiser, bire qu'une proposition est stupide ou bizarre

Grammaire : Verbes en er-ranger, mettre impératif, il faut, devoir +infinitif, prépositions de lieu

Unit-IV: Pierre apprend a conduire et mangez –vous correctement ? **(15 heures)**

Rassurer, exprimer l'indirection exprimer l'autorisation, avertir, demander des informations sur les habitudes de quelqu'un, offrir a manger ou a boire, accepter, refuser, exprimer la certitude.

Grammaire: impératif-être, avoir, savoir, pronoms compléments d'objet indirect, le passe compose avec avoir expression de la quantité-articles partitifs, adverbes, pronoms directs et indirects, pronom en, présent des verbes –manger, boire ,offrir ,prendre, la condition avec si.

Unit-V: Ils ont eu tort tous les deux !et Comment as-tu passe le weekend **(10 heures)**

Demander son chemin, indiquer le cheminin a quelqu'un, reprocher / conseiller, parler des activités du week-end, demander a quelqu'un de se taire

Grammaire: le passe compose, adverbes mots interrogatifs, le passe compose avec être, faire du….pouvoir, vouloir.

Manuel:

1. K. Madanagobalane, **Synchronie -1**, Samhitâ publication, 2011.

Livre de référence:

1. Annie Berthet / B_atrix Sampsonis / Catherine Hugot / V_ronnique M kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006
2. Yves Loiseau / R_gine M-rieux, Connexions 1, Didier ,2011

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGF210002	Title of the Paper French-II									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	4	4	2	3	4	3	3	2	2	3	3	3.0
CO2	3	3	3	3	4	3	3	2	2	2	3	2.8
CO3	3	2	3	2	4	3	3	2	2	3	3	2.7
CO4	3	3	4	3	4	3	3	3	3	3	3	3.2
CO5	3	3	4	3	4	2	4	4	4	4	5	3.6
CO6	3	4	3	3	3	3	4	4	3	4	4	3.5
										Mean Overall Score		3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: II **Hours/Week: 4**
17UGS210002 **Credits : 3**

SANSKRIT-II

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* knowledge and understanding of basic Sanskrit grammar
* knowledge and understanding of essential Sanskrit vocabulary
* knowledge and understanding of the appropriateness of basic Sanskrit structures and expressions in a given context
* the ability to understand short passages in written Sanskrit on everyday topics
* the ability to produce short passages in written Sanskrit on everyday topics
* introduction of basic grammar (Avyaya Imperfect tense and Sandirules. Samasah.)

Unit-I **8 hours**

Visheshanaah
Saravanaama shabdas.

Unit-II **12 hours**

Sandhi Niyamaah Abhyaasah.(Guna, Visarga, Dirgha, Vrddhi)

Unit-III **12 hours**

Lang lakaarah. Kriyapadaani

Unit-IV **14 hours**

Gopala Vimshathi. (1-10) slokas.

Unit-V **14 hours**

Avyayas, Tatpurusha, Karma dhaaraya samaasah.

Books Recommended

1. Paundrapuram Ashram, Srirangam -620 006. Gopalavimshathi, 2014
2. R.S. Vadhyar & Sons, book – Sellers and Publishers, Kalpathi, Palghat-678 003, Kerala, Southe India, Shabdha Manjari, 2014
3. Kulapthy, K. M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai - 400007, 2014

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGS210002					Title of the Paper Sanskrit-II						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	5	3	5	4	4	3	3	3	4	4	3	3.2	
CO2	4	3	4	4	4	3	3	3	3	4	3	3.0	
CO3	4	3	3	4	4	3	3	3	4	4	3	3.0	
CO4	4	3	3	4	3	3	3	4	4	4	3	3.0	
CO5	4	4	4	3	4	3	4	4	4	3	4	3.2	
CO6	5	4	4	4	4	3	3	3	4	4	3	3.2	
											Mean Overall Score		3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: II **Hours/Week: 5**
17UGE220102 **Credits: 3**

GENERAL ENGLISH-II

Course Outcome

* Ask open-ended questions in real-life situations
* Use polite expressions in appropriate ways
* Use correct punctuation marks and capital letters
* Use appropriate vocabulary
* Put ideas into a cohesive paragraph
* Develop positive self-esteem and thereby communicate effectively

Unit-I

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The best monosyllablic Comparison
09. The best di/polysyllabic Comparison
10. Practising Quality Words

Non-Detailed:

"Julius Caesar" from *Six Tales From Shakespeare*

Unit –II:

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter

22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

Unit-III:

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humourous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

Unit-IV:

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Sord Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
49. E-mailing an Application
50. Mock Interview

Non-Detailed:

"King Lear" from *Six Tales From Shakespeare*

Unit-V:

51. Society Word Grid
52. Classify Society Wordlist

53. Rearrange the Story
54. Storytelling
55. Story Cluster
56. Words Denoting Time
57. Expressing Time
58. What Can You Buy?
59. Noise Pollution
60. Positive News Headlines
61. Negative News Headlines
62. Matching Conditions
63. What Whould You Do?
64. If I were the Prime Minister
65. My Dream Country

Non-Detailed: "Macbeth" from *Six Tales From Shakespeare*

Textbook

1. Joy, J.L. & Peter, F.M. *Let's Communicate 2*, New Delhi: Trinity Press, 2014. Print.

Non-Detailed Text

1. Dodd, E F. *Six Tales From Shakespeare*. London: Macmillan, 1987. Print. (Last three tales)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UGE120102					Title of the Paper General English-II								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	4	4	4	5	4	4	3	3	3	4	4		3.9
CO2	4	3	4	4	4	5	5	4	4	4	4	4	3		4.0
CO3	4	3	4	4	4	3	3	4	4	3	3	4	4		3.6
CO4	4	3	3	4	4	4	4	3	3	5	5	4	4		3.8
CO5	4	3	4	4	4	4	4	3	3	4	4	5	5		3.9
CO6	5	4	4	3	3	4	4	3	4	4	5	4	4		3.9
													Mean Overall Score		3.8

Result: The Score for this Course is 3.8 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **L P C**
17UEL230202 **5 - 4**

ELECTRIC CIRCUIT ANALYSIS

Course Outcomes:

1. Ability to understand and solve network problems
2. Understand and apply circuit theorems to complex network analysis
3. Acquire knowledge on sinusoidal steady state analysis
4. Acquire knowledge on transient analysis of passive circuits
5. Ability to understand implications of coupled circuits
6. Understand electrical isolation and magnetic coupling in coupled circuits

UNIT-I: DC Circuit Analysis **(10 Hrs)**

Kirchhoff's voltage law, Kirchhoff's current law -Network graphs - Mesh analysis- Nodal analysis - Source Transformation technique. Network Topology: Tree - Co-Tree - Incidence matrix - Tie set-Cut set-Duality of network.

UNIT-II: Network Theorems **(15 Hrs)**

Star-Delta Transformation- Superposition Theorem-Thevenin's Theorem-Norton's Theorem-Reciprocity Theorem- Compensation Theorem- Maximum power transformation Theorem-Tellegen's Theorem, Millman's Theorem (Problems in relevant topics).

UNIT-III: Sinusoidal Steady State Analysis **(15 Hrs)**

Sinusoidal Steady state analysis: Average and RMS values of periodic waveform-Form factor and Peak factor-Characteristics of sinusoids-The complex forcing function- Phasor relationship for R, L, C-Impedance-Admittance- Phasor Diagrams. AC Circuit Power Analysis: Average power-Reactive power-Apparent power-power factor-Power Triangle involving R,L, and C. Analysis of series and parallel RL,RC and RLC circuit. Frequency response: Parallel resonance-series resonance-Q factor, impedance and bandwidth of the resonant circuit.

UNIT-IV: Transients **(10 Hrs)**

Steady state and Transient response- DC response of an RL, RC and RLC circuit, AC transient response of RL,RC,RLC series. State variable methods of circuit analysis.

UNIT-V: Coupled Circuits **(10 Hrs)**

Magnetically coupled circuits: Mutual inductance -Coefficient of coupling- Ideal transformer -analysis of multi winding coupled circuits -series connection of couple inductors. Dot convention rule - Tuned circuits -single tuned -double tuned coupled circuits (Problems in relevant topics).

BOOK FOR STUDY:

1. A.Sudhakar,Shymmohan S Palli,"Circuits & Networks Analysis and Synthesis", 3rd Edition,(2007) Tata McGraw -Hill publishing company Ltd.

BOOKS FOR REFERENCE:

1. Paranjothi, S.R, "Electric Circuit Analysis", 4th edition, New Age International.2011
2. B.L. TherajaA.k. Theraja "A Textbook of Electrical Technology" S. Chand & Company Ltd 2005.
3. Robert L. Boylstad, "Introductory Circuit Analysis", 13th Edition, Pearson, 2015

SECTIONS:

UNIT	BOOK	SECTIONS
I	1	1.2,1.4 lecture notes
II	2	1.1,1.1.1, 1.11, 1.13, 1.6, 1.6.2, 2.3, 2.5, 2.9, 2.10, 2.13-2.14, 3.2-3.5, 3.7, 3.18-3.19 (lecture notes – self inductance)
III	1	1.5.1-1.5.4.4, table 1.2, 3.1-3.3.1,3.4, 3.5.1
IV	1	4.1 - 4.2.13
V	1	2.3,2.3.3, 2.3.7-2.4.6,(lecture notes- solar cell, operation, phototransistor construction, application)

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UEL230202				Title of the Paper: ELECTRIC CIRCUIT ANALYSIS								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	4	2	4	4	4	4	4	4	4	3	2	4	3.6
CO2	4	4	2	4	4	4	4	4	4	4	3	2	4	3.6
CO3	4	4	2	4	4	4	4	4	4	4	3	2	4	3.6
CO4	4	4	2	4	4	4	4	4	4	4	3	2	4	3.6
CO5	4	4	2	4	4	4	4	4	4	4	3	2	4	3.6
CO6	4	4	2	4	4	4	4	4	4	4	3	2	4	3.6
												Mean Overall Score		3.6

Result: The Score for this Course is 3.6 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **L P C**
17UEL230203 **- 3 4**

Electronics Practical-I:
ELECTRONICS AND NETWORK CIRCUIT CHARACTERISTICS

Course Outcomes

1. Able to understand the network theorems by practical experiments.
2. Able to know the characteristics of basic electronic components

List of Experiments (Any sixteen experiments)

1. Verification of ohm's law
2. Study of Series and parallel connection of resistance in circuits
3. Study of series and parallel connection of capacitor in circuits.
4. Study of RC time constant using DC source
5. Study of Diode characteristics
6. Study Half wave rectifier with and without filter
7. Study Full wave rectifier with and without filter
8. Study of opto electronic devices (photodiode, phototransistor, LDR, LED)
9. Verification of Kirchhoff's voltage law
10. Verification of Kirchhoff's current law.
11. Branch voltage identification using Mesh analysis
12. Node current measurement using Nodal analysis
13. Verification of Thevenin's theorem
14. Verification of Norton's theorem
15. Verification of Superposition theorem
16. Verification of Compensation theorem
17. Verification of Reciprocity theorem
18. Verification of Maximum power transformation theorem
19. Study of sinusoidal steady state analysis of series RC and LC
20. Study of steady state analysis of series RLC circuit.
21. Study of transient analysis of series RC and LC
22. Study of transient analysis of series RLC circuit.
23. Study of load current and load voltage in star delta transformation.

Semester II **L P C**
17UEL230204 **- 3 4**

WORKSHOP PRACTICE-I

Course Outcomes

1. Ability to understand and get the hands on experience about the electronics components used in the electronics laboratory.

List of Practices (Any sixteen experiments)

1. Electronic components identification
2. Resistance color code calculation and verification
3. Study the function of CRO and Function Generator
4. Study the function of Multimeter and LCR meter
5. Soldering and de-soldering the components in PCB layout.
6. Construction of power supply-I (single supply)
7. Construction of Power supply-II (Dual supply)
8. Cabinet making for power supply.
9. Construction and testing of LED's in serial and parallel
10. PCB layout preparation using software. (pcb track width and copper square area calculation)
11. PCB Layout design and etching.
12. SMD component Soldering and De-soldering
13. Transformer Identification and troubleshooting
14. Construction of Transformer-less power supply
15. Hobby circuit - I
16. Hobby circuit - II
17. Hobby circuit - III
18. House wiring-I (fitting switches, AC pin sockets and indicator lamp in switch box)
19. House wiring-II (Two way switches, circuit breaker-ELCB, MCB)
20. PC hardware assembling
21. Audio system assembling (amplifier and speaker)
22. Mobile phone troubleshooting
23. Study of SMPS power supply
24. Simple emergency lamp with 12V battery

Semester II **L P C**
17UEL230402 **6 - 5**

Allied:

MATHEMATICS-II

Course Outcomes

1. Basic ideas of correlation
2. Basic concepts of curve fitting
3. Applications of curve fitting and correlation
4. Numerical methods and its application.
5. Ideas of Laplace transforms in the field of Electronics.
6. Ideas of Fourier series in their major discipline.
7. Basic concepts of Trigonometry
8. Use of trigonometry in their major discipline of Electronics

Unit I: Correlation

Correlation coefficient- Rank correlation - curve fitting by least square methods - Fitting a straight line (No derivation, Numerical problems only) (Chapter 12, Pages 396-410) (Chapter 15, Pages 602-608)

Unit II:Numericals methods:

Solving algebraic and transcendental equations : Bisection Method - Newton-Raphson method. Solving simultaneous equations - Gauss elimination-Iteration methods - Gauss-Seidal Methods (problems only). (Chapter III, Section 5, Chapter IV, Section 1,6) (pages 81-85,97-106,113-120,140-146)

Unit III: Laplace Transforms:

Laplace Transforms - Definition- properties - the inverse transforms - solving differential equations using Laplace transforms (simple problem only) (Chapter VII pages 289-311)

Unit IV: Fourier Series:

Fourier series - Even and odd functions - properties of odd and even functions - Half range Fourier series (Omitting general interval). (Chapter II, 123-149)

Unit V:Trignometry:

Expansion of cosnq and sin nq - Powers of sines and cosines of q in terms of functions of multiples of q. (Chapter 5- sec 5.1- 5.4, pages: 220- 242).

Textbook

1. R.S.N. Pillai and Bagavathi, Statistics- Theory and Practice, S. Chand and Co. Ltd., New Delhi 2014. (Unit I)
2. M.K.Venkataraman, Numerical Methods in science and Engineering, 2nd Edition, the National Publishing Co., Madras 1987 (For Units II)
3. Narayanan and Manickavachagam Pillai, Ancillary Maths, Book II , S. Viswanathan Pvt. Ltd., Madras (For unit III &IV).
4. Ancillary Mathematics, Vol - I, 2009 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Kandaswamy (For unitV)

Reference Books:

1. Dr. P. R. Vittal, Allied Mathematics (In single volume) Margham Publications, Reprint 2003.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathy, Numerical Methods, S. Chand & Company Ltd, Reprint 1999.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UEL230402					Title of the Paper: MATHEMATICS-II								Hours 6	Credits 5
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO2	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO3	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO4	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO5	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO6	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO7	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
CO8	5	5	1	4	3	4	5	4	2	2	4	4	3	3.5	
													Mean Overall Score	3.5	

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 2**
17UCE240802A **Credit: 2**

COMPUTER LITERACY

Course Outcomes

1. Understand the basics of Computer Systems
2. Familiar with the applications of MS-Office / HTML & CSS
3. Know the statistical data analysis using R
4. Aware the latest trends and technologies such as Mobile Computing, Big Data and Analytics, Cloud Computing.
5. Understand the concepts of social networking sites.
6. Knowledge in Cyber Crime and Cyber Ethics.

Unit-I: Computer System

Computer - An Introduction - Hardware Components - Input and Output Technologies - Computer Hierarchy- Software Fundamentals - Systems Software and Os- Application Software- Software Licensing - Open Systems- Open Source Software- Programming Languages- Information Systems- General It Trends.

Unit-II: (For Non-CS)

Microsoft Word: Introduction - Word Environment - Opening and Creating a New Document - Saving Documents - Proofing Features - Printing a Document - Formatting Text - Working with Shapes and Lists - Line and Paragraph Spacing- Working with Tables - Columns and Ordering- Working with Pictures- Working with Headers and Footers - Using Indents and Tabs - Using Mail Merge.

Microsoft Excel: Introduction - Document Creation - Renaming a worksheet - Office user interface - Open a New Workbook - Columns, Rows, and Cells - Selecting a cell - - Basic data entry, fill handle - - Insert columns - Arithmetic Calculations & Formulas - Excel Formulas- Calculate with Functions - Function Library - Graphs and Charts - Printing the Document.

Microsoft Powerpoint: Starting PowerPoint - Working with Slides - Applying Theme - Animation- Transitions – Views.

Unit-II: (For CS)

HTML: Introduction - HTML generations – HTML Tags – Headings – Paragraphs – Comments – Line Breaks – Formatting Tags – Hyperlinks – Images – Lists – Tables – Frames – Forms.

CSS: Introduction – Use of External Style Sheet – Defining Styles – Use Relative Sizing – Use Numbered Value for Color.

Unit-III: Statistical Data Analysis

Introduction - R Programming Language - Basic R Commands - Univariate and Bivariate Statistical Measures - Graphic Representation of Statistical Data - Lab Exercise.

Unit-IV: SMAC

Introduction - Understanding the Enterprise of Tomorrow - Social Networking - Mobile Computing - Big Data and Analytics - Cloud Computing

Unit-V: Cyber Crime

Definition - List of Cyber Crimes - Cyber Ethics- Unethical Behaviour - Securing information privacy and confidentiality - Internet Ethics - Indian Information Technology Act - Advantages of Cyber Laws - National e-Governance Plan (NeGP) - eCommerce - Electronic Fund Transfer (EFT)

Book for Study

1. Department of Foundation Course, "Computer Literacy", St. Joseph's College, 2017.

Books for Reference

1. Alexis Leon, "Introduction to computers", Vikas Publishing House Pvt. Ltd., New Delhi, 2008.
2. Alexis Leon and Mathew Leon, "Introduction to computers with Ms Office 2000", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2005.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UCE240802A					Title of the Paper COMPUTER LITERACY								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	4	4	5	5	4	3	4	3	4	4	4	4.15	
CO2	5	5	4	4	4	4	4	4	4	3	4	4	4	4.08	
CO3	4	3	3	4	4	4	4	4	4	3	4	4	4	3.77	
CO4	5	5	4	4	4	5	4	4	4	3	4	4	4	4.15	
CO5	4	4	3	4	4	4	4	4	4	3	4	4	4	4.15	
CO6	5	5	5	4	4	5	4	4	4	4	4	4	4	4.31	
													Mean Overall Score	4.10	

Result: The Score for this Course is 4.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester II **Hours/Week: 2**
17UFC241002 **Credits: 2**

FUNDAMENTALS OF HUMAN RIGHTS

Course Outcome

1. To ensure acquiring the knowledge about the historical background of human rights.
2. To ensure sensitizing the young the values of human rights.
3. To ensure the importance of human rights in the Indian context.
4. To ensure learning the fundamental duties in the constitution of India.
5. To ensure educating the youth in respecting and protecting the rights of every other human being.
6. To ensure teaching the youth on the vulnerabilities of women and children.

