J.N.N INSTITUTE OF ENGINEERING

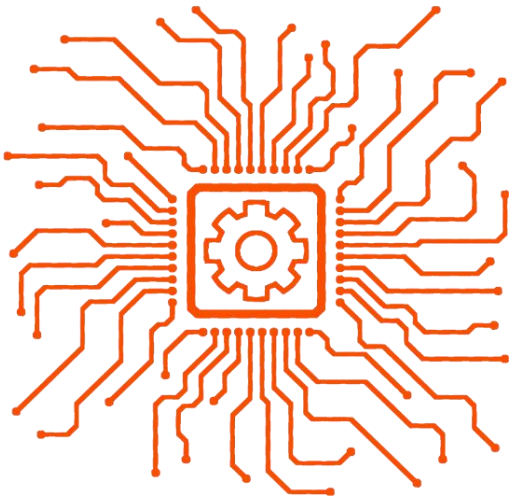
AUTONOMOUS

NAAC 'A' Grade | Approved by AICTE | Affiliated to Anna University

ACADEMIC CURRICULUM
(REGULATION 2022)
FOR

UNDER GRADUATE PROGRAMMES
CHOICE BASED CREDIT SYSTEM
(Applicable to the students admitted from the Academic Year 2023 – 2024 onwards)

B.E – ELECTRONCIS AND COMMUNCIATON ENGINEERING



B.E- ELECTRONICS AND COMMUNICATION ENGINEERING

ABOUT THE DEPARTMENT

The Department of Electronics and Communication Engineering, was established in the year 2008 with an intake of 60, with the intent of raising highly qualified Engineers, Entrepreneurs and Researchers who can make substantial contribution to the field of Electronics and Communication Engineering. The research interests of the faculty members of the department encompass the wide area of applied and fundamental aspects of Electronics and Communication Engineering. It offers innovative approaches for teaching-learning and encourages virtual learning with un-compromised professional ethics.

The undergraduates from this department have become professional engineers, and are employed both in core and software companies. They are well represented at core companies, such as Robert Bosch, Qualcomm, Aricent Group, Wipro R&D and as well as smaller start-up companies. They have become successful Software developers and Managers in the leading software companies, such as Thoughtworks, Infosys, Cognizant Technology Solutions, HCL Technologies, TCS, IGate, etc.

VISION

The Department of Electronics and Communication Engineering supports the mission of the College by providing programs of the highest quality to produce world class engineers through teaching, research and service who can address challenges of the millennium and to be recognized by the society at large as an excellent department.

MISSION

MISSION 1: Ensure effective teaching–learning process to provide in-depth knowledge of principles and its applications pertaining to Electronics & Communication Engineering and interdisciplinary areas equip the students with strong foundations to enable them for continuing education

MISSION 2: Nurtures the spirit of innovation and creativity among faculty and students.

MISSION 3: Inculcate creative thinking through innovative and group work exercises which enhances the entrepreneur skills, employability and research capabilities

PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)

Bachelor of Electronics and Communication Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

PEO 1: To provide the students with a strong foundation in the required sciences in order to pursue studies in Electronics and Communication Engineering.

PEO 2: To gain adequate knowledge to become good professional in electronic and communication engineering associated industries, higher education and research.

PEO 3: To develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.

PEO 4: To prepare students to critically analyse existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

PEO 5: To inculcate in the students a professional and ethical attitude and an ability to visualize the engineering issues in a broader social context.

PROGRAMME OUTCOMES (POs)

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

PSO 1: To analyse, design and develop quality products and services by applying Electronics and Communication Engineering concepts and best practices

PSO 2: To adapt to emerging information and communication technologies (ICT) to innovate and create solutions to existing/novel problems

B.E ELECTRONICS AND COMMUNICATION ENGINEERING
CURRICULUM FOR SEMESTERS I TO VIII AND SYLLABI FOR SEMESTER I – IV
SEMESTER I

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
MANDATORY COURSE										
*	22IP100	Induction Programme	-	-	-	-	-	03 Weeks	0	-
THEORY COURSES										
1	22HST101	Professional English	L+P	2	0	4	0	6	4	HSMC
2	22BST101	Basic Mathematics for Engineers	L	3	2	0	0	5	4	BSC
3	22BST102	Engineering Physics	L	3	0	0	0	3	3	BSC
4	22BST103	Engineering Chemistry	L	3	0	0	0	3	3	BSC
5	22EST101	Problem Solving and Python Programming	L	3	0	0	0	3	3	ESC
6	22HSM101	தமிழர் மரபு/ Heritage of Tamils	L	1	0	0	0	1	1	HSMC
EMPLOYABILITY ENHANCEMENT COURSE										
7	22EET101	Engineering and Professional Skills	L+P	1	0	2	0	3	2	EEC
PRACTICAL COURSES										
8	22ESP101	Problem Solving and Python Programming Laboratory	P	0	0	4	0	4	2	ESC
9	22BSP101	Physics and Chemistry Laboratory	P	0	0	4	0	4	2	BSC
EMPLOYABILITY ENHANCEMENT COURSE										
10	22EEP101	Product Tinkering Laboratory	P	0	0	2	0	2	1	EEC
			TOTAL	**16**	**02**	**16**	**00**	**34**	**25**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category

SEMESTER II

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1		Language Elective	L+P	3	0	2	0	5	4	HSMC
2	22BST203	Transforms and Numerical methods	L	3	2	0	0	5	4	BSC
3	22ECT201	Electronic Devices	L	3	0	0	0	3	3	PCC
4	22EST203	Basics of Electrical Engineering and Circuits	L	3	0	0	0	3	3	ESC
5	22EST202	Engineering Graphics	L+P	1	0	4	0	5	3	ESC
6	22HSM201	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	L	1	0	0	0	1	1	HSMC
EMPLOYABILITY ENHANCEMENT COURSE										
7	22EET201	Innovation and Design Thinking*	L	2	0	0	0	2	2	EEC
MANDATORY COURSE										
8	22NXP201	NCC/NSS/YRC Credit Course Level – I #	-	1	0	0	0	1	1#	-
PRACTICAL COURSES										
9	22ESP201	Engineering Product Laboratory	P	0	0	3	0	3	1.5	ESC
10	22ECP201	Circuits and Devices Laboratory	P	0	0	3	0	3	1.5	PCC
			TOTAL	**17**	**02**	**12**	**00**	**31**	**23**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category

 # NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.
***Common for all branches**