Unit-I

Introduction, Classification of Human Rights, Scope of Human Rights, Characteristics of Human Rights, and Challenges for Human Rights in the 21st Century.

Unit-II

Human Rights in Pre-World War Era, Human Rights in Post-World War Era, Evolution of International Human Rights Law - the General Assembly Proclamation, Institution Building, Implementation and the Post Cold War Period. The ICC.

Unit-III

Introduction, Classification of Fundamental Rights, Salient Features of Fundamental Rights, and Fundamental Duties

Unit-IV

Women's Human Rights, Issues related to women's rights, and Rights of Women's and Children

Unit-V

Human Rights Violations, Human Rights Violations in India - the Human Rights Watch Report, January 2012, Human Rights Organizations.

Text Book:

1. **Techniques of social Analysis: Fundamentals of Human Rights,** Department of Foundation course, St.Joseph's College, Tiruchirappalli, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester II	Course Code 17UFC241002					Title of the Paper FUNDAMENTALS OF HUMAN RIGHTS								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	1	5	5	2	4	4	5	5	4	4	5	5	4.2	
CO2	4	1	5	4	2	4	4	4	4	5	5	5	5	4.0	
CO3	5	1	5	5	2	5	5	4	4	4	5	5	5	4.2	
CO4	4	1	5	5	2	2	4	3	5	5	4	4	5	3.8	
CO5	5	1	5	4	1	5	5	5	5	5	4	4	4	4.1	
CO6	3	1	5	4	1	4	3	5	5	3	4	4	5	3.6	
												Mean Overall Score		3.9	

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

பருவம்: 3 **மணி நேரம்: 4**

17UGT310003 **புள்ளிகள்: 3**

பொதுத்தமிழ்-III

பாடத்தின் விளைவு

- செம்மொழியாம் தமிழ் மொழியின் சிறப்பை அறிதல்.
- பண்டை இலக்கியங்கள் உணர்த்தும் அறக்கருத்துகளை அறிதல்
- புதினம் வாயிலாகத் தற்காலச் சமுதாயச் சிக்கல்களையும், அதற்கான தீர்வுகளையும் ஆராயும் திறன் பெறுதல்
- மானுட வாழ்வில் அகம், புறம் பற்றிய பாகுபாட்டை தமிழ்ச்செய்யுள் வாயிலாக அறிதல்.
- தமிழர்களின் ஈகையும் வீரமும் எடுத்துரைக்கும் புறச்செய்திகளை அறிதல்
- நீதிநூல்கள் மனித வாழ்வை செம்மைப்படுத்தும் பாங்கினை உணர்த்துதல்.

அலகு: 1 **(12 மணி நேரம்)**

நெடுநல்வாடை (முழுமையும்)

அலகு: 2 **(12 மணி நேரம்)**

குறுந்தொகை - பாடல்கள் - (32, 323, 305, 290, 168)
யாப்பிலக்கணம் (வெண்பா, ஆசிரியப்பா)

அலகு: 3 **(12 மணி நேரம்)**

கலித்தொகை - பாடல்கள் - (குறிஞ்சிக்கலி-15, பாலைக்கலி-9, மருதக்கலி-15, நெய்தற்கலி-22, முல்லைக்கலி-07)
இலக்கிய வரலாறு - முதற்பாகம் ('தமிழ் மொழியின் தொன்மையும சிறப்பும' முதல் 'சங்க தொகை நூல்கள்' முடிய) புதினம்.

அலகு: 4 **(12 மணி நேரம்)**

பதிற்றுப்பத்து - பாடல்கள் (12, 24,)
புறநானூறு - பாடல்கள் (46, 86, 122, 214, 246)
அணியிலக்கணம்

அலகு: 5 **(12 மணி நேரம்)**

திருக்குறள் - ஈகை, ஆள்வினை உடைமை, நிறை அழிதல் ஆகிய அதிகாரங்கள்
நாலடியார் - இளமை நிலையாமை(11), பிறன்மனை நயவாமை(82), பெருமை(185), அறிவின்மை(254), காமநுதலியல்.(391).
இலக்கிய வரலாறு - சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய

பாடநூல்கள்:

1. செய்யுள் திரட்டு, தமிழாய்வுத் துறை வெளியீடு (2017-2020).
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2014.
3. புதினம் (ஒவ்வொரு கல்வியாண்டும் ஒவ்வொரு புதினம்). காணாமல் போன கவிதை (2017-18).

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGT310003					Title of the Paper பொதுத்தமிழ்-III								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	5	4	5	5	4	5	5	5	4	4	5	4.6	
CO2	5	5	4	3	4	5	4	5	5	5	4	4	5	4.4	
CO3	5	5	5	3	4	5	5	5	5	5	4	3	5	4.5	
CO4	5	5	5	5	4	5	5	5	5	5	4	5	5	4.8	
CO5	5	4	4	4	4	5	5	5	5	5	3	3	5	4.3	
CO6	5	5	5	3	4	5	5	5	5	5	4	3	5	4.5	
													Mean Overall Score		**4.5**

Result: The Score for this Course is 4.5 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: III **Hours/Week: 4**
17UGH310003 **Credits: 3**

HINDI-III

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* the ability to enable the students to complete the pre-reading task to comprehend the local and global issues in the lessons.
* the ability to enable the students to complete the post-reading task centering on Grammar and Skill Development.
* the relevance of Bhakthi Movement in Hindi Literature.
* the ability to imagine and write poems.
* the ability to quote poetry in Speeches.
* the ability to write friendly and formal letters.

Unit-I **8 hours**

Tera Sneh Na Kho oon, Kavi Parichaya, Patra Likne ke Kaaran, Patra Kee Avashyakatha, Sandhi keeiye, Vigrah Keejiye

Unit-II **12 hours**

Ek boondh, Tera Sneh Na Kho oon kavitha kee manovygnaik stiti, Chutti Patra, Sandhi

Unit-III **12 hours**

Ekloondh Kavitha Ka Uddeshya, Kabir Ke Dohe, Nagar Palika ko Patra, Samas

Unit-IV **14 hours**

Vimal Indu Kee Vishal Kiranen, Rahim Ke Dohe, Naukari Keliye Avedan Patra, Upasarga

Unit-V **14 hours**

Thulasi ke Dohe, Kitab Maangne Keliye Patra, Pratyaya, Kaviparichaya

Books Recommended

1. Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Subodh Hindi, Paatamala-3, Chennai-600 017, Hindi, 2016.
2. DBHP Sabha, T.Nagar, Chennai-600 017, Abihav Patralekhan, 2016
3. Ram Dev, Vyakaran Pradeep, Hindi Bhavan, 63 Tagore Nagar, Alahabad 2, 2016.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGH310003					Title of the Paper Hindi-III						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	4	3	4	3	3	3	4	4	4		3.6
CO2	3	3	2	3	2	3	3	3	5	3	5		3.0
CO3	3	3	3	3	4	3	3	4	3	3	3		3.2
CO4	3	2	2	3	3	3	3	3	3	3	4		2.9
CO5	3	3	3	3	3	3	4	3	3	3	4		3.2
CO6	4	4	4	4	3	3	3	3	3	3	3		3.3
										Mean Overall Score			3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: III **Heures /Semaine: 4**
17UGF310003 **Credits : 3**

FRANÇAIS-III

Course Outcomes

* Comparer la culture de l'Inde et de la France
* Familiariser l'étudiant avec le vocabulaire, la grammaire et les conversations
* Connaître des journaux, des courriels, des lettres
* Parler des projets de vacances
* Exprimer l'étonnement
* Parler de ses projets d'avenir, exprimer l'opposition.

Unit-I: Un entretien et Au restaurant (10 heures)

Demander des informations personnelles à quelqu'un, donner des informations, répondre à une proposition. Réserver une table, demander la carte, commander, apprécier les plats, demander l'addition.

Grammaire: Imparfait, Imparfait et passé composé, expression du temps, expression de la conséquence.Le futur, présent des verbes peser, rejoindre, le passé récent, le présent progressif, le futur proche, Restriction-ne…que, moi aussi…

Unit-II : Enfin les vacances ! et Un autre institut (10 heures)

Raconter son emploi du temps quotidien, parler des projets de vacances, exprimer l'étonnement. Rassurer/consoler, s'indigner

Grammaire: Verbes pronominaux, pronom y, quelqu'un/ne…personne, quelque chose/ne…rien, ne…jamais, Déjà/ne…pas encore, chacun, adjectifs indéfinis.Pronoms relatifs, impératif, indicateurs de temps : de…a, a partir de….jusqu'a, depuis, pendant.

Unit-III : Un Indien célèbre visite la France et Qui dépense plus? (10 heures)

Demander des informations sur quelqu'un, demander une opinion, donner son opinion. Dire à quelqu'un d'être prudent, faire des reproches à quelqu'un, se justifier.

Grammaire: Pronoms relatifs composés, pronoms compléments d'objet directs et indirectes, opposition savoir/Connaitre, connecteurs chronologiques, nombre ordinaux.Le comparatif, c'est+ nom+ qui, il reste, encore, il y a, souvent.

Unit-IV: Penser à son avenir - (15 heures)

Parler de ses projets d'avenir, exprimer l'opposition.

Grammaire : Style direct/indirect, proposition introduite par que, mots d'enchaînement – donc, pourtant.

Unit-V: L'astrologie (15 heures)

Exprimer des conditions, dire quelque chose n'a pas d'importance, proposer quelque chose.

Grammaire: Le conditionnel – la condition.

Manuel:

1. K.Madanagobalane, **Synchronie-II**, Samhitâ Publication, 2011.

Livre de référence :

1. Annie Berthet /B_atrix Sampsonis/ Catherine Hugot /V_ronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/R_gineM_rieux, Connexions 1, Didier, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGF310003					Title of the Paper French-III						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	2	3	4	4	2	3	3	2	2		3.0
CO2	3	3	3	3	4	4	2	3	4	2	3		3.1
CO3	3	2	3	2	4	3	4	3	3	3	3		3.0
CO4	3	3	4	3	4	2	3	3	3	4	4		3.3
CO5	3	3	4	3	4	2	3	3	4	4	4		3.4
CO6	3	4	3	3	3	3	3	3	4	4	4		3.4
											Mean Overall Score		3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: III **Hours/Week: 4**
17UGS310001 **Credits : 3**

SANSKRIT-III

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* Knowledge and understanding of essential Sanskrit vocabulary in a given topic
* Knowledge and understanding of the appropriateness of basic Sanskrit structures in Slokas
* Knowledge of the basic Sanskrit poetry.
* An idea on Epics and Puranas.
* The usage of – Upasargas.
* The familiarization the history of Sankrit literature Vedas – Puranas and Natakas.

Unit-I **8 hours**

Romodantam. Balakandam. 1-15

Unit-II **12 hours**

Romodantam. Balakandam. 15-30

Unit-III **12 hours**

Vedas – Vedangas. vivaranam.

Unit-IV **14 hours**

Puranas. Upanishads.

Unit-V **14 hours**

Upasargas. Bhavishyat Kaalah

Books recommended:

1. Parameshwara, Ramodantam, LIFCO, Chaennai, 2015.
2. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat-678003, Kerala, South India, History of Sanskrit Literature, 2015.
3. Kulapathy, K.M., Saral Sanskrit Balabodh, Bharathiya Vidya Bhavan, Munshimarg, Mumbai-400 007, 2015.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGS310003					Title of the Paper Sanskrit-III						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	5	3	5	4	4	3	3	3	3	3	4		3.1
CO2	4	3	4	4	4	4	3	3	3	4	4		3.1
CO3	4	3	3	4	4	4	4	4	3	3	4		3.1
CO4	4	3	3	4	3	4	4	4	3	4	4		3.1
CO5	4	4	4	3	4	3	3	4	3	4	4		3.1
CO6	5	4	4	4	4	3	3	3	3	4	3		3.1
										Mean Overall Score			3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: III **Hours/Week: 5**
17UGE320103 **Credits: 3**

GENERAL ENGLISH-III

Course Outcome

* Comprehend the local and global issues through the lessons
* Do the tasks centering on skill development and enhance their Grammar Using and Writing Skills
* Use interactive skills
* Train and develop the Listening and Reading Skills of the learners through teacher-led reading practice
* Enhance their Listening, Reading, Speaking, and Writing Skills
* Develop their Creative and Critical Thinking and Speaking Skills

Unit-I: *Suggestions to Develop Your Reading Habit

1.0 Introduction
1.1 Objectives
1.2 Listening and Reading Skills through Teacher-led Reading Practice
1.3 Glossary
1.3.1 Words
1.3.2 Phrases
1.4 Reading Comprehension
1.5 Critical Analysis
1.6 Creative Task
1.7 General Writing Skill: Letter Writing: Informal
1.8 Grammar: Simple Present Tense
1.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-II: *The Secret of Success: An Anecdote

2.0 Introduction
2.1 Objectives
2.2 Listening and Reading Skills through Teacher-led Reading Practice
2.3 Glossary
2.3.1 Words
2.3.2 Phrases
2.4 Reading Comprehension
2.5 Critical Analysis
2.6 Creative Task
2.7 General Writing Skills: Letter Writing: Formal

2.8 Grammar: Present Continuous Tense
2.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-III: ***The Impact of Liquor Consumption on the Society**
3.0 Introduction
3.1 Objectives
3.2 Listening and Reading Skills through Teacher-led Reading Practice
3.3 Glossary
3.3.1 Words
3.3.2 Phrases
3.4 Reading Comprehension
3.5 Critical Analysis
3.6 Creative Task
3.7 General Writing Skills: Letter to Newspaper
3.8 Grammar: Simple Past Tense
3.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times*.

Unit-IV: * Dr. A.P.J. Abdul Kalam: A Short Biography
4.0 Introduction
4.1 Objectives
4.2 Listening and Reading Skills through Teacher-led Reading Practice
4.3 Glossary
4.3.1 Words
4.3.2 Phrases
4.4 Reading Comprehension
4.5 Critical Analysis
4.6 Creative Task
4.7 General Writing Skill: Write a letter applying for a job
4.8 Grammar: Past Continuous Tense
4.9 **Non-Detailed Text:** Dickens, Charles. *Hard Times.*

Unit-V: *Golden Rule: A Poem
5.0 Introduction
5.1 Objectives
5.2 Listening and Reading Skills through Teacher-led Reading Practice
5.3 Glossary

5.3.1 Words
5.3.2 Phrases
5.4 Reading Comprehension
5.5 Critical Analysis
5.6 Creative Task
5.7 Grammar: Simple Future Tense
5.8 General Writing Skill: Circular-Writing
5.9 **Non-Detailed Text: Dickens, Charles. *Hard Times.***

Unit-VI: *Hygiene
6.0 Introduction
6.1 Objectives
6.2 Listening and Reading Skills through Teacher-led Reading Practice
6.3 Glossary
6.3.1 Words
6.3.2 Phrases
6.4 Reading Comprehension
6.5 Critical Analysis
6.6 Creative Task
6.7 General Writing Skill: Writing an Agenda for a Meeting
6.8 Grammar: Future Continuous Tense
6.9 **Non-Detailed Text: Dickens, Charles. *Hard Times.***

Textbook

1. Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. New Delhi: Trinity, 2016. Print.

Non-Detailed Text:

1. Dickens, Charles. *Hard Times.* Wordsworth: Printing Press, 1854. Print.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UGE320103					Title of the Paper General English-III								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	5	5	4	5	5	5	5	5	5	5	4	4.84	
CO2	5	5	5	5	5	5	5	5	5	5	5	5	4	4.92	
CO3	5	5	5	5	5	5	5	5	5	5	5	5	4	4.92	
CO4	5	5	5	5	4	5	5	5	5	5	5	5	4	4.84	
CO5	5	5	5	5	4	5	5	5	5	5	5	5	4	4.84	
CO6	5	5	5	5	4	5	5	5	5	5	5	5	4	4.84	
												Mean Overall Score		4.86	

Result: The Score for this Course is 4.86 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **L P C**
17UEL330205 **6 - 4**

DIGITAL ELECTRONICS

Course Outcomes

1. Ability to understand digital signals and number systems
2. Ability to understand the operations of basic and universal logic gates
3. Ability to acquire knowledge on sequential and combinational logic circuits
4. Acquire knowledge on different memory storage types
5. Understand the basics of digital integrated circuits
6. Ability to understand Boolean algebra for digital circuits simplification

UNIT-I: Digital Concepts and Number systems (15hrs)

Introduction to digital concepts - digital and analog quantities - Binary digits - logic levels and digital waveforms - basic logic operations - digital integrated circuits. Decimal numbers - binary numbers - decimal to binary conversion - binary arithmetic - 1's and 2's complement - signed numbers - arithmetic operations with signed numbers - hexadecimal numbers - octal numbers - BCD - digital codes -gray code - alphanumeric codes - ASCII - error detection and correction codes.

UNIT-II: Logic gates and Boolean algebra and logic simplification (15 hrs)

Logic Gates: Inverter - AND - OR - NAND - NOR - Exclusive-OR - Exclusive-NOR - IC gates. Boolean operations and Expressions - Laws and rules of Boolean Algebra -DeMorgan's Theorems - Boolean analysis and logic circuits - Simplification using Boolean Algebra - Standard forms of Boolean Expressions - Boolean Expressions and Truth Tables -Karnaugh map - SOP minimization - POS minimization - five variable k-map

UNIT-III: Combinational logic circuits (15 hrs)

Basic combinational logic circuits - AND-OR Logic - AND-OR-Invert logic - implementing combinational logic - NAND and NOR gates - logic circuit operation with pulse waveforms. Overview of logic functions - basic adders - half adder - full adder - parallel binary adders - comparators - decoders - 4 bit decoders - BCD to decimal decoder - BCD to 7 segment decoder - encoders - decimal to BCD encoder - code converters - BCD to binary conversion - binary to gray and gray to binary conversion - multiplexers - 4 input multiplexer - demultiplexers - 1 line to 4 line demultiplexer- parity generators/ checkers - glitches in decoder circuits.

UNIT-IV: Sequential logic circuits (15 hrs)

Introduction to sequential logic circuits - Latches - SR latch - gated SR latch - D latch - edge triggered Flip-flops -SR flip-flop - D flip-flop - JK flip-flop - Master-slave flip-flops - flip-flop operating characteristics - Counters - Asynchronous counter - 2-bit and 3-bit Asynchronous binary counter - Asynchronous decade counter - synchronous counter - 2 bit and 3 bit synchronous binary counter - up/down synchronous counter - design of synchronous counter - cascaded counter - counter decoding - decoding glitches - Shift registers - serial in/serial out - serial in/parallel out - parallel in/serial out - parallel in/parallel out - bidirectional shift registers - shift register counters - Johnson counter - Ring counter

UNIT-V: Memory storage, digital integrated circuits and PLDs (12 Hrs)

Basics of Semiconductor memory - RAM - ROM - PROMs and EPROMs - flash memories - memory expansion - special types of memories - magnetic and optical storage - Basics of digital integrated chips - operational characteristics -CMOS circuits - TTL circuits - practical considerations in the use of TTL - comparison of CMOS and TTL - PLDs - SPLDs - PAL.

BOOK FOR STUDY:

1. T. L. Floyd and R.P. Jain, "Digital Fundamentals", Pearson education, 8th Edition,2008.

BOOKS FOR REFERENCE:

1. M. Morris Mano and Michael D. Ciletti, "Digital design", Pearson education, 4th Edition.2008.
2. G.K. Kharate, "Digital Electronics", Oxford University Press, 1st Edition, 2010.
3. John F. Wakerly, "Digital Design: Principles and Practices", Prentice Hall, 4th Edition 2006

SECTIONS:

UNIT	BOOK	SECTIONS
I	1	1.1 - 1.4, 2.1 - 2.12
II	1	3.1 - 3.7, 4.1 - 4.11
III	1	5.1 - 5.5, 6.1 - 6.11
IV	1	7.1 - 7.4, 8.1 - 8.6, 9.1 - 9.7
V	1	10.1 - 10-8, 11.1 - 11.6, 12.1 - 12.3

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UEL330205					Title of the Paper: DIGITAL ELECTRONICS								Hours 6	Credits 5
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	2	4	5	4	5	4	2	4	1	2	4	3.6	
CO2	5	5	2	4	5	4	5	4	2	4	1	2	4	3.6	
CO3	5	5	2	4	5	4	5	4	2	4	1	2	4	3.6	
CO4	5	5	2	4	5	4	5	4	2	4	1	2	4	3.6	
CO5	5	5	2	5	4	4	5	4	2	4	1	2	4	3.6	
CO6	5	5	2	4	5	4	5	4	2	4	1	2	4	3.6	
												Mean Overall Score		3.6	

Result: The Score for this Course is 3.6 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17UEL330403A **Credits: 4**

Allied: APPLIED PHYSICS-I

Course Outcomes

1. Acquire the knowledge of conducting materials
2. Know and understand different magnetic materials.
3. Learn the properties of dielectric materials and its applications.
4. Understand the principles of superconducting materials and its applications.
5. Know the various modern engineering materials
6. Understand the basics of nanomaterials and carbon nanotubes.

UNIT-I:

CONDUCTINGMATERIALS **(12 Hrs)**

Introduction – Classical free electron theory of metals - Quantum theory – Free electron gas – Fermi energy and carrier concentration. Introduction – Origin of magnetic moment –Bohr magnetron –Diamagnetism – Paramagnetism and Ferromagnetism – Hysteresis –Anti-Ferro magnetic materials – Ferrites –Applications.

UNIT-II:

MAGNETIC MATERIALS **(12 Hrs)**

Introduction - Origin of magnetic moment - Bohr magnetron - Diamagnetism, Paramagnetism and Ferromagnetism - Hysteresis - Anti-ferromagnetic materials - Ferrites - Applications.

UNIT-III:

DIELECTRIC MATERIALS **(12 Hrs)**

Introduction - Basic definitions - Various types of polarization in dielectric materials - Frequency and temperature dependence of polarization - Internal field or local field – Clausius-Mosotti equation - Dielectric losses - Dielectric breakdown - Applications of dielectric materials - Ferro electricity.

UNIT-IV:

SUPERCONDUCTING MATERIALS **(12 Hrs)**

Introduction – Meissner effect - Transition temperature - Isotope effect - Types of superconductors - BCS theory - High-TC superconductors - Applications of superconductors.

UNIT-V:

MODERN ENGINEERINGMATERIALS **(12 Hrs)**

Metallic glasses - Shape memory alloys - Nano materials - Carbon nanotubes.

BOOK FOR STUDY

1. Engineering Physics - D.K. Bhattacharya &A. Bhaskaran, Oxford University Press, 2010.

Unit	Section
Unit – 1	6.1 – 6.5
Unit – 2	8.1 – 8.8
Unit – 3	10.1 – 10.10
Unit – 4	9.1 – 9.8
Unit – 5	11.1 – 11.4

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UEL330403A					Title of the Paper Allied: APPLIED PHYSICS-I								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	1	3	3	5	3	3	2	3	1	2	2		3.23
CO2	5	4	2	4	4	4	4	2	3	2	1	2	2		3.31
CO3	5	4	2	4	3	4	4	3	3	3	1	2	2		3.07
CO4	5	4	1	3	4	4	4	2	2	3	1	2	3		2.92
CO5	5	4	1	3	4	4	4	3	2	2	1	2	3		2.92
CO6	5	5	2	3	3	4	5	4	2	3	2	2	2		3.23
														Mean Overall Score	3.11

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 4**
17UEL330403B **Credits: 4**

Allied: Computer Science-I

INTERNET AND DATABASE CONCEPTS

Course Outcomes

1. Know the concept behind the web and working of internet
2. Acquire the basic knowledge of designing web pages
3. Design colourful web pages and is able to create a basic website
4. Create web forms and fetch data meaningfully on the web
5. Learn the essence of Databases
6. Infer the skills to fetch and manipulate data through queries

UNIT-I **(hr 12)**

Introduction to the Internet : Computers in Business - Networking - Internet-Email - Resource Sharing -Gopher - WWW - Usenet - Telnet – BulletinBoard Service - Wide Area Information Service.

UNIT-II **(12)**

Introduction to HTML: Designing a home page - HTML document – Anchortag - Hyperlinks - Head and Body sections: Header section - Title – Prologue- links - colourful pages - comments - Body Section: Heading – Horizontalruler - Paragraph - Tabs - Images and pictures - Lists and their types - Nested lists - Table handling.

UNIT-III **(12)**

Frames - Frameset definition - Frame definition - Nested framesets. Formsand form elements.

UNIT-IV **(12)**

Database System Applications - Database Systems versus File Systems - View of Data - Data Models - Database Languages - Database Users andAdministrators - Transaction Management - Database System Structure -Application Architectures - History of Database Systems.

UNIT-V **(12)**

SQL Statements: Data Retrieval: SELECT, Data Definition Languages:CREATE, ALTER, DROP, RENAME, and TRUNCATE, Data ManipulationLanguage: INSERT - UPDATE, DELETE - MERGE. Transactional Control: COMMIT, ROLLBACK, SAVEPOINT, and Data Control Language: GRANT, REVOKE, SELECT ORDER BY - SELECT GROUP BY.

BOOKS FOR STUDY

1. C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill,2000.
2. Henry F. Korth Abraham Silberschatz , Database System Concepts,Fourth Edition McGraw Hill International Editions 2002.

BOOKS FOR REFERENCE

1. Wendy Willard, "Web Design - A beginners Guide", Tata McGraw Hill.
2. Thomas A. Powell, "The Complete Reference Web Design", Tata McGrawHill.
3. C.J. Date, An Introduction to Database System, seventh edition, PearsonEducation, New Delhi, 2002.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UEL330403B					Title of the Paper: Computer Science-I								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	3	4	4	3	3	3	4	4	4	3	4		3.6
CO2	5	4	4	4	4	3	4	4	5	4	4	4	4		4.0
CO3	4	4	4	4	4	4	4	4	3	4	4	4	4		3.9
CO4	4	3	4	4	3	3	4	3	4	3	4	4	3		3.5
CO5	4	4	3	4	3	3	3	3	3	3	3	4	3		3.3
CO6	4	4	4	4	4	3	3	4	4	3	4	4	4		3.7
													Mean Overall Score		3.7

Result: The Score for this Course is 3.7 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III **Hours/Week: 2**
17UFC340901 **Credits: 2**

ENVIRONMENTAL STUDIES

Course Outcome

1. To ensure understanding the significance of environment in which we live.
2. To ensure imparting knowledge on the recent issues associated with environment.
3. To ensure educating the youth the causes and consequences of various types of pollutions.
4. To ensure sensitizing the youth the increasing threats to nature and the misery mankind faces.
5. To ensure the limitations of the available natural resources and the need to sustain them.
6. To ensure imparting the knowledge on the concept of biodiversity and its advantages.

Unit-I: Environmental Studies

Environment - Scope and Importance - Environmental Movements in India - Eco-feminism - Public Awareness.

Unit-II: Natural Resources

Food Resources - L and Resources - Forest Resources - Mineral Resources - Water Resources - Energy Resources

Unit-III: Ecosystems, Biodiversity and Conservation

General structure - Functions of ecosystem - Energy flow and ecological pyramids - Biodiversity and conservation - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

Unit-IV: Environmental Pollution

Air pollution - Water pollution - Oil pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution – Radiation pollution

Unit-V: Environment, Human Population & Social Issues

Human population growth - Urgent steps required for sustainable development - Conserving water - Current Environmental Issues

Text Book:

1. **Environmental studies,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester III	Course Code 17UFC340901					Title of the Paper ENVIRONMENTAL STUDIES								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	5	5	5	3	5	4	4	4	5	3	4	3	4.0	
CO2	5	4	5	5	4	4	5	5	5	4	4	4	4	4.5	
CO3	5	4	5	5	3	5	4	4	5	3	3	4	2	4.0	
CO4	5	4	4	4	4	4	4	5	4	5	4	4	3	4.2	
CO5	5	5	4	5	4	3	5	5	4	4	5	3	4	4.3	
CO6	5	5	4	4	3	4	4	3	3	4	3	2	4	3.7	
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 2**
17UFC441004A **Credits: 2**

FORMATION OF YOUTH-II

Course Outcome

1. To ensure preparing the students to live in harmony with nature.
2. To ensure the youth the significance of public health and the related issues.
3. To ensure sensitizing the youth about addictions and their consequences.
4. To ensure educating the youth on disaster management and First-Aid.
5. To ensure enlightening on the developmental issues and challenges of youth today.
6. To ensure the value of counselling for attaining positive mental health.

Unit-I: Harmony with Nature

What is environment, Why should we think of harmony, Longing for human well-being, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Forest resources, Water resources, Mineral resources, Food resources, Fruits of dishormony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life

Unit-II: Public Health

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - The Indian Scenario, Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Health and Drug Addiction, Drug abuse

Unit-III: Disaster Management and First-Aid

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Disaster Management, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid, Disaster Declaration and Response

Unit-IV: Issues Dealing with Science

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science,

Technology and Innovation Policy of India, Harnessing the forces of science and technology for the future

Unit-V: Counselling for the Adolescents

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news.

Text Book:

1. **Formation of Youth,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004A					Title of the Paper FORMATION OF YOUTH-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	5	4	5	5	3	4	5	5	4	5	4		4.4
CO2	4	4	4	4	4	5	4	3	4	4	4	5	5		4.2
CO3	5	3	5	4	5	4	4	3	4	4	4	5	5		4.2
CO4	3	4	5	4	4	5	4	4	4	4	4	3	4		4.0
CO5	2	4	4	4	5	5	4	4	5	5	5	4	5		4.3
CO6	4	3	4	4	5	3	4	5	5	4	5	5	4		4.2
													Mean Overall Score		4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 2**
17UFC441004B **Credits: 2**

RELIGIOUS DOCTRINE-II

Course Outcome

1. To ensure appreciation of the harmony of religion.
2. To ensure training the youth in the power of prayer.
3. To ensure the understanding of Mary's role in salvation history and Marian Dogmas.
4. To ensure enlightening the graces and invisible effects of the sacraments.
5. To ensure the youth with the promise that God forgives failings on repentance.
6. To ensure understanding the concept of salvation and the promise of eternal life.

Unit: I Harmony of Religions

Introduction - Religions of India - Buddhism - Jainism - Sikhism - Judaism - Confucianism - Christianity - Zoroastrianism - Islam

Unit: II The Christian Prayer

Prayer Defined - Reasons to pray - The Way to Pray - Types of Prayer - Obstacles for Prayer - Prayer in Old -The Lord's Prayer

Unit: III Mary, the Blessed Virgin, Mother of God

Introduction - Marian Dogmas - Mary in need of Redemption - Mary in the New Testament - Apparitions of Mary - Devotion to Mary

Unit: IV Sacraments of Initiation

Introduction - An Overview - Baptism - Confirmation - Holy Eucharist

Unit: V Sacraments of Healing & at the Service of the Community

Reconciliation - Anointing of the Sick - Holy Orders – Matrimony

Text Book:

1. **Life in the Lord,** Department of Foundation course, St. Joseph's College, Tiruchirappalli-2, 2011.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004B					Title of the Paper RELIGIOUS DOCTRINE-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	1	4	3	3	4	4	4	5	4	5	5	5		3.9
CO2	4	1	4	3	3	4	4	4	5	4	5	5	5		3.9
CO3	4	3	4	4	3	4	4	5	4	4	5	5	5		4.2
CO4	4	1	4	3	3	4	4	4	5	4	5	5	5		3.9
CO5	4	1	4	3	3	4	4	4	5	4	4	4	5		3.8
CO6	4	1	4	3	3	5	5	5	5	4	5	4	4		4.0
													Mean Overall Score		3.9

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

பருவம்: 4 **மணி நேரம்: 4**

17UGT410004 **புள்ளிகள்: 3**

பொதுத்தமிழ்-IV

பாடத்தின் விளைவு

- நாடகத்தின் போக்குகள், உத்திகள், பாத்திரப்படைப்பு, உரையாடல் முறை, கற்பனைத்திறம் போன்றவற்றை அறிந்துகொள்ளுதல்.
- புதிய நாடகங்களைப் படைக்கும் திறனைப் பெறுதல்.
- நாடகங்களை நடிக்கும் திறன் பெறுதல்
- கிரேக்க, ஆங்கில நாடகங்களை அடியொற்றி தமிழ்நாடகம் தோன்றிய வரலாறு அறியச் செய்தல்.
- சங்ககாலம் தொட்டு இக்காலம் வரை காதல் பற்றிய உணர்வுகளை எடுத்துரைத்தல்.
- தமிழ் வரலாற்றின் மன்னர்களின் ஆட்சியின் சிறப்புகளையும் வீழ்ச்சிகளையும் எடுத்துக்காட்டுதல்.

அலகு-1 **(12 மணி நேரம்)**

மனோன்மணீயம், பாயிரம், அங்கம் - 1, களம் 1 - 5 வரை.

அலகு-2 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 2, களம் 1 - 3 வரை.

இலக்கிய வரலாறு நான்காம் பாகம் - தமிழும் பிற துறைகளும் பக்கம் (365-387).

அலகு-3 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 3, களம் 1 - 4 வரை.

உரைநடை நாடகம் (கௌதம புத்தர்)

அலகு-4 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 4, களம் 1 - 5 வரை.

இலக்கிய வரலாறு நான்காம் பாகம் - சமயத்தவரின் தமிழ்ப்பணி (பக்கம் 391-402)

அலகு-5 **(12 மணி நேரம்)**

மனோன்மணீயம், அங்கம் - 5, களம் 1 - 3 வரை.

இலக்கிய வரலாறு நான்காம் பாகம் - வெளிநாடுகள் தந்த தமிழ் இலக்கியம் (பக்கம் 410-435)

பாடநூல்கள் :

1. சுந்தரனார், மனோன்மணீயம், தமிழாய்வுத்துறை (பதிப்பு), தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2. (அங்கம் : 3 களம் : 4 நீங்கலாக)
2. பாலசுப்பிரமணியம். கு.வெ, கௌதம புத்தர், அய்யா நிலையம், தஞ்சாவூர்
3. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2014.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGT410004					Title of the Paper தொழுந்துமிழ்-IV								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	5	5	5	5	5	4	4	5	5	5	4.5	
CO2	5	4	3	5	4	5	5	4	4	3	4	5	5	4.3	
CO3	4	3	3	5	4	3	3	4	3	3	4	5	5	3.7	
CO4	5	5	4	5	5	5	5	5	5	4	5	5	5	4.8	
CO5	3	4	4	5	5	4	4	4	5	4	4	4	4	4.1	
CO6	4	3	4	5	5	4	3	3	4	3	2	2	3	3.4	
													Mean Overall Score		4.1

Result: The Score for this Course is 4.1 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: IV **Hours/Week: 4**
17UGH410004 **Credits: 3**

HINDI-IV

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* the ability to empower the students with globally employable soft skills
* the ability to translate Hindi passages to English
* the ideas on human values
* the ability to instruct the moral values given by the Bhakthi Saints
* the knowledge of Indian festivals .
* the knowledge of culture and tradition

Unit-I **8 hours**

Vidyarthi, Banking Shabda, Anuvad, Anuvad Lesson – 1, Adhikal, Premchand

Unit-II **12 hours**

Pusthakalaya, Nemikaryalaya Tippaniyan, Anuvadak, Anuvad lesson-2, Bakthikal-Gyan Marg, Mahadevivarma

Unit-III **12 hours**

Thyohar, Anuvad Ke Gun, Anuvad lesson – 3, Bakthi, Tippaniyaan, Prem Marg, Pant

Unit-IV **14 hours**

Yugpuresh Gandhi, Anuvadak Ke Gun, Anuvad Lesson – 4 Bakthikal, Bakthikal – Ram Bakthi Kal - Krishna Bakthi, Dinkar

Unit-V **14 hours**

Braman, Anuvad ek kala, Swarnayug Bakthikal, Anuvad Lesson - 5, Reetikal, Chayavad

Books Recommended

1. Kendriya Sachivalaya, Hindi Parishad New Delhi, Karyalaya Sahayika, 2016.
2. Dakshin Bharat Hindi Prachar Sabha Chennai-17, Niband Radhana, Hindi, 2016.
3. DBHP Sabha, Chennai-17, Anuvad Abyas-3, Hindi, 2016
4. Rajnath Sharma, Hindi Sahitya ka Itihas, Vinkod Pustak Mandir, Agra-2, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGH410004					Title of the Paper Hindi-IV						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	4	3	4	3	3	4	5	4	4	3.5	
CO2	3	3	2	3	3	3	5	3	4	3	3	3.1	
CO3	3	3	3	3	4	3	3	3	4	3	3	3.1	
CO4	3	2	2	3	2	3	3	3	3	3	3	2.7	
CO5	3	3	3	3	3	3	5	3	3	4	4	3.3	
CO6	4	4	4	4	3	5	3	5	4	4	3	3.9	
											Mean Overall Score	3.3	

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semestre: IV **Heures /Semaine: 4**
17UGF410004 **Credits : 3**

FRANÇAIS-IV

Course Outcomes

* Comparer la culture de l'Inde et de la France
* Familiariser l'étudiant avec le vocabulaire, la grammaire et les conversations
* Connaître les auteurs français (20 auteurs) et leurs œuvres
* Dire qu'on aime quelqu'un/ quelque chose
* Demander des informations
* Exprimer une opinion personnelle et Justifier son opinion.

Unit-I : Prières du Nouvel An (10 heures)

Exprimer l'inquiétude, le regret, le souhait, l'obligation, la sympathie.

Grammaire : Le subjonctif, verbe craindre

Unit-II : Retrouvailles (10 heures)

Marquer la surprise

Grammaire : Le subjonctif, pronoms possessifs.

Unit-III : C'est lui le meilleur ! (10 heures)

Dire qu'on aime quelqu'un/ quelque chose, donner son opinion, insister.

Grammaire : Le superlatif, les pronoms démonstratif.

Unit-IV Sauvons notre Terre ! (15 heures)

Enchaînement de cause et d'effet, demander à quelqu'un de tenir compté de quelque chose.

Grammaire : Le plus-que-parfait, il y a.

Unit-V : Le jour des élections s'approche et les auteurs français (20 auteurs) et leurs œuvres (15 heures)

Demander des informations, dire qu'une action n'est pas utile, exprimer une opinion personnelle, Justifier son opinion.

Grammaire : Le participe présent – le gérondif, la voix passive.

Manuel:

1. K.Madanagobalane, **Synchronie-II**, Samhitâ Publication, 2011.

Livre de référence:

1. Annie Berthet /B_atrix Sampsonis/ Catherine Hugot /V_ronnique M Kizirian / Monique Waendendries, **Alter Ego A1**, Hachette, 2006.
2. Yves Loiseau/R_gineM_rieux, Connexions 1, Didier, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGF410004					Title of the Paper French-IV						Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	2	3	4	4	2	3	2	2	3		3.0
CO2	3	3	3	3	4	4	2	4	3	2	3		3.1
CO3	3	2	3	2	4	3	4	3	3	3	4		3.1
CO4	3	3	4	3	4	1	2	2	4	3	3		2.9
CO5	3	3	4	3	4	3	2	2	4	4	5		3.4
CO6	3	4	3	3	3	4	4	2	4	3	4		3.4
										Mean Overall Score			3.2

Result: The Score for this Course is 3.2 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester: IV **Hours/Week: 4**
17UGS410004 **Credits : 3**

SANSKRIT-IV

Course Outcomes

At the end of the course, a student should be able to demonstrate…

* knowledge and understanding of the history of Sanskrit Drama.
* knowledge and understanding of the Nataka vivaranam.
* the introduction of Functional - Sanskrit conversation Letter writing.
* the ability to apply relevant theoretical perspectives to topics within the field of study
* the competence in academic writing and oral presentation skills.
* the ability to work both independently and in groups on presentations and/or development of Projects.

Unit-I **8 hours**

Paataah – Asta, Nava Dasha, Sankhya prayogah.

Unit-II **12 hours**

Lot lakaarah. Prqayaogah. Kartari Vaakyaani

Unit-III **12 hours**

Naatakasya Itihaasah.

Unit-IV **14 hours**

Karnabhaaram. Naatakam.

Unit-V **14 hours**

Kathaapaatra Vailaksharnyam.

Books recommended:

1. R.S.Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat 678003, Kerala, South India, History of Sanskrit Literature, 2014.
2. Samskritha Bharathi, Aksharam 8th Cross, 2nd Phase, Giri Nagar, Bangalore. Vadatu Sanskritam – Samskara Binduhu, 2014.
3. R.S. Vadhyar & Sons, Book-Sellers and Publishers, Kalpathi, Palghat 678003, Kerala, Soth India. Karnabharam, 2014.
4. Kulapathy, K.M., Saral Sanskrit Balabodh, Bharathiya vidya Bhavan, Munshimarg, Mumbai 400007, 2014.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGS410004	Title of the Paper Sanskrit-IV									Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	Mean Score of COs
CO1	5	3	5	4	4	3	3	3	3	3	4	3.1
CO2	4	3	4	4	4	3	3	4	3	4	3	3.1
CO3	4	3	3	4	4	3	4	4	4	4	4	3.2
CO4	4	3	3	4	3	3	3	4	4	4	4	3.1
CO5	4	4	4	3	4	3	4	3	4	4	4	3.0
CO6	5	4	4	4	4	3	3	3	3	3	4	3.2
											Mean Overall Score	3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Semester: IV **Hours/Week: 5**
17UGE420104 **Credits: 3**

GENERAL ENGLISH-IV

Course Outcome

* Comprehend the local and global issues through the lessons
* Do the tasks centering on skill development and enhance their Grammar Using and Writing Skills
* Use interactive skills
* Train and develop the Listening and Reading Skills of the learners through teacher-led reading practice
* Improve their General Writing Skills such as Note-Taking, Note-Making, Précis Writing, Paragraph Writing, and Writing Short Essays on Current Issues/General Topics
* Understanding the social background and human character of the period

Unit-VII:

***Women through the Eyes of Media**

7.0 Introduction
7.1 Objectives
7.2 Listening and Reading Skills through Teacher-led Reading Practice
7.3 Glossary
7.3.1 Words
7.3.2 Phrases
7.4 Reading Comprehension
7.5 Critical Analysis
7.6 Creative Task
7.7 General Writing Skill: Writing Minutes of a Meeting
7.8 Grammar: Present Perfect Tense
7.9 **Non -Detailed Poem:** Thomas Hood (1799–1845): "Silence"

Unit-VIII:

***Effects of Tobacco Smoking**

8.0 Introduction
8.1 Objectives
8.2 Listening and Reading Skills through Teacher-led Reading Practice
8.3 Glossary
8.3.1 Words
8.3.2 Phrases

8.4 Reading Comprehension
8.5 Critical Analysis
8.6 Creative Task
8.7 General Writing Skill: Note-Taking
8.8 Grammar: Present Perfect Continuous Tense
8.9 **Non -Detailed Poem:** Coventry Patmore (1823-1896): "The Toys"

Unit-IX:

*** Short Message Service (SMS)**

9.0 Introduction
9.1 Objectives
9.2 Listening and Reading Skills through Teacher-led Reading Practice
9.3 Glossary
9.3.1 Words
9.3.2 Phrases
9.4 Reading Comprehension
9.5 Critical Analysis
9.6 Creative Task
9.7 General Writing Skill: Note-Making
9.8 Grammar: Past Perfect Tense
9.9 **Non -Detailed Poem:** Stephen Spender (1909-1995): "Daybreak"

Unit-X:

***An Engineer Kills Self as Crow Sat on his Head: A News Paper Report**

10.0 Introduction
10.1 Objectives
10.2 Listening and Reading Skills through Teacher-led Reading Practice
10.3 Glossary
10.3.1 Words
10.3.2 Phrases
10.4 Reading Comprehension
10.5. Critical Analysis
10.6. Creative Task
10.7 General Writing Skill: Précis Writing
10.8 Grammar: Past Perfect Continuous Tense
10.9 **Non -Detailed Poem:** Gabriel Imomotimi Okara (1921): "Once Upon a Time"

Unit-XI:

***Traffic Rules**

11.0 Introduction
11.1 Objectives
11.2 Listening and Reading Skills through Teacher-led Reading Practice
11.3 Glossary
11.3.1 Words
11.3.2 Phrases
11.4 Reading Comprehension
11.5 Critical Analysis
11.6 Creative Task
11.7 General Writing Skill: Paragraph Writing
11.8 Grammar: Future Perfect Tense
11.9 **Non -Detailed Poem:** Robert Winner (1930-1986): "Opportunity"

Unit-XII:

***A Handful of Answers: A Zen Tale**

12.0 Introduction
12.1 Objectives
12.2 Listening and Reading Skills through Teacher-led Reading Practice
12.3 Glossary
12.3.1 Words
12.3.2 Phrases
12.4 Reading Comprehension
12.5 Critical Analysis
12.6 Creative Task
12.7 General Writing Skill: Writing Short Essays on Current Issues/General Topics
12.8 Grammar: Future Perfect Continuous Tense
12.9 **Non -Detailed Poem:** Ted Hughes (1930–1998): "The Harvest Moon"

Textbook

1. Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. New Delhi: Trinity, 2016. Print.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UGE420104					Title of the Paper General English-IV								Hours 5	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	5	5	4	4	4	5	5	5	4	5	5		4.61
CO2	5	4	5	5	3	4	5	5	5	5	5	5	5		4.69
CO3	4	4	5	4	4	3	4	4	5	5	4	4	5		4.23
CO4	4	4	5	4	4	3	4	5	5	5	4	4	5		4.30
CO5	5	4	5	4	4	4	4	4	5	5	4	4	5		4.38
CO6	5	5	5	5	4	4	4	5	5	5	4	4	5		4.61
												Mean Overall Score			**4.47**

Result: The Score for this Course is 4.47 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **L P C**
17UEL430206 **6 - 4**

ELECTRONIC DEVICES AND CIRCUITS

Course Outcomes

1. Ability to acquire the knowledge on basic electronic devices.
2. Ability to understand the various applications of electronic devices.
3. Ability to differentiate various transistors
4. Will be able to classify and analyze various power devices
5. Ability to understand various types of Oscillators
6. Will be able to acquire knowledge on feedback amplifiers & Power Amplifiers

UNIT-I: Special Function Diodes (15 Hrs)

Introduction-Diode resistance -Transition or space charge capacitance-Diffusion capacitance-Effect of temperature on PN junction diode-Junction diode switching characteristics-Break down in PN junction diode-Diode as circuit element -Zener diode, varactor diode, step recovery diode, Schottky diodes, Tunnel diode, Gunn diode- Diode applications.

UNIT-II: Transistor amplifier (15 Hrs)

Introduction - Characteristics- Relation between alpha beta-Transistor configuration-Biasing of transistor-Biasing methods of transistor-Transistor switch-Transistor inverter - current mirror Using BJT-Transistor amplifier-Transistor: voltage and current amplifier-Single stage CE, CC and CB Amplifier. UJT characteristics and operating principle.

UNIT-III: FET, MOSFET& Power Devices (15 Hrs)

Introduction - construction of FET -operation of FET - Configurations ofFET - Pinch-off voltage - VI characteristics - Low Frequency Modelof FET - Construction of MOSFET - Enhancement type - Depletion type - VI characteristics - Construction of SCR - Equivalent transistor model -operation - VI characteristics - Construction of TRIAC, DIAC & IGBT.

UNIT-IV: Feedback Amplifiers (15 Hrs)

Concepts of feedback - effects and Types of negative feedback - Feedback topology - Nyquist criterion for stability of feedback amplifiers - Barkhausen's Criterion - Mechanism for start of oscillation - oscillators -Analysis of LC oscillators: Colpitt's - Hartley - Clapp oscillator circuits -RC phase shift oscillator - Wien's bridge oscillator - crystal oscillator circuits.

UNIT-V: Tuned & Power Amplifiers (12 Hrs)

Tuned Amplifier: Single Tuned - Double Tuned - Stagger tuned - PowerAmplifiers: Working principle of Class A - Class AB - Class B - Class C - ClassD - Class S amplifiers - Efficiency of class A, Band C amplifiers.

BOOKS FOR STUDY:

1. Salivahanan. S, Suresh Kumar .N, Vallavaraj. A, "Electronic Devices and Circuits", 2nd Edition, TMH, 2008
2. R.Y.Borse, "Basic electronic Devices and circuits" First edition 2012, Adhyayan Publishers & Distributors, New Delhi.

BOOKS FOR REFERENCE:

1. Thareja B.L."Basic electronics" S. Chand and Co. 3rd edition -2012.
2. David bell. "electronic devices and circuits", 5th edition, 2008, PHI
3. Mehta V.K & Mehta R, "Principles of Electronics", 3rd edition, S. Chand& Co, 2005.
4. Albert Malvino and David Bates, "Electronics Principles", 8th Edition, 2015, Mc Graw Hill.

SECTIONS:

UNIT	BOOK	SECTIONS
I	1	4.15-4.23,5.1-5.5,5.7.5-5.9, 17.1 – 17.2
II	2	4.1.8-4.1.11, 5.1 – 5.1.1.3, 5.1.2 – 5.1.3, 5.1.5 – 5.1.7, 6.1, 6.2, 6.4, 6.6 -6.7
III	1	7.1-7.6, 7.9-7.11, 17.2, 8.3, 8.4, 8.7, 8.8. Lecture notes- IGBT
IV	1	14.2 - 14.6, 15.3- 15.7, 15.11(i) - 15.12, 15.14
V	1	13.3.1, 13.3.2, 13.6, 12.1 - 12.14

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UEL430206	Title of the Paper: ELECTRONIC DEVICES AND CIRCUITS										Hours 6	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	2	4	4	3	4	4	2	4	2	3	3	3.4
CO2	5	4	2	4	4	3	4	4	2	4	2	3	3	3.4
CO3	5	4	2	4	4	3	4	4	4	4	2	3	3	3.4
CO4	5	4	2	4	4	3	4	4	2	4	2	3	3	3.4
CO5	5	4	2	4	4	3	4	4	2	4	2	3	3	3.4
CO6	5	4	2	4	4	3	4	4	2	4	2	3	3	3.4
												Mean Overall Score		3.4

Result: The Score for this Course is 3.4 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV	L	P	C
17UEL430207	-	3	4

Electronics Practical-II

DIGITAL ELECTRONICS AND ELECTRONICS DEVICES AND CIRCUITS

Course Outcomes

1. Ability to understand the concepts of semiconductor circuits and digital circuits by practical experiments
2. To learn the basic IDE's for circuit simulation.

List of Experiments: Any Sixteen - Digital electronics (8) and Analog (8)

Digital Experiments:

1. Construction and study of basic gates (NOT, AND and OR) using transistor and diodes
2. Simplification of Boolean laws
3. Simplification and verification of K-map
4. Construction and study of 4:1 Multiplexer and 1:4 Demultiplexer and study of IC 74151 and IC74154
5. Construction and study of encoder and decoder
6. Construction and study of synchronous counters
7. Construction and study of Flip-Flops
8. Construction and study of Asynchronous counters
9. Construction and study of Shift registers
10. Construction and study of adder and subtractors
11. Construction and study of 3bit parity generator and checker
12. Construction and study of binary to gray, gray to binary code, decimal to ASCII and ASCII to decimal code converters
13. Construction and Study of basic gates (AND, OR and NOT) using Universal gates (NAND and NOR) and study of voltage levels (TTL & CMOS).

Analog experiments (Electronics devices and Circuits)

14. Study of Zener diode characteristics.
15. UJT relaxation oscillator
16. Study of clipper and clamper circuits using diodes
17. Study of transistor biasing ,calculation of Q-point and DC load line analysis

18. Study of FET biasing.
19. Study of MOSFET characteristics.
20. Study of SCR characteristics
21. Lamp dimmer using TRIAC& DIAC
22. Study of Transistor characteristics -CE mode
23. Study of Transistor characteristics -CB mode
24. Study of Transistor characteristics -CC mode
25. Construction and Study of RC coupled Transistor amplifier
26. Transistor voltage and current amplifier
27. Hartley oscillator -construction and verification of start of oscillation equation
28. Colpitt's oscillator - construction and verification of start of oscillation equation
29. Construction and study of RC phase shift oscillator
30. Construction and study of Wien's bridge oscillator
31. Construction and study of Class A Power Amplifier
32. Construction and study of Class B Power Amplifier
33. Construction and study of Class E Power Amplifier

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Semester IV **L P C**

17UEL430301A **4 - 3**

Core Elective: HOME APPLIANCES SERVICING AND REPAIR

Course Outcomes

1. Ability to understand the classification of active components
2. Ability to understand the classification of passive components
3. Will be able to integrate trouble shooting skills in equipment servicing
4. Will be able acquire knowledge on operations of home appliances
5. Ability to acquire knowledge on maintenance and safety measures of home appliances
6. Ability to understand test and troubleshooting chart of home appliances

UNIT-I: Electronic components (10 Hrs)

Introduction–Passive components–Transformer–Working principle–application–Active devices: Diode–Transistor– Analog IC–amplifier–oscillators and Digital ICs–logic gates–encoder–decoder.

UNIT-II: Equipments for servicing (8 Hrs)

Soldering Iron–Flux–lead–Zero defect soldering–Desoldering pump–soldering station–Basics of Multimeter–Measurement of current, voltage and resistance using multimeter–Checking transistors and diodes–In circuit measurements.

UNIT-III: Heating appliances (10 Hrs)

Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer–Toasters– Geysers– MicroWave Ovens– Oven –Disassembling and assembling procedure– Fault indicator–Testing and Troubleshooting methods.

UNIT-IV: Motorised appliances (10 Hrs)

Types of Motors–DC and AC motor– Fans– mixers– blenders–wet grinders–circuit connection- testing methods. Washing machine – Electrical connections–assembly – Dish washer –Electrical connection–Testing and troubleshooting methods.

UNIT-V: Refrigeration appliances (10 Hrs)

Fridge– Electrical connection– Compressor–coolants–Automatic defrost circuits –Testing and troubleshooting of refrigerators–Air coolers and Air conditioners–Mounting and fixing of Air Conditioners–testing and troubleshooting methods.

Book for Study: Material prepared by the department

Book for Reference:

1. Trevor Linsely, "Electronic Servicing and Repairs", 3rd Edition, 2011, Rouledge

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UEL430301A					Title of the Paper: HOME APPLIANCES SERVICING AND REPAIR								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	2	4	5	4	3	2	3	4	4	4	4		3.5
CO2	4	3	2	4	5	4	3	2	3	4	4	4	4		3.5
CO3	4	3	2	3	5	4	3	2	3	4	4	4	4		3.5
CO4	4	3	2	3	5	4	3	2	3	4	4	4	4		3.5
CO5	4	3	2	5	5	4	3	2	3	4	4	4	4		3.6
CO6	4	3	2	4	5	4	3	2	3	4	4	4	4		3.5
												Mean Overall Score			3.5

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **L P C**
17UEL430301B **4 - 3**

Core Elective:

LAB EQUIPMENTS MAINTENANCE AND SERVICING

Course Outcomes:

1. Ability to understand the classification of active components
2. Will be able to understand the classification of passive components
3. Will be able to integrate trouble shooting skills in lab equipment servicing
4. Ability to acquire knowledge on operations of lab equipment.
5. Ability to acquire knowledge on maintenance and safety measures of lab equipment
6. Will be able to understand test and troubleshooting chart of lab equipment.

UNIT-I: Passive and Active components **(10 Hrs)**

Resistors–types–Colorcode–wattage–tolerence–capacitors–types–inductors–transformer–stepup and step down–-uses–Diode–ratings–operation–transistor–NPN and PNP–switching–amplifier–Diode and Transistor testing–MOSFET–Types–Testing MOSFET.

UNIT-II: Power supply **(10 Hrs)**

AC power supply-parameters–DC power supply design–Regulated power supplies–single–Dual– variable voltage–Switched mode power supply–Transformerless power supply design– Design of fuses–Testing and troubleshooting.

UNIT-III: Analog Equipments **(10 Hrs)**

Variable Resistance Box–variable Capacitance Box– variable inductance box–Cathode Ray oscilloscope –Block diagram–Frequency measurement – Function generator– Range of frequencies–Amplitude–types of waves-Meters- Ammeter-Voltmeter-Testing and trouble shooting.

UNIT-IV: Digital Equipments **(8 Hrs)**

LED–current limiting concept–switches–types-Logic module–circuit diagram–Concept of common ground–Pulse generator–Circuit diagram – Active low and Active high pulses – Logic modules interfacing boards–Kits–Testing and troubleshooting methods.

UNIT-V:Common chemistry lab equipments **(10 Hrs)**

Digital balance–block diagram–Load cell sensors–pH meter–electrode specifications–Stirrer–Centrifuge–Rotation Per Minute measurement–magnetic stirrer with paddle–block diagram–Ovan–heating elements

BOOK FOR STUDY:

Material prepared by the department

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UEL430301B			Title of the Paper: LAB EQUIPMENT MAINTENANCE AND SERVICING								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	4	2	2	4	4	4	3	3	4	3	4	3	4	3.4
CO2	4	2	2	4	4	4	3	3	4	3	4	3	4	3.4
CO3	4	2	2	4	5	4	3	4	4	3	4	3	4	3.5
CO4	4	2	2	4	5	4	3	4	4	3	4	2	4	3.5
CO5	4	2	2	4	5	4	3	3	4	3	4	2	4	3.4
CO6	4	3	2	4	5	4	3	2	4	4	4	4	4	3.6
													Mean Overall Score	3.5

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **L P C**
17UEL430404A **4 - 4**

Allied: APPLIED PHYSICS - II

Course Outcomes

1. Understand the laws of quantum physics.
2. Understand the working of laser.
3. Know the types of lasers and the application of laser
4. Learn the basics of ultrasonic, its production and applications.
5. Understand principles, functions and applications of fiber optics
6. Understand physics of semiconducting materials.

UNIT - I:

QUANTUM PHYSICS **(12 Hrs)**

Introduction - Black body radiation - Compton effect - Matter waves - Hesienberg's Uncertainty principle - Schordinger 's wave equation - The electron microscope

UNIT - II:

LASERS **(12 Hrs)**

Introduction - Principle of spontaneous emission and stimulated emission - Population inversion – Types of lasers – He-Ne lasers – CO_2 laser – semiconductor laser - Industrial applications - Medical application – Holography – applications of holography

UNIT - III:

ULTRASONICS **(12 Hrs)**

Introduction - Production of ultrasonic waves - Detection of ultrasonic waves - Properties of ultrasonic waves - Cavitation - Acoustic grating - Industrial applications - SONAR - Non-destructive testing - Medical application

UNIT – IV:

FIBRE OPTICS AND APPLICATIONS **(12 Hrs)**

Introduction - Propagation of light in optical fibres - Numerical aperture and acceptance angle - Types of optical fibres - Double crucible technique of fiber drawing - Splicing - Power losses in optical fibres - Fibre optic communication systems - Light sources - Detectors - Fibre optic sensors - Endoscope.

UNIT- V:

SEMICONDUCTING MATERIALS **(12 Hrs)**

Introduction - Intrinsic semiconductors – Carrier concentration – Fermi level – variation of Fermi level with temperature – Electrical conductivity – Band

gap determination – Extrinsic semiconductors (carrier concentration in n-type and p-type semiconductors) –Variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall Effect and its Applications.

BOOK FOR STUDY

1. Engineering Physics - D.K. Bhattacharya &A. Bhaskaran, Oxford University Press, 2010.
   Unit-1: Sec.4.1-4.7; Unit-2: Sec.2.1-2.7; Unit-3: Sec.1.1-1.10; Unit-4: Sec.3.1-3.12; Unit-5: Sec.7.1-7.11

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UEL430404A					Title of the Paper Allied: APPLIED PHYSICS-II								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	1	3	3	5	3	3	2	3	1	2	2		3.23
CO2	5	4	2	4	4	4	4	2	3	2	1	2	2		3.31
CO3	5	4	2	4	3	4	4	3	3	3	1	2	2		3.07
CO4	5	4	1	3	4	4	4	2	2	3	1	2	3		2.92
CO5	5	4	1	3	4	4	4	3	2	2	1	2	3		2.92
CO6	5	5	2	3	3	4	5	4	2	3	2	2	2		3.23
													Mean Overall Score		3.11

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **L P C**
17UEL430405A **- 2 2**

Practical:
APPLIED PHYSICS

Course Outcomes

1. Learn the basics of ultrasonic, its production and applications.
2. Understand principles, functions and applications of fiber optics.
3. Understand physics of semiconducting materials.

Any 16 experiments

1. Spectrometer – Refractive index of a prism
2. Spectrometer – Grating – Minimum Deviation – Wavelength
3. Field along the axis of a coil – Field
4. Field along the axis of the coil – Moment of a magnet – TAN A
5. Convex lens
6. Concave lens
7. P.O Box – Temperature coefficient – Thermister
8. Carey Foster's Bridge – R and n
9. Potentiometer – Ammeter Calibration
10. Potentiometer – Resistance of a coil of wire R and n
11. BG – Figure of merit & Resistance of the Galvanometer
12. BG – Determination of C
13. Conversion of a Galvanometer into voltmeter
14. Conversion of a Galvanometer into Ammeter
15. Newton's law of cooling
16. K- Forbe's method
17. Resonaters
18. Air Wedge – Thickness of a wire
19. Newton's Rings – Determination of R
20. Sonometer – Frequency

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Semester IV **Hours/Week: 4**
17UEL430404B **Credits: 4**

Allied: Computer Science-II
DATA AND COMMUNICATION NETWORKS

Course Outcomes

1. Familiarize the students to understand the basic concepts of Data Communication
2. Understand the Classification of computer networks
3. Acquire the knowledge of Topology
4. Gets to know about the various types of networks
5. Learns the different transmission media
6. Infers the concept used in Mobile Communication technology

Unit-I **(12)**

Data Communication Fundamentals: Analog Signal Transmission – Digital Signal Transmission. Data Transmission: Serial and Parallel Transmission – Communication Modes – Transmission Modes – Transmission Media : Two – wire open lines – Twisted Pair – Coaxial Cable – Optical Fibers – Unguided Transmission Media.

Unit-II **(12)**

Classification of Computer Networks: Classification by Geographical Spread – Topological Classification – Classification by Ownership – Circuit Switching – Message Switching – Packet Switching – Routing – Multiplexing and Concentration: Frequency Division Multiplexing – Time Division Multiplexing – Concentrator – Terminal Handling – Components of Computer Network

Unit-III **(12)**

Local Area Network – The Evolution of LAN – LAN Architecture – The OSI Model and LAN Access – LAN advantages and Services – Characteristics of LAN: The Server – Workstations – The Transmission Media for LAN – Communication Equipments – LAN Topologies: Bus and Tree – Ring Topology – Star Topology – LAN Access Protocols : Round Robin – Contention – Reservation.

Unit-IV **(12)**

Wireless LANs: Need for Wireless LANs – Advantages of Wireless LANs – Components of Wireless LAN: Mobile Clients – Special Units – Working of Wireless LANs – Transmission Media: Radio Wave Technologies –

Narrowband Technology –DSSS - FHSS – Infrared Technology: Characteristics of Infrared Transmission – Direct Modulation – Operating Modes – Benefits and Drawbacks – Wireless LAN Types : Ad hoc Wireless LAN – Infrastructure Wireless LAN

Unit-V **(12)**

Digital Cellular Radio : Global Systems for Mobile Communications – Cellular Digital Packet Data – Code Division Multiple Access – Bluetooth technology : The Evolution – Goals and Features – Bluetooth products – Network Architecture – Hardware and Software Architecture – Applications – Features of ISDN – ISDN Channels – ISDN Services – ISDN User Interface

Books for Study

1. Rajesh, Eswarakumar, Balasubramanian, "Computer Networks, Fundamentals and Applications", Vikas Publishing House Pvt. Ltd, 2002.

Books for Reference

1. William Stallings, " Data and Computer Communications", Prentice Hall of India, Seventh Edition, 2004.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UEL430404B					Title of the Paper: Computer Science-II								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	4	4	2	2	2	2	3	4	5	3	3	3.1	
CO2	5	2	4	5	4	2	2	2	4	4	4	4	2	3.3	
CO3	5	4	5	4	4	2	4	2	4	3	4	5	2	3.6	
CO4	4	2	5	4	2	2	2	2	5	3	4	4	2	3.1	
CO5	4	4	4	4	2	2	3	2	4	3	3	4	2	3.1	
CO6	4	4	4	4	4	2	3	2	4	3	3	5	3	3.4	
												Mean Overall Score		3.3	

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester III & IV **Hours/Week: 2**
17UEL430405B **Credits: 2**

Allied:

COMPUTER SCIENCE PRACTICALS
(SOFTWARE LAB - WEB DESIGN USING HTML)

Course Outcomes

1. Able to understand the Web desiging concepts using HTML by practically

Detailed Study

1. Simple web page with all the text formatting tags
2. Adding images to Web pages
3. Creating Lists (Ordered and unordered list)
4. Adding links to Web Pages
5. Creating Tables using various attributes
6. Creating Frames
7. Designing forms using simple form elements
8. Implementation of Data Definition language commands
9. Implementation of DML, TCL and DCL commands

Simple Projects using HTML

1. Creating Web blocks consists of personal details
2. Creating Website for the Department/college

Semester IV **Hours/Week: 2**
17UFC441004A **Credits: 2**

FORMATION OF YOUTH-II

Course Outcome

1. To ensure preparing the students to live in harmony with nature.
2. To ensure the youth the significance of public health and the related issues.
3. To ensure sensitizing the youth about addictions and their consequences.
4. To ensure educating the youth on disaster management and First-Aid.
5. To ensure enlightening on the developmental issues and challenges of youth today.
6. To ensure the value of counselling for attaining positive mental health.

Unit-I: Harmony with Nature

What is environment, Why should we think of harmony, Longing for human well-being, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Forest resources, Water resources, Mineral resources, Food resources, Fruits of dishormony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life

Unit-II: Public Health

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - The Indian Scenario, Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Health and Drug Addiction, Drug abuse

Unit-III: Disaster Management and First-Aid

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Disaster Management, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid, Disaster Declaration and Response

Unit-IV: Issues Dealing with Science

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science,

Technology and Innovation Policy of India, Harnessing the forces of science and technology for the future

Unit-V: Counselling for the Adolescents

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news.

Text Book:

1. **Formation of Youth,** Department of Foundation course, St.Joseph's College, Tiruchirappalli-2, 2016.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004A					Title of the Paper FORMATION OF YOUTH-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	5	4	5	5	3	4	5	5	4	5	4		4.4
CO2	4	4	4	4	4	5	4	3	4	4	4	5	5		4.2
CO3	5	3	5	4	5	4	4	3	4	4	4	5	5		4.2
CO4	3	4	5	4	4	5	4	4	4	4	4	3	4		4.0
CO5	2	4	4	4	5	5	4	4	5	5	5	4	5		4.3
CO6	4	3	4	4	5	3	4	5	5	4	5	5	4		4.2
													Mean Overall Score		4.2

Result: The Score for this Course is 4.2 (Very High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester IV **Hours/Week: 2**
17UFC441004B **Credits: 2**

RELIGIOUS DOCTRINE-II

Course Outcome

1. To ensure appreciation of the harmony of religion.
2. To ensure training the youth in the power of prayer.
3. To ensure the understanding of Mary's role in salvation history and Marian Dogmas.
4. To ensure enlightening the graces and invisible effects of the sacraments.
5. To ensure the youth with the promise that God forgives failings on repentance.
6. To ensure understanding the concept of salvation and the promise of eternal life.

Unit: I Harmony of Religions

Introduction - Religions of India - Buddhism - Jainism - Sikhism - Judaism - Confucianism - Christianity - Zoroastrianism - Islam

Unit: II The Christian Prayer

Prayer Defined - Reasons to pray - The Way to Pray - Types of Prayer - Obstacles for Prayer - Prayer in Old -The Lord's Prayer

Unit: III Mary, the Blessed Virgin, Mother of God

Introduction - Marian Dogmas - Mary in need of Redemption - Mary in the New Testament - Apparitions of Mary - Devotion to Mary

Unit: IV Sacraments of Initiation

Introduction - An Overview - Baptism - Confirmation - Holy Eucharist

Unit: V Sacraments of Healing & at the Service of the Community

Reconciliation - Anointing of the Sick - Holy Orders – Matrimony

Text Book:

1. **Life in the Lord,** Department of Foundation course, St. Joseph's College, Tiruchirappalli-2, 2011.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester IV	Course Code 17UFC441004B					Title of the Paper RELIGIOUS DOCTRINE-II								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO2	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO3	4	3	4	4	3	4	4	5	4	4	5	5	5	4.2	
CO4	4	1	4	3	3	4	4	4	5	4	5	5	5	3.9	
CO5	4	1	4	3	3	4	4	4	5	4	4	4	5	3.8	
CO6	4	1	4	3	3	5	5	5	5	4	5	4	4	4.0	
													Mean Overall Score		3.9

Result: The Score for this Course is 3.9 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL530208 **5 - 4**

MICROPROCESSORS AND ITS APPLICATION

Course Outcomes:

1. Ability to acquire knowledge on architecture of 8085 microprocessor.
2. Ability to understand the 8085 instruction set and memory mapping concepts.
3. Ability to understand and interpret 8085 assembly language program.
4. Will be able to acquire knowledge on interfacing different peripheral devices with 8085.
5. Ability to understand architecture of 8086 microprocessor
6. Will be able to understand the instruction set of 8086 to develop assembly language programs.

UNIT-I: Architecture of Intel 8085 (12 Hrs)

Overview of microprocessors - Architecture of 8085 microprocessor, ALU-Timing and control unit – registers - Address bus and data bus – Pin configuration – Intel 8085 instructions – opcode and operands – instruction word size - Instruction cycle – Fetch operation – Execute operation - machine cycle and T-state instruction and date flow- timing diagram for opcode fetch cycle – memory read – I/O read – memory write – I/O write

UNIT-II: Instruction Set & Programming Basics of 8085 (12 Hrs)

Instruction and data format -Addressing modes -direct addressing -register addressing -register indirect addressing -immediate addressing -implicit addressing -status flags -symbols and abbreviations -Intel 8085 -data transfer -arithmetic -logic - branching -stack I/O and machine control group. Assembly language -high level language.

Programming exercises -multiplication, division, array manipulation (average in array, ascending, descending, mean, median), BCD to seven segment display.

UNIT-III: Advanced Programming of 8085 (12 Hrs)

Stack and stack related operations – Subroutines - interrupt based programming: hardware and software interrupts – interrupts call location – RST7.5,6.5 and 5.5 -Asynchronous and synchronous data transfer-Delay subroutine : Time delays using single register and register pair-8085 simulator software.

UNIT-IV: Peripheral Interfaces (14 Hrs)

Address space partitioning -Memory and I/O interfacing -PPI 8255 -UART 8251 –8253 Timer -8259 interrupt controller -8237 programmable DMA -8275 programmable CRT controller-8279 keyboard and display interface controller - Applications Stepper motor and traffic controller using 8085 microprocessor.

UNIT-V: Intel 8086 Architecture (10 Hrs)

Intel 8086 architecture - Pin description and function overview - Minimal &maximum mode -Bus activities during read/write operation-Interrupts structure and its operation - Comparative study of 286,386,486 & Pentium processors.

BOOKS FOR STUDY:

1. B. Ram: Fundamentals of microprocessors and microcomputers-DhanpatRai Publications, New Delhi, 5th edition, reprint 2003.
2. Barry B. Brey, "THE INTEL MICROPROCESSORS", 8th Edition, Imprint of PEARSON.2009.

BOOKS FOR REFERENCE:

1. Ramesh S. Gaonkar: Microprocessor Architecture, Programming and Application with the 8085-Penram International Publishing, Mumbai,6th edition,2013
2. V. Vijayendran: Fundamentals of microprocessor-8085- S. Viswanathan publishers, Chennai, 2009.

SECTIONS:

UNIT	BOOK	SECTION
I	1	Chapter – 3
II	1	Chapter – 4,5.1-5.3, Programming exercises- lecture notes
III	1	5.5-5.6, 7.5.1-7.5.3,7.4.1,7.4.2,9.1-9.2
IV	1	7.1-7.3.2, 7.7,7.10,7.11.1,7.9,7.8,7.12,7.12.5,9.7-9.8
V	2	2.1,9.1,9.3-9.6,12.1,16.1,17.1,18.1,19.1

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530208				Title of the Paper: MICROPROCESSOR AND ITS APPLICATION								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	5	2	4	4	4	2	3	1	4	4	2	4	3.4
CO2	5	5	2	4	4	4	4	1	4	1	3	2	4	3.3
CO3	5	5	2	4	4	3	3	1	4	1	3	2	4	3.1
CO4	5	5	2	4	4	4	4	3	4	4	3	2	4	3.7
CO5	5	5	2	4	4	3	2	3	1	4	4	2	4	3.3
CO6	5	5	2	4	4	3	3	2	4	1	3	2	4	3.2
													Mean Overall Score	3.3

Result: The Score for this Course is 3.3 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL530209 **5 - 4**

LINEAR INTEGRATED CIRCUITS

Course Outcomes:

1. Ability to understand different IC fabrication techniques
2. Will be able to acquire knowledge on Op-amp and its characteristics.
3. Ability to understand various applications of Op-amps.
4. Ability to understand functional blocks of IC555
5. Ability to design circuits usingIC555
6. Ability to understand the knowledge on analog to digital converter and digital to analog converter.

UNIT-I: Integrated Circuit Fabrication (10 Hrs)

Introduction - Classification - IC chip size and circuit complexity - Fundamentals of Monolithic IC technology - Development of IC - Package types - Basic planar process - Fabrication of a typical circuit - Active and Passive components for ICs - fabrication of FETs - thin and thick film technology.

UNIT-II: Op-Amp and Its Characteristics (12 Hrs)

Introduction to op-amp - basics of op-amp -circuit symbol - op-amp terminals - linear IC's - ideal op-amp - open loop operation - feedback in ideal op-amp - inverting amplifier - non-inverting amplifier - voltage follower - differential amplifier - CMRR - op-amp internal circuit - difference amplifier - constant current source - input resistance - active load - level translator - output stage. DC characteristics - Input bias current - input offset current - input offset voltage - total offset voltage - thermal drift. Slew rate - analysis of data sheets of an op-amp.

UNIT-III: Op-Amp Applications (12 Hrs)

Basic op-amp applications - scale changer inverter - summing amplifier - inverting summing amplifier - non-inverting summing amplifier -subtractor-adder-subtractor- instrumentation amplifier - AC amplifier - V to I and I to V converter - op-amp circuits using diodes - half-wave rectifier - full-wave rectifier - peak detector - clipper - clamper - sample and hold circuit - Differentiator - integrator. Comparator - zero crossing detector - window detector - phase detector - Schmitt trigger.

UNIT-IV: Waveform Generators and Filters (12 Hrs)

Square Wave generator –monostable multivibrator- triangular wave generator - sine wave generator - phase shift oscillator - Wien's bridge oscillator - Square wave generator -RC filters - first order low pass filter - second order low pass filter - high pass active filter - band pass filter - Band reject filter.

UNIT-V: Timer and D/A, A/D Converters (14 Hrs)

555 Timer: Functional block diagram -Monostable operation - applications in monostable mode - missing pulse detector - linear ramp generator - frequency divider - pulse width modulation -Astable operation - applications in astable mode - FSK generator - pulse-position modulator - 555 timer as Schmitt trigger - PLL - phase detector - voltage controlled oscillator - introduction to digital to analog converters - basic DAC techniques - weighted resistor DAC - R-2R Ladder DAC - inverted R-2R Ladder - Analog to digital converters - flash - counter type - servo tracking A/D converter - Successive approximation converter - Dual slope ADC - DAC and ADC specifications.

BOOK FOR STUDY:

1. Roy D. Choudhury, Shail Jain, "Linear Integrated Circuits", 2002 Reprint, New Age International (P) Limited.

BOOKS FOR REFERENCES:

1. Ramakant A. Gayakwad, "Op-amps and Linear Integrated Circuits", 4th Edition, Prentice Hall India,2003.
2. N. Mathivanan, "PC based instrumentation: concepts and practice", 1st Edition, PHI learning Pvt. Ltd.2007

SECTIONS:

UNIT	BOOK	SECTIONS
I	1	1.1 - 1.9 lecture notes – development of IC and package types
II	1	2.1 - 2.4.6, 3.1 - 3.2.5, 3.3.4 - 3.4
III	1	4.1 - 4.7, 4.10 - 4.11, 5.1 - 5.3
IV	1	5.4 - 5.7, 7.1. - 7.2.2, 7.2.4 - 7.2.6.
V	1	8.1 - 8.5, 9.1 - 9.4, 10.1 - 10.2.3, 10.3 - 10.3.4, 10.3.6, 10.4

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530209					Title of the Paper: LINEAR INTEGRATED CIRCUITS							Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	3	2	4	4	2	3	4	2	4	2	4	3.3
CO2	5	4	3	4	4	4	4	3	4	3	3	2	4	3.6
CO3	5	4	3	3	4	4	4	3	4	3	3	2	4	3.5
CO4	5	4	3	4	4	4	3	3	4	3	3	2	4	3.5
CO5	5	4	3	2	4	4	3	3	4	2	3	2	4	3.3
CO6	5	4	3	4	4	4	4	3	4	2	3	2	4	3.5
												Mean Overall Score		3.5

Result: The Score for this Course is 3.5 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL530210 **6 - 4**

COMMUNICATION SYSTEM

Course Outcomes:

1. Ability to understand the basics of analog communication systems
2. Acquire knowledge on various modulation techniques
3. Acquire knowledge on AM transmitter and receiver functions
4. Ability to understand FM transmitter and receiver functions
5. Ability to understand various types of noise in communication systems
6. Acquire knowledge on PAM and PCM techniques

UNIT-I: Amplitude Modulation (12 Hrs)

Modulation - Types of modulation (AM, FM and PM) - Mathematical expression for AM wave - Side frequencies - Modulation index - power relationship - component phasor of AM signal - spectrum of AM wave. Generation of AM waves - Linear modulation - collector, base and emitter modulation - Square law modulator - Balanced modulator –DSS- SC-SSB - SC generation - VSB. Demodulation of AM waves

UNIT-II: Frequency and Phase Modulation (12 Hrs)

Angle modulation - Phase and frequency modulation - Mathematical representation of FM and PM - Frequency spectrum of FM - Bandwidth of FM: Bessel's identity - Carson's rule - spectrum of Narrow Band and Wide Band FM. Generation of FM - Direct and indirect method - Relationship between FM and PM - Pre-emphasis and de-emphasis in FM. Demodulation of FM waves - Slope detector - Balanced slope detector - Foster - Seeley discriminator - Ratio detector - Amplitude limiter.

UNIT-III: Transmitter and Receivers (12 Hrs)

Communication transceiver- Block schematic study of transmitters - AM transmitter - High level and low level AM transmitters - SSB-SC transmitter - FM transmitter - Direct and indirect FM transmitters. Block schematic study of receivers - Types - TRF receiver- Super heterodyne receiver -Double conversion receiver - Choice of IF frequencies - Tracking -Alignment - AGC - AFC - Characteristics of receivers -

UNIT-IV: Noise (12 Hrs)

Introduction-Classification of noise-Atmospheric noise-Extraterrestrial noise-Man made noise-Thermal noise-Shot noise-Addition of noise due to several sources- Addition of noise due to several amplifiers in cascade- Noise in

reactive circuits-Signal to Noise ratio-Noise figure-Calculation of noise figure-Expression for noise figure in terms of equivalent noise resistance-Noise temperature

UNIT-V: Pulse Modulation (12 Hrs)

Sampling process - PAM - other forms of pulse modulation - Bandwidth - Noise trade off - Quantization - PCM - Noise considerations in PCM systems - TDM - Digital multiplexers - Virtues, limitation and modification of PCM modulation - Linear prediction - Differential pulse code modulation - delta modulation - Adaptive Delta Modulation.

BOOKS FOR STUDY:

1. Kennedy and George Davis, "Electronic Communication Systems", 4th Edition, 1999.
2. Dennis Roddy and John Coolen, "Electronic Communications", 4th Edition, PHI, 1997
3. Simon Hawkins, John Wiley, "Communication systems", 4th Edition, 2001.
4. G.K. Mithal 'Radio engineering, 20th edition kanna publication, 2002.

BOOKS FOR REFERENCE:

1. R.P. Singh and S.D. Sapre, "Communication Systems Analog and Digital", Tata McGraw Hill, 1995.
2. Anokh Singh, "Principles of communication Engineering", S. Chand and Co. Ltd., 1994.
3. Taub and Schilling, "Principles of communication", 2nd Edition, McGraw Hill, 1989.
4. N.D Deshpande, D.A. Deshpande, & P.K. Rangola, "Communication electronics",7th reprint. Tata Mc Graw Hill New Delhi, 1996

SECTIONS:

UNIT	BOOK	SECTIONS
I	2	Chapter 2,4
II	1	Chapter 4
III	1 2	Chapter 5, Chapter 11
IV	4	Chapter 2
V	3	4.1-4.7, 4.10, 4.11

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530210					Title of the Paper: COMMUNICATION SYSTEM								Hours 6	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	2	3	4	4	4	5	2	2	2	4	4	3.4	
CO2	4	4	2	3	4	4	4	5	2	2	2	4	4	3.4	
CO3	4	4	2	3	4	4	4	5	2	2	2	4	4	3.4	
CO4	4	4	2	3	4	4	4	5	2	2	2	4	4	3.4	
CO5	4	4	2	3	4	4	4	5	2	2	2	4	4	3.4	
CO6	4	4	2	3	4	4	4	5	2	2	2	4	4	3.4	
													Mean Overall Score		3.4

Result: The Score for this Course is 3.4 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL530211 **- 6 4**

Electronics Practical-III
OPERATIONAL AMPLIFIER, COMMUNICATION, MICROPROCESSOR & 'C' PROGRAMMING

Course Outcomes

1. To learn the principles of operations and applications of Operational amplifier.
2. Ability to learn the concepts of instrumentation
3. Able to learn the programming in microprocessor

List of experiments:

Any sixteen: Op-amp (6), Microprocessor (5), Communication and 'C' programming (5)

1. Microprocessor 8085- Programming I { Data transfer and rotate operations }
2. Microprocessor 8085- Programming II {addition, subtraction, multiplication and division }
3. Microprocessor 8085- Programming III { Code conversion - Gray to Binary, Binary to BCD Binary to Gray, BCD to Binary }
4. Microprocessor 8085 - Programming IV { largest, smallest, sorting in ascending order and descending order }
5. Microprocessor 8085 - Programming V {Usinguser routines in Monitor program}
6. Microprocessor Interfacing - Input and Output using8255 PPI
7. Microprocessor Interfacing - 8253
8. Microprocessor Interfacing - Traffic Controller.
9. Microprocessor Interfacing - Stepper Motor Controller.
10. Study of AM
11. Study of FM
12. Study of PAM, PWM, PPM and PCM
13. Study of Transmission Line Characteristics
14. Study of BM
15. Fiber optic communication {NA, Losses, receiver sensitivity}
16. Study of op-amp characteristics using LM741
17. Construction and study of inverting, non-inverting, voltage follower, summing amplifier using op-amp LM741

18. Construction and study of comparator, integrator and differentiator using op-amp TL064
19. Construction and study of instrumentation amplifier using op-amp LM358
20. Construction and study of phase shift and wiens bridge oscillator using op-amp LM358
21. Construction and study of filters using op-amp LM358 (Low pass filter, High pass filter and Band pass filter)
22. Construction and study of I to V converter, V to I converter using op-amp LM358.
23. Construction and study of astable and monostablemultivibrator using IC555.
24. Construction and study of 4-bit DAC using R-2R ladder method
25. Construction and study of 4 bit flash type ADC
26. Solving simultaneous equations using op-amp.
27. Study of 555 applications using PSpice {Square wave, saw tooth & VCO}
28. C programming-I (input, output, string and file manipulation)
29. C programming-II (implementation of statistical functions)
30. C programming-III (functions and header file creation)
31. C programming-IV (pointers and structures)

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Semester V **L P C**
17UEL530212A **- - 2**

Self-Paced Learning:
PROGRAMMABLE LOGIC CONTROLLER

Course Outcomes:

1. Ability to understand the concepts of PLC
2. Ability to understand PLC wiring
3. Acquire knowledge on PLC ladder logic programming
4. Ability to write Ladder Logic programming for interfacing sensors
5. Acquire knowledge on simulation environments of PLC
6. Ability to understand the various applications of PLC systems

UNIT-I: Overview of PLC

Introduction to PLC - PLC Vs Microcontroller - Basic Componentsand their Symbols - Control Transformers - Fuses - Switches - Relays -Time Delay Relays

UNIT-II: Programmable Logic Controller & Fundamental Programming

PLC Configurations - System Block Diagram - Physical Components Vs Program components -Internal Relays -Basics of PLC Programming-Developing Fundamental PLC Wiring Diagramsand Ladder Programs

UNIT-III: Advanced Programming Techniques

Ladder Program execution Sequence - Counters -industrialexamples- Timers - Master control Relays and control Zones - AND LadderRung- Entering Normally Closed Contacts - OR Ladder Rung

UNIT-IV: Analog I/O & Sensors

Analog (A/D) inputs - Analog (D/A) output - Sensor Output classification-Connecting Discrete sensors to PLC inputs –Proximitysensors- Optical Proximity Sensors.

UNIT-V: Working In Omron & Keyence Ide with Ladder Logic

Introduction to OMRON & KEYENCE - Creating a project – LadderProgramming- Compiling and Executing - Ladder Programs - Logic Gatefunctions (AND, OR, NOT, NAND, NOR, XOR) - Using Timers (ON delaytimer, OFF delay timer, one shot pulse, flashing pulse).

BOOKS FOR REFERENCE

1. John R. Hackworth, Frederick D. Hackworth, Jr., "Programmable Logic Controllers, Programming Methods and Applications", NewDelhi: Pearson Education, 3rd edition, 2008.
2. John. W .Webb, Renaldo A. Rein, "Programmable Logic Controller Principles and Application", Prentice Hall India, 5th Edition, 2003.
3. Frankpetruzella, "Programmable Logic Controllers", Tata McGraw Hill, 2nd edition, 1997.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530212A					Title of the Paper: Self-Paced Learning: PROGRAMMABLE LOGIC CONTROLLER								Hours -	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	5	2	3	4	4	3	4	4	3	4	3	4		3.7
CO2	4	5	2	3	4	4	3	4	4	3	4	3	4		3.7
CO3	4	5	2	3	4	4	3	4	4	3	4	3	4		3.7
CO4	4	5	2	3	4	4	3	4	4	3	4	3	4		3.7
CO5	4	5	2	3	4	4	3	4	4	3	4	3	4		3.7
CO6	4	5	2	3	4	4	3	4	4	3	4	3	4		3.7
											Mean Overall Score				3.7

Result: The Score for this Course is 3.7 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL530212B **- - 2**

Self-Paced Learning:
AUDIO ELECTRONICS

Course Outcomes:

1. Ability to understand the principles of sound
2. Will be able to acquire the knowledge on principles of acoustics
3. Ability to integrate audio equipment handling and maintenance skills
4. Ability to understand various service techniques in audioequipment repair
5. Ability to acquire the knowledge on PA audio system maintenance
6. Will be able to integrate testing and troubleshooting skills on audio systems

UNIT-I: Principles of Sound

Components of sound: pitch, intensity, tones and harmonics- propagation of sound- speed of sound in air -perception of sound- human hearing capability -Voice Frequency - measurement techniques of sound

UNIT-II: Acoustics and Auditorium

Fundamental of Acoustics- acoustic sub disciplines: speech, music, architecturalplan of room- specification- analyzing acoustic level of room- hydrography(echo sounding)- echo Cancellation techniques- selection: microphones, amplifiers, speakers -positioning the speakers- Sound System Installation -Electrification : power stabilization, earthing , Cooling - Multi Amplifier System Arrangement. Safety and precautions.

UNIT-III: Microphone

Basic Principle of Sound transducer -Internal and External Structure of microphone - Types of microphone–microphone polar patterns- impedance matching -Microphone Specification: frequency response, gain, noise and distortion- application specific design.

UNIT-IV: Speaker

Internal Structure of speaker- Specification of Speaker: impedance, power, frequency response, gain, noise and distortion - types of speaker -Speaker box design and types -line matching transformer- losses and noises in speaker systems- Handling of Speakers.

UNIT-V: Amplifiers

Pre amplifier, pre amplifier cum mixer -power amplifier –Specification of Amplifier- Impedance matching -power rating -output load management- simple Public Addressing system (PA) - PA system connecting Methodology - Home Theatre amplifiers

BOOKS FOR REFERENCES

1. John Linsleyhood, “Audio Electronics”, Newnes Publishers, 2nd ed., 1995.
2. Bob Cordell, “Designing Audio Power Amplifiers” McGraw Hill Professional, 2010.
3. Sontheimer, R., “Designing audio circuits”, Elektor International Media, 1998.

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530212B					Title of the Paper: Self-Paced Learning: AUDIO ELECTRONICS								Hours -	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	3	3	3	4	5	3	3	4	3	3	4	4		3.7
CO2	4	3	3	3	4	5	3	3	4	3	3	4	4		3.7
CO3	4	3	3	3	4	5	3	3	4	3	3	4	4		3.7
CO4	4	3	3	3	4	5	3	3	4	3	3	4	4		3.7
CO5	4	3	3	3	4	5	3	3	4	3	3	4	4		3.7
CO6	4	3	3	3	4	5	3	3	4	3	3	4	4		3.7
													Mean Overall Score		3.7

Result: The Score for this Course is 3.7 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL530302A **4 - 4**

Core Elective-A: PROGRAMMING IN 'C' LANGUAGE

Course Outcomes:

1. Acquire knowledge on variables and data types in C programming
2. Acquire knowledge on control statements for efficient programming
3. Ability to Create user defined functions for various applications
4. Ability to implement strings and pointers
5. Ability to write embedded c programs for novel applications
6. Ability to differentiate c and embedded c

UNIT-I: Overview of C (10 Hrs)

Introduction to C - Basic Structure of C Language - Elements of C Language: C Character Set - Constants - keyword and Identifiers - Variables - Data types - Declaration of variable - operators and Expressions: arithmetic operators - relational operators - logical operators - assignment and conditional operators - data type conversion and mixed mode operations.

UNIT-II: Control Statements (8 Hrs)

Managing Input and Output operations: GETC, PUTC, SCANF, PRINTF-assignment statements - Illustrations. Control statements: IF, IF ELSE, ELSE.IF, SWITCH, GOTO Statement - FOR, WHILE, DO WHILE Statements - programs.

UNIT-III: Functions and Arrays (10 Hrs)

C Functions: Library functions - user defined functions - advantage of the functions - arguments - function declaration - recursive functions - storage class specifies - scope of the variables. ARRAYS: Introduction - one-dimensional arrays - two-dimensional arrays - Initialization -Multi-dimensional arrays

UNIT-IV: Strings and Pointers (10 Hrs)

Strings: Introduction - Declaring, Initializing - Functions: strcat(), strcmp(), strcpy(), strlen() - Table of Strings. POINTERS: Introduction - declaring a pointer variable - address operator - pointer arithmetic - pointers as function parameters - passing parameters by reference - pointers and arrays - dynamic storage allocation.Structures -declaration -example program.

UNIT-V: Embedded C Programming **(10 Hrs)**

Introduction to C Programming for Embedded Systems -Template for Embedded C Program -C Directives -Example -Programming Time Delays - Indefinite Loops -Variables in Embedded C-Example - C Functions-Example - Other Loops in C - Example -Making Decisions in the Program - Operator - Example -Logical and Bit-wise Operations Arrays

BOOKS FOR STUDY:

1. Balagurusamy. E "Programming in ANSI C", Tata McGraw-Hill Publishing Company ltd, 2008.
2. Material prepared by the department

BOOKS FOR REFERENCE:

1. Yashvant kanetkar, "Let us C", Third edition,1999, BPB publication.
2. Denies Ritche Ansi, 1990, C programming language, 1990.
3. Brian Kernighan and Denies Ritche, "C programming language, 1990.

SECTIONS

UNIT	BOOK	SECTIONS
I	1	1.1-1.10, 2.2-2.8,3.1-3.7,3.14
II	1	4.2-4.5, 5.1-5.5,5.7,5.9,chapter 6
III	1	9.1-9.5,9.16,9.19,7.1-7.7
IV	1	Chapter – 8, 11.1-11.6,10.1-11.16
V	2	Lecture notes

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530302A	Title of the Paper: Core Elective: PROGRAMMING IN 'C' LANGUAGE											Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	3	3	5	4	4	4	2	1	3	4	5	3.6
CO2	5	4	3	3	5	4	4	4	3	1	3	4	5	3.7
CO3	5	4	3	3	5	4	3	4	4	1	3	4	5	3.7
CO4	5	4	3	3	5	4	3	4	4	1	3	4	5	3.7
CO5	5	4	3	3	5	4	4	4	4	1	3	4	5	3.8
CO6	5	4	3	3	5	4	4	4	4	1	3	4	5	3.8
													Mean Overall Score	3.7

Result: The Score for this Course is 3.7 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V	L	P	C
17UEL530302B	4	-	4

Core Elective-B:
COMPUTER HARDWARE AND NETWORKS

Course Outcomes:

1. Ability to understand fundamentals of computer hardware
2. Acquire knowledge on installation of Operating System
3. Ability to understand the interfacing of various hardware components
4. Ability to understand Networking and its Connections
5. Ability to understand troubleshooting techniques used in computer service
6. Acquire knowledge on add-on card and its driver installation

UNIT-I: Basic Computer Hardware (8 Hrs)

Introduction - Basic Input/output System -CPUs - motherboards - BIOS - Memory systems- Bus structures- Expansion cards- Ports -connectors and cables- Data storage devices- Video and multimedia input/output devices- Printers and scanners - Display devices

UNIT-II: Assembling and installation (10 Hrs)

Portable computers and devices - Operating systems –software - Electricity and power systems - Monitoring and management –Security and Safety - Assembling and disassembling - Troubleshooting and maintaining a PC

UNIT-III: Computer Networks (10 Hrs)

Basic networking concepts - Physical and logical topologies, Bus, Star, Ring and Mesh topologies Network topologies: - types of network: LAN, WAN, MAN, PAN, CAN. - Networking Model - The OSI model - TCP/ IP Model - Network adapters. - Protocols. - Network Switching Technologies.

UNIT-IV: Internet communication (10 Hrs)

Internet –Intranet- Types of Internet connections: - Dialup, Broadband, Leased Line- Wi-Fi- Wi-Max- 2G, 3G, 4G, WWW, E-mails, Search Engines, Social Networking. - Cloud application. - Audio-video Conferencing. - Voice over Internet Protocol (VOIP) -Recovery and backup -. Essential security measures

UNIT-V: Network Hardware and Components (10 Hrs)

Concept of Server- client, node, segment, backbone, host etc. Analog and Digital transmission, Network Interface Card, Crimping tools and Color

standards for Straight crimping and Cross crimping Functions of NIC, Repeaters, Hub, Switches, Routers, Bridges- Transmission Media and Topologies - Media types: STP cable, UTP cable, Coaxial cable, Fiber cable, Base band and Broadband transmission, Cables and Connectors-Cabling and troubleshooting.

BOOKS FOR STUDY:

1. Upgrading and Repairing PCs: 19th Edition By Mueller Scott, 2009.
2. Computer networks, Andrew S. Tanenbaum, David J. Wetherall, 5th edition, 2011.
3. "A+ Guide to Hardware, Managing, Maintaining and Troubleshooting", Jean Andrews 6th Edition, 2002.

BOOKS FOR REFERENCE:

1. Troubleshooting of Electronic Devices By Nipun Sharma, Firewall Media Publications, New Delhi, 2009.
2. Computer Monitor CRT/LCD & TFT Service Manual By S. K. Gupta, GT Publication, Jaipur, 2009.
3. Troubleshooting of Electronic Devices By Nipun Sharma, Firewall Media Publications, New Delhi, 2009.

SECTIONS:

UNIT	BOOK	SECTIONS
I	1	1- 15
II	1	Chapter 4.1
III	2	1.2 - 1.5
IV	2	3.1 - 3.15
V	3	CHAPTER 1

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL530302B			Core Elective: COMPUTER HARDWARE AND NETWORKS								Hours 4	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	3	2	3	4	4	3	4	4	2	5	4	4	3.6
CO2	5	3	2	3	4	3	4	4	4	2	5	4	4	3.6
CO3	5	3	2	3	4	3	4	4	4	2	5	4	4	3.6
CO4	5	3	2	3	4	4	4	4	4	2	5	4	4	3.6
CO5	5	3	2	3	4	5	3	4	4	2	5	4	4	3.6
CO6	5	3	2	3	4	4	3	4	4	2	5	4	4	3.6
												Mean Overall Score		3.6

Result: The Score for this Course is 3.6 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17UEL540601 **2 - 2**

Skill-Based Elective-I:

ENTREPRENEURIAL ELECTRONICS

Course Outcomes:

1. Will be able to acquire the knowledge on basic electrical technology
2. Will be able to acquire the knowledge on working principle of measuring instruments
3. Will be able to acquire the knowledge on active components and their classification
4. Ability to understand testing procedures of active components
5. Will be able to acquire the knowledge on Soldering techniques for troubleshooting
6. Will be able to acquire the knowledge hobby circuit and de-soldering techniques for troubleshooting

UNIT-I:

Introduction to Electrical Technology **(5 Hrs)**

Introduction to Electricity–Alternating Current Based System -Single Phase -3 Phases -Dc Signal -Dc Source -Fundamentals-Voltage, Current and Power-Power Factor–Passive Components.

UNIT-II:

Measuring Instruments **(5 Hrs)**

Introduction to Multimeter – Analog Multimeter –Digital Multimeter - Voltage Measurement – Current Measurement – Resistance Measurement - Cathode Ray Oscilloscope –Frequency Calculation - Function Generator – Calibration.

UNIT-III:

Active Components **(5 Hrs)**

Diode - Half Wave Rectifier - Switching Circuits - Transistor - NPN testing – PNP testing - Transistor Amplifier – Oscillator – Metal Oxide Semiconductor Field Effect Transistor – Introduction - MOSFET Types – Testing MOSFET - Switching Circuits Based On MOSFET.

UNIT-IV:

Servicing and Trouble Shooting **(5 Hrs)**

Soldering And De-Soldering Techniques – Pretreatment - Precaution During

Soldering And Desoldering - DC Power Supply Design -Single – Dual-Variable Voltage - Printed Circuit Board - Layout Drawing.

UNIT-V:

Hobby Circuits **(4 Hrs)**

Circuit Design Basics – Amplifier Circuits – Applications - Oscillator Circuits -Automated Switching Circuits – Relay Based Circuits – Opto-Coupler Based Circuits -Timer/Counter Based Circuits.

BOOKS FOR STUDY:

Material prepared by the department.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester V	Course Code 17UEL540601					Title of the Paper: ENTREPRENEURIAL ELECTRONICS								Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
CO2	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
CO3	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
CO4	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
CO5	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
CO6	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
CO7	5	3	2	3	4	3	4	4	3	3	4	5	4		3.6
											Mean Overall Score				3.6

Result: The Score for this Course is 3.6 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester V **L P C**
17USS540701A **2 - 2**

Inter Departmental Courses (IDC):
SOFT SKILLS

Course Outcomes

1. To augment the level of confidence in articulation oif the students in their communication.
2. To ensure that the students learn to speak and interact with one another as social beings
3. To equip them and train to present the best of themselves as job seekers.
4. To equip with conversation techniques, presentation skills and grooming
5. To prepare them write their own resume and enhance their interview skills required by employers
6. To ensure that the students learn the parameters of group dynamics a key component of conversation

Module I

Basics of Communication: Definition of communication, Barriers of Communication, Grooming, Presentations & Practicum.

Module II

Resume Writing & Interview Skills: Resume Writing: What is resume? Types of Resume - Chronological, Functional and Mixed Resume**,** Steps in preparation of Resume. **Interview Skills:** Preparation

Module III

Group Discussion: Basics of Group Discussion, Parameters of GD, Essential Points for GD preparation, and GD Topics and Practicum.

Module IV

Personal Effectiveness: Self Discovery; and Goal Setting; Questioneers & Presentations for interview, Common interview questions, Attitude, Body Language, The mock interviews and Practicum

Module V

Numerical Ability: Calendar, Average, Percentage; Profit and Loss**,** Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance**,** Problems on Trains**,** Boats and Streams; Ratios and Proportions.

Module VI

Test of Reasoning - Verbal Reasoning: Series Completion, Analogy; Data Sufficiency, Assertion and Reasoning; and Logical Deduction. **Non-Verbal Reasoning:** Series; and Classification

Textbook

1. JASS, 2016. *Straight from the traits: Securing the soft skills*. St.Joseph's College, Trichy

References

1. Aggarwal, R.S. 2010. *A Modern Approach to Verbal and Non Verbal Reasoning*. S.Chand, New Delhi.
2. Aggarwal, R.S. 2001. Quantitative Aptitude. S.Chand. New Delhi
3. Covey, Stephen. 2004. *7 Habits of Highly effective people,* Free Press. Egan, Gerard. (1994). *The Skilled Helper* (5th Ed). Pacific Grove, Brooks/ Cole.
4. Khera ,Shiv 2003. *You Can Win.* Macmillan Books , Revised Edition.
5. Murphy, Raymond. 1998. *Essential English Grammar*. 2nd ed., Cambridge University Press. Sankaran, K., & Kumar, M. *Group Discussion and Public Speaking*. M.I. Pub, Agra, 5th ed., Adams, Media.
6. Trishna's 2006. *How to do well in GDs & Interviews*, Trishna Knowledge Systems.
7. Yate, Martin. 2005. H*iring the Best: A Manager's Guide to Effective Interviewing and Recruiting*.

Evaluation Pattern

Modules	Topic	Examination Pattern	
		CIA	Online
I	Basics of Communication	15	5
II	Resume Writing & Interview Skills	15	5
III	Group Discussion	10	10
IV	Personal Effectiveness	10	10
V	Numerical Ability (Common Session)	-	10
VI	Test of Reasoning (Common Session)	-	10
	Total	**50**	**50**

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Semester V **Hours/Week: 2**
17USS540701B **Credits: 2**

Inter Departmental Courses (IDC):
NATIONAL CADET CORPS

Course Outcomes

1. NCC 'C' and 'B" certificates are very much useful and increase credit marks in UPSC and SSB examinations..
2. They learnt discipline punctual and leadership quality.
3. They got physical fitness for Army and Police selection.
4. They learnt general knowledge find political issue.
5. They got trained for social service and volunteers for disaster.
6. They will be the best citizens of India.

Unit-I: About NCC - Personality Developmet - Self Awareness (6 hours)

NCC Aims and objectives of NCC - Organization and training and NCC song Incentives for cadets in NCC - NCC ranks Religion, culture , traditions and customs of India.- National integration – importance and necessity - Freedom struggle and nationalist movement in India - Personality development - Introduction to personality development - Factors influencing / shaping personality – Physical , social, psychological and philosophical Self awareness – know yourself / insight . - Change your mindset.

Unit-II: Interpersonal Relationship and Communication - NDMA (6 hours)

Interpersonal relationship and communication - Communication skills Leadership traits - Types of leadership Attitude – assertiveness and negotiation - Time management - Effects of leadership with historical examples - Stress management skills - Interview skills - Conflict motives.- Importance of group – team work - Disaster Management - Civil defence organization and its duties – NDMA Types of emergencies / natural disasters- Assistance during natural / other calamities / floods / cyclone / earth quake / accident - Setting up of relief camp during disaster Management - Collection and distribution of aid material .

Unit-III: Social Awareness and Community Development - Hygiene and Sanitation (6 hours)

Social awareness and community development - Basics of social service-weaker sections of our society and their needs - Health and Hygiene Structure and functioning of the human body - Hygiene and sanitation- Physical and mental health - Infectious and contagious diseases and its prevention -

Basic of home nursing and first aid in common medical emergencies - Wounds and fractures - Introduction to yoga and exercises

Unit-IV: AIR-WING (6 hours)

Principles of flight – Elementary Mechanics – Atmosphere - Venturi effect and Bernauli's theorem - Glossary of terms; Aero engines – Aero-engine components; Aircraft components – Airframe structure; Metereology – Importance of Metereology in Aviation; Air Navigation – Why a pilot should study Navigation; Airmanship – Airmanship; Aeromodelling – History of Aeromodelling – Materials used in Aeromodelling – Types of Aeromodels.

Unit-V: NAVAL (6 hours)

Naval orientation - history of Indian Navy – Navy head quarters commands fleets- ships shore establishment war ships and their role - induction to Anti submarine warfare.- Types of war ships - types anchor parts of anchor - GPS RACON RADAR - types of firewater making in the ships- NBCD organization and structure - Damage flooding.

Text Book

1. Cadet's hand book published by the Directorate General, National Cadet Corps, Ministry of Defence, R. K. Puram, New Delhi 110022, 2008.

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Semester VI **L P C**
17UEL630213 **5 - 4**

MICROCONTROLLER AND ITS APPLICATIONS

Course Outcomes:

1. Will be able to acquire the knowledge on architecture of 8051 microcontroller
2. Ability to understand the instruction set and addressing modes 8051 microcontroller
3. Ability to write assembly and C language programs for 8051 microcontroller
4. Will be able to acquire knowledge on on-chip peripherals of 8051
5. Ability to interface external sensors and devices with 8051 for various applications
6. Will be able to acquire knowledge on RTX51 and its application

UNIT-I: Introduction to 8051 Microcontroller (10 Hrs)

Introduction to Microcontroller - Comparison of Microcontrollers and Microprocessor - overview of 8051- Pin description of 8051 - Registers - Program counters - ROM & RAM space - Data types and directive - Stack and PSW - SFR.

UNIT-II: 8051 Assembly Language (10 Hrs)

Programming 8051 addressing modes: Immediate - Register - Direct - Indirect - Instruction set: Arithmetic and logical operations - Call and jump instructions - Bit manipulation instructions -Simple assembly language programs..

UNIT-III: On-Chip Peripherals of 8051 (15 Hrs)

Counters/Timers - Counter programming - Basics of serial communication - RS232 and MAX 232 IC connection - Serial communication registers - Serial communication programming - Interrupts - Interrupts registers - Internal and external interrupts programming.(only ASM programming for all the topics)

UNIT-IV: Applications of Microcontroller (15 Hrs)

Interfacing: Matrix keyboard - LCD - ADC - DAC - Temperature monitoring system -DC motor interfacing and PWM - Stepper motor. (Only embedded C programming).

UNIT-V: Introduction to RTOS (10 Hrs)

Introduction to OS and RTOS - RTX-51 Real-Time Operating System, Single Task Program, Round-Robin Task Switching, os_wait Function, Wait for Timeout, Wait for Signal, Pre-emptive Task Switching, TRAFFIC: RTX-51 Tiny Example Program, Traffic Light Controller Commands, Software, TRAFFIC Project.

BOOKS FOR STUDY:

1. Muhammad Ali Mazidi, J.G. Mazidi and R.D. McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd edition, Pearson education, 2006.
2. Material prepared by the department (Keil RTX51 user guide)

BOOKS FOR REFERENCE:

1. J. S. Parab, V.G. Shelake, R.K. Kamat and G.M. Naik ,"Exploring C for Microcontrollers A hands on approach",1st edition, Springer, 2007.
2. Kai Qian, David Den Haring, Li Cao, "Embedded Software Development with C", 1st edition, Springer, 2009

SECTIONS:

UNIT	BOOK	SECTIONS
1	1	1.1 – 1.2, 8.1, 2.1 – 2.7
2	1	5.1 – 5.4, 3.1 – 3.2, 4.1 – 4.2
3	1	9.1 – 9.2, 10.1 – 10.3, 11.1 – 11.5,
4	1	12.1 – 12.2, 13.1 – 13.3, 17.2 – 17.3
5	2	Material prepared by the department (Keil RTX51 user guide)

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UEL630213				Title of the Paper: MICROCONTROLLER AND ITS APPLICATION								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	2	2	5	5	3	4	3	3	4	5	4	3.8
CO2	5	4	2	3	5	5	3	4	3	5	4	5	4	4.0
CO3	5	4	2	2	5	5	3	4	3	5	4	5	4	3.9
CO4	5	4	2	2	5	4	3	4	4	4	4	5	4	3.8
CO5	5	4	2	2	5	4	4	4	4	3	4	5	4	3.8
CO6	5	4	2	3	5	4	4	4	4	4	4	5	4	4.0
											Mean Overall Score			3.8

Result: The Score for this Course is 3.8 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **L P C**
17UEL630214 **5 - 4**

POWER ELECTRONICS

Course Outcomes:

1. Ability to understand the basics of power electronics
2. Will be able to acquire knowledge on line commutated rectifiers and converters
3. Will be able to acquire knowledge on AC and DC regulators
4. Ability to understand chopper circuits
5. Ability to understand inverter circuits
6. Will be able to acquire knowledge on applications of power electronic devices

UNIT-I:

Basics Concepts of Power Electronics and Semiconductor Power Switches and Characteristics **(10 hrs)**

Conversion of electrical energy: Classification of converters- Output parameters and characteristics of converters-Influence of converters on the grid-Basic converter parameters-AC and DC filters- Dynamic processes in filters. Power diode-Power bipolar transistors.

Thyristor: Controllable Semiconductor switches with p-n-p-n structures. Gate commutated thyristors (GCTs, ETOs, MTOs)

UNIT-II:

Line Commutated Rectifiers and Converters **(15 hrs)**

The rectification principle -Circuit with active load-Circuit with resistive-inductive load-Counter-EMF load-Single-phase bridge circuit -Three phase bridge circuit. Characteristics of Rectifiers: Output voltage ripple-Distortion of the input current-The commutation of the thyristors-External rectifier characteristic-Energy characteristics of rectifiers Grid-tie inverters. Direct frequency converters -Thyristor-based ac-ac converters- Reducing of the output-voltage distortion.

UNIT-III:

AC and DC Regulators **(10 hrs)**

Ac voltage regulators based on thyristors-Single-phase ac voltage regulators-Operation with active load-Operation with resistive-inductive load-Operation with inductive load-Three-phase ac voltage regulators. Dc voltage regulators-

Step-down dc/dc converter-Step-up dc/dc converter-Inverting regulator-The Cuk converter

UNIT-IV:

Choppers and Inverters (15 hrs)

Choppers: Principle of chopper operations - Control strategies-step up and step down choppers - quadrant operation. Voltage Inverters - Single-phase voltage inverters - Pulse-width control in single-phase voltage inverters - Three-phase voltage inverters. Current inverters - Transistor current inverters - Pulse-width control in current inverters - Current inverters based on single -throw thyristors. PWM techniques in inverters-Single-phase full-bridge voltage source inverter -Three-phase voltage source inverter. Current Source inverters.

UNIT-V:

Applications of Power Electronics (10 hrs)

Improving of the efficiency of power supply-Control of power transmission and power quality- Control of AC power flows - Reactive-Power compensation - Phase shifters - Power transmission and dc links - Power quality control - Electric drives Control of dc machines - Control of induction motors - Scalar control- Vector control - Control of synchronous machines - Control of synchronous motors with adjustable excitation - Control of switched motors, SMPS,UPS-Static switches-Static circuit breakers - Solid state relays.

BOOKS FOR STUDY:

1. Yuriy Rozanov, Sergey Ryvkin Evgeny Chaplygin, Pavel Voronin, "Power electronics basics-operating principles, design, formulas and applications". CRC Press, 1st Edition, 2016.
2. Dr.P.S.Bimbhra "Power Electronics", Khanna publishers, 4th edition, 2006.

BOOKS FOR REFERENCE:

1. Rashid, MH "Power Electronics Handbook" Butterworth-Heinemann Publications 2011.
2. MD Singh "Power Electronics" Tata McGraw Hill, New Delhi, 2004.
3. Power Electronics by PC Sen, Tata McGraw-Hill Publication company Ltd., New Delhi 30th reprint 2008.

SECTIONS:

UNIT	BOOK	SECTIONS
I	1	1.1-1.5,2.2-2.2.3,2.7,2.7.1,2.4,2.4.1,2.5.2.
II	1	4.2-4.2.1.3,4.2.2.2,4.2.2.4,4.2.3-4.2.3.2,4.3.1,4.4-4.4.2.
III	1	4.5-4.5.2,5.2-5.2.4
IV	2	7.1-7.4.5
	1	6.1-6.1.3,6.2-6.2.3,7.2.1-7.2.2
V	1	10.1-10.1.1.5,10.2-10.2.3.2
	2	11.1,11.2,11.4,11.6

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UEL630214					Title of the Paper: POWER ELECTRONICS								Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	2	3	4	2	2	2	4	3	4	4	4	3.3	
CO2	5	4	3	3	4	3	3	3	4	4	4	5	4	3.8	
CO3	5	4	3	3	4	4	3	3	4	3	4	5	4	3.8	
CO4	5	4	2	3	4	3	3	3	4	4	4	5	4	3.8	
CO5	5	4	2	3	4	3	3	3	4	4	4	5	4	3.8	
CO6	5	4	3	2	4	3	2	2	4	4	4	4	4	3.5	
													Mean Overall Score	3.6	

Result: The Score for this Course is 3.6 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **L P C**
17UEL630215 **5 - 3**

SENSOR TECHNOLOGY

Course Outcomes:

1. Will be able to acquire knowledge on basics and fundamentals of sensors classification
2. Will be able to acquire knowledge on principles of resistive, capacitive and inductive type sensors
3. Ability to understand sensors role in flow, level and pressure measurement systems
4. Will be able to acquire knowledge on principles of optical sensors
5. Will be able to acquire knowledge on bio-receptors and biosensors design
6. Ability to understand various sensors used in different applications

UNIT-I: Sensor Fundamentals **(12 hrs)**

Basic Sensor Technology, Sensor Systems, Sensor Characteristics, System Characteristics, Instrument Selection, Data Acquisition and Readout, Installation, Sensor Signal Conditioning: Conditioning Bridge Circuits, Amplifiers for Signal Conditioning, Analog to Digital Converters for Signal Conditioning, Signal Conditioning High Impedance Sensors.

UNIT-II: Force, Weight Sensors and Temperature Sensors **(12 hrs)**

Introduction, Quartz Sensors, Strain Gauge Sensors: Strain-Gauge Based Measurements, Strain Gauge Sensor Installations, Sensor Types and Technologies, Introduction to temperature sensor, types and technologies, applications of temperature Sensors.

UNIT-III: Capacitive and Inductive Displacement Sensors **(12 hrs)**

Introduction, Capacitive Sensors, Inductive Sensors, Capacitive and Inductive Sensor Types, Selecting and Specifying Capacitive and Inductive Sensors, Comparing Capacitive and Inductive Sensors, Applications, Latest Developments.

UNIT-IV: Flow, Level and Pressure Sensors **(12 hrs)**

Introduction to Flow sensors, Selecting Flow Sensors, Installation and Maintenance, Recent Advances in Flow Sensors, Level Sensors, Piezoresistive Pressure Sensing, Piezoelectric Pressure Sensors, applications.

UNIT-V: Optical, Position and Biosensors **(12 hrs)**

Photosensors, Contact and Non-contact Position Sensors, Linear and Rotary Position and Motion Sensors, Biosensors: Overview of Biosensor,

Applications of Biosensors, Origin of Biosensors, Bioreceptor Molecules, Transduction Mechanisms in Biosensors, Application Range of Biosensors.

BOOKS FOR STUDY:

1. Jon S. Wilson, "Sensor Technology Handbook", Newnes is an imprint of Elsevier, Elsevier Inc, 2005.

BOOKS FOR REFERENCE:

1. Jacob Fraden, "Handbook of Modern sensors - Physics, Designs and applications", 3rd Edition, Springer, 2004.
2. A. K. Sawhney, "Electrical and Electronics Measurements and Instrumentation", DhanpatRai and company, 2001.
3. H.S. Kalsi, "Electronics Instrumentation", 2nd Edition,TMH, 2004.
4. Dr. M. Arumugam, "Biomedical Instrumentation", 2nd Edition, Anuradha Publications, 1994.
5. D.Patrabnabis, "Principles of Industrial Instrumentation", 2nd Edition, Tata McGraw-Hill, 2000.

SECTIONS

UNIT	BOOK	SECTIONS
1	1	1.1, 2.1, 4.1, 4.2,4.3,4.4
2	1	11.1-11.3,19.1-19.3, 20.1,20.2
3	1	8.1-8.9
4	1	10.1- 10.6, 16.1, 16.2
5	1	14.1, 15.1-15.3,6.1-6.6

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UEL630215					Title of the Paper: SENSOR TECHNOLOGY							Hours 5	Credits 4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	2	3	4	3	3	4	3	2	5	3	4	3.5
CO2	5	4	2	3	4	3	3	4	3	2	5	3	4	3.5
CO3	5	4	2	3	4	3	3	4	3	2	5	3	4	3.5
CO4	5	4	2	3	4	3	3	4	3	2	5	3	4	3.5
CO5	5	4	2	3	4	3	3	4	3	2	5	3	4	3.5
CO6	5	4	2	3	4	3	3	4	3	2	5	3	4	3.5
												Mean Overall Score		3.5

Result: The Score for this Course is 3.5 (Moderate Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI	L	P	C
17UEL630216	-	6	4

Electronics Practical - IV

MICROCONTROLLERS, POWER ELECTRONICS AND SENSOR TECHNOLOGY

Course Outcomes:

1. Will be able to acquire knowledge on principles of optical sensors
2. Will be able to acquire knowledge on bio-receptors and biosensors design
3. Ability to understand various sensors used in different applications

List of experiments

Any sixteen - Microcontroller (8), Power electronics (4), Sensors(4)

1. Writing C program for 8051 and to study its equivalent disassembly codes in ASM using Keil software.
2. Microcontroller program I {Data transfer}
3. Microcontroller program II {Arithmetic and Logical}
4. Microcontroller program III {Code conversion}
5. Interfacing microcontroller with LED {blinking LED, Bi-colour & RGB}
6. Interfacing matrix keypad with a microcontroller.
7. Study of Timers in 8051 microcontroller.
8. Study of Counters in 8051 microcontroller.
9. Study of interrupts in 8051 microcontroller.
10. Study of serial communication in 8051 microcontroller.
11. Interfacing ADC with 8051 microcontroller.
12. Interfacing LCD with 8051 microcontroller.
13. Interfacing GSM with 8051 microcontroller
14. Interfacing printer with 8051 microcontroller.
15. Frequency measurement using 8051.
16. Full Wave Control of rectifier output using SCR, TRIAC and UJT
17. Construction and study of step up and step down choppers
18. PWM based motor speed control using IGBT.
19. Construction and study of voltage fed inverters using IGBT/SCR.
20. Construction and study of static circuit breakers.
21. Study of Sensors - I {Temperature – LM35, RTD, Thermocouple)

22. Study of Sensors - II {LVDT, Hall Effect, Strain Gauge, Flow and Level}.
23. Study of Sensors – III { opto triac, opto SCR, opto coupler}
24. Study of DC motor control using PWM with 8051 microcontroller (L293 motor driver)
25. Interfacing stepper motor with 8051 microcontroller
26. Interfacing LED dot matrix display with 8051 microcontroller
27. Interfacing seven segment display with 8051 microcontroller
28. Study of charge controller for solar panel
29. DHT11 sensor interfacing with 8051 microcontroller (temperature and humidity sensor)
30. Ultrasonic sensor interfacing with 8051 microcontroller
31. RTC interfacing with 8051 microcontroller
32. Interfacing Relay with 8051 microcontroller

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Semester VI	L	P	C
17UEL630217	-	-	2

COMPREHENSIVE EXAMINATION

Course Outcomes:

1. Ability to understand and recollect the knowledge on Electric circuit, digital electronics, control system and communication systems concepts.

UNIT-I: Electric circuit theory

DC circuit analysis- KCL- KVL - Series and parallel circuits - Network theorem - Thevenin – Norton – Superposition - Reciprocity - Sinusoidal analysis – Terminologies - RLC series and parallel circuits-Different kinds of power - Transient analysis - RL-RC and RLC-Network topology - Tie set and cut set.

UNIT-II: Electronic Devices

Diodes-PN junction - Zener diode - Varactor diode-Tunnel - Schottky diode-PIN diode-Transistor configurations - a- b- g relationship-FET characteristics and amplifier- MOSFET-types-MOSFET Switches- UJT- characteristics - standoff ratio- SCR- TRIAC – DIAC - IGBT-LED - LCD.

UNIT-III: Digital electronics

Number system-Decimal – Octal – hexadecimal-Conversion-Logic gates-minimization technique-K-Map- Combinational circuits-Adder-Subtractor-Encoder-Decoder-Sequential circuits-Latch-Flipflop-up/down counter-synchronous counter-Asynchronous counter-Shift register.Memory devices-RAM-ROM-PROM-EEPROM

UNIT-IV: Microprocessors and Microcontroller

Microprocessor 8085-Architecture-Instruction set-AsSem-bly level programming-Interfacing Peripheral IC's-8251-8253-8259-8237-8279-Microcontroller 8051-Architecture-Instruction set-Assembly level programming-ADC and DAC interfacing.

UNIT-V: Communication system and C language

Modulation:AM,FM and PM techniques-Demodulation:AM and FM-Pulse modulation technique-Fibre optic communication-Single mode and multimode operation-Modulation techniques. Introduction to C - Basic Structure of C Language - Elements of C Language: C Character Set - Constants - keyword and Identifiers - Variables - Data types - Declaration of variable - operators and Expressions: arithmetic operators - relational operators - logical operators - assignment and conditional operators - data type conversion and mixed mode operations -control statements -strings and arrays -pointers and functions - structures.

Semester VI	L	P	C
17UEL630303A	4	-	4

Core Elective: CONTROL SYSTEM

Course Outcomes:

1. Will be able to acquire the knowledge on mathematical models of control system
2. Ability to understand the components of control system
3. Will be able to acquire knowledge on time response analysis of various systems
4. Ability to understand the process of frequency response analysis
5. Will be able to acquire the knowledge on concepts of stability
6. Will be able acquire the knowledge on Routh Hurwitz criterion and Nyquist stability analysis

UNIT-I: Mathematical Models of Control System (8 Hrs)

Control system - Examples of control systems - Mathematical models of control systems - Electrical systems - Electrical analogous of mechanical translational systems (two nodes) - Electrical analogous of mechanical rotational systems - Block diagram - Signal flow graph.

UNIT-II: Components of Control System (8 Hrs)

Components of Automatic control system - Potentiometer -Synchros-Controllers -Tachogenerators- Modulator and Demodulator - Example.

UNIT-III: Time Response Analysis (12 Hrs)

Time response - Test signals - Order of a system - Response of first order system for unit step input - Second order system - Time domain specifications - Response with P, PI & PID controllers - Type number of control systems - Steady state error - Static error constants - Steady state error when input is unit step, unit ramp and unit parabolic signal - Generalized error coefficients - Correlation between static and dynamic error coefficients.

UNIT-IV: Frequency Response Analysis (10 Hrs)

Frequency response - Frequency domain specifications - Estimation of frequency domain specifications for II order system - Correlation between time and frequency response - Frequency response plots - Bode plot - Polar plot - Nichols plot - M & N circles - Nichols chart.

UNIT-V: Concepts of Stability and Root Locus (10 Hrs)

Definitions of stability - Location of roots on the S-plane for stability -Routh Hurwitz criterion - Mathematical preliminaries for Nyquist stability criterion - Relative stability - Gain margin root locus.

BOOK FOR STUDY:

1. NagoorGani. A, "Control system", 1st Edition, RBA publications, 2006.

BOOKS FOR REFERENCES:

1. M. Gopal, "Control system Principles and design", TMH, 1998
2. B.C. Kuo, "Automatic Control Systems", 7th Edition, PHI,1995.

SECTIONS

UNIT	BOOK	SECTION
I	1	1 1.1 – 1.3, 1.6,1.9 – 1.12
II	1	2.1 – 2.4, 2.9 – 2.10, EXAMPLE 2.4
III	1	3.1 – 3.3, 3.5 – 3.15, 3.17
IV	1	4.1 – 4.8, 4.10, 4.11
V	1	5.1 – 5.4, 5.6 - 5.8

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UEL630303A	Title of the Paper: Core Elective: CONTROL SYSTEM											Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	2	3	5	5	4	4	1	2	1	2	4	3.2
CO2	4	4	2	3	5	5	4	4	1	2	1	2	4	3.1
CO3	4	4	2	3	5	4	4	4	1	2	1	2	4	3.0
CO4	5	4	2	3	5	4	4	4	1	2	1	2	4	3.1
CO5	5	4	2	3	5	4	4	4	1	2	1	2	4	3.1
CO6	4	4	2	3	5	4	4	4	1	2	1	2	4	3.0
											Mean Overall Score			3.1

Result: The Score for this Course is 3.1 (High Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\text{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \text{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI **L P C**
17UEL630303B **4 - 3**

Core Elective:
ELECTRONIC MEASUREMENT SYSTEM

Course Outcomes:

1. Ability to understand errors in measurement
2. Will be able to acquire the knowledge on different types of measuring instruments
3. Ability to understand electrical indicating and test instruments
4. Ability to understand variable conversion elements and transmission techniques
5. Will be able to acquire the knowledge on instruments design using different digital integrated circuits
6. Will be able to acquire the knowledge on principles on various biomedical instruments

UNIT-I: Instrument types and performance characteristic (10 Hrs)

Introduction - review of instrument types - active and passive instruments - null type and deflection type instruments - analog and digital instruments - indication instruments - smart and Non-smart instruments. Static characteristics of instruments - accuracy and inaccuracy - precision - tolerance - range of span - linearity - sensitivity of measurement - threshold - resolution - sensitivity to disturbance - hysteresis effects - dead space - Dynamic characteristics of instruments - necessity for calibration. ESD – EMC.

UNIT-II: Measurement uncertainty and calibration (10 Hrs)

Sources of Systematic Error - Reduction of systematic errors - quantification of Systematic Errors - sources and treatment of systematic errors - statistical analysis of measurements subject to random errors - mean and median values - standard deviation and variance - graphical data analysis - standard error of the mean - estimation of random error in a single measurement. Aggregation of measurement system errors - combined effect of systematic and random errors. Calibration - principles of calibration - control of calibration environment - calibration chain and traceability - calibration records

UNIT-III: Electrical indicating and test instruments (10 Hrs)

Introduction -digital meters - voltage to time conversion digital voltmeter - potentiometric - dual slope integration - voltage to frequency conversion - digital multimeter- analogue meter - moving coil meter - moving iron - clamp

on meters - analogue multimeter- oscilloscopes - analog oscilloscopes - Digital storage oscilloscopes - computer based oscilloscope. Display of measurement signals - recording of measurement data - presentation of data.

UNIT-IV: Variable conversion elements and Measurement signal transmission (10 Hrs)

Bridge circuits - null-type dc bridge - deflection type DC bridge - error analysis - ac bridges - commercial bridges - Resistance measurement - dc bridge circuit - voltmeter-ammeter method - resistance substitution method - use of digital voltmeter to measure resistance - Ohmmeter - inductance measurement - capacitance measurement - current measurement - frequency measurement - digital counter/timer - PLL - oscilloscope - Wien bridge - phase measurement - X-Y plotter - phase sensitive detector. Electrical transmission - pneumatic transmission -fibre optic transmission - optical and radio telemetry - digital transmission protocols

UNIT-V: Biomedical instruments (8 Hrs)

ECG - origin of cardiac action potential - ECG lead configurations - ECG recording set up - practical considerations of ECG recording - Analysis of recorded ECG signal -vector cardiography- phonocardiography - Echocardiography, blood cell counter - electron microscope - principle of magnetic focusing - scanning electron microscope (SEM-) - spectrophotometer - flame photometer.

BOOK FOR STUDY:

1. Alan S. Morris and R. Langari, Measurement and instrumentation theory and application, 1st edition, publisher : Academic Press, 2012
2. M. Arumugam , Biomedical Instrumentation, , 3rd edition, Publisher: Anuradha,2016
3. ESD BOOK is based on CEI/IEC 61340-5-1: 1998 and CEI/IEC 61340-5-2/ TS:1999 published by the International Electrotechnical Commission, 3, rue de Varambe, Geneva, Switzerland

BOOKS FOR REFERENCE:

1. Albert .D. Helfrick and William D. Hooper, “Modern Electronic Instrumentation and Measurement Techniques”, PHI, 1st edition, 1990
2. H.S. Kalsi, “Electronics Instrumentation”, 2nd edition, TMH, 2004
3. Leslie Cromwell, Fred J. Werbell and Eruch A. Pfeiffer, “biomedical instrumentation and measurements”, 2nd edition, PHI, 2005

4. A. K. Sawhney, “Electrical and Electronics Measurements and Instrumentation”, DhanpatRai and company, 2001.

SECTION:

UNIT	BOOK	SECTIONS
I	1	1.1 - 1.4, 2.1 - 2.4. ESD & EMC Lecture notes
II	1	3.1 - 3.6.7, 3.7, 4.1 - 4.5
III	1	7.1 - 7.4, 8.1 - 8.5
IV	1	9.1 - 9.8, 10.1 - 10.7, 11.1 - 11.4
V	2	4.3 - 4.3.8, 7.1 - 7.3, 7.5.2 - 7.5.3

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Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UEL630303B					Core Elective: ELECTRONIC MEASUREMENT SYSTEM								Hours 4	Credits 3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)								Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	5	4	2	3	4	4	4	3	2	4	4	3	3	3.5	
CO2	5	4	2	3	4	4	3	3	2	4	4	3	3	3.4	
CO3	5	4	2	3	4	4	3	3	2	4	4	3	3	3.4	
CO4	5	4	2	3	4	4	4	3	2	4	4	3	3	3.5	
CO5	5	4	2	3	4	4	4	3	2	4	4	3	3	3.5	
CO6	5	4	2	3	4	4	4	3	2	4	4	3	3	3.5	
													Mean Overall Score		3.5

Result: The Score for this Course is 3.5 (Moderate Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

Values Scaling:

$$\textbf{Mean Score of COs} = \frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}} \qquad \textbf{Mean Overall Score for COs} = \frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$$

Semester VI	L	P	C
17UEL640602	2	-	2

Skill-Based Elective-II:
TROUBLESHOOTING COMPUTER HARDWARE

Course Outcomes:

1. Will be able to integrate the computer hardware trouble-shooting skills
2. Will be able to acquire knowledge on various power supplies and terminal connectors
3. Ability to understand various computer components and peripherals
4. Ability to classify computer memory standards
5. Will be able to acquire the knowledge on assembling and installation of PC
6. Will be able to acquire knowledge on safety and maintenance of PC

UNIT-I:

PC organization **(5 Hrs)**

Introduction to computer hardware -components of mother boards–connectors types: onboard -front panel –back panel –ports-slots -Basics of add on cards–BIOS.

UNIT-II:

Power supply **(5 Hrs)**

Power supply unit-SMPS outputs -Voltage measurements-CPU connector-Motherboard connector and device connectors-cabinet types–AT,ATX,BTX,SFF,ITX and its form factor-Types of cases–Tower case–desktop case-portable case.

UNIT-III:

Memories **(4 Hrs)**

Semiconductor memory – ROM–PROM–EPROM – RAM–Virtual memory-Cache memory-Linear and Physical memory-video memory-Secondary memories: Floppy–HDD–CD Rom-CD-RW-DVD.

UNIT-IV:

Input and Output devices **(5 Hrs)**

Input devices–keyboard-mouse-types of mouse-DIN/PS2 port-Serial port–parallel ports–USB ports-Output devices- monitor- printer -Organization and connectors.

UNIT-V:

Assembling and installation **(5 Hrs)**

PC Assembling –Bios setting -Booting sequence setting-Installation Menu-Selection-Partitioning-Formatting–Copying and installation-Account creation-Device driver installation.

Book for Study:

1. Material prepared by the Department.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester VI	Course Code 17UEL640602	Title of the Paper: Skill-based Elective: TROUBLESHOOTING COMPUTER HARDWARE										Hours 2	Credits 2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
CO1	5	4	2	3	4	4	5	4	4	4	5	3	4	3.9
CO2	5	4	2	3	4	4	5	5	5	4	5	3	4	4.1
CO3	5	4	2	3	4	4	4	3	3	5	4	3	4	3.7
CO4	5	4	2	3	4	4	5	5	5	5	4	3	4	4.1
CO5	5	4	2	3	4	4	4	5	5	5	3	3	4	3.9
CO6	5	4	2	3	4	4	4	4	4	4	3	3	4	3.7
											Mean Overall Score			3.9

Result: The Score for this Course is 3.9 (Moderate Relationship)

Note:

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very poor	Poor	Moderate	High	Very High

***Values Scaling*:**

Mean Score of COs = $\frac{\text{Total of Values}}{\text{Total No. of POs \& PSOs}}$	**Mean Overall Score for COs** = $\frac{\text{Total of Mean Scores}}{\text{Total No. of COs}}$

Notes

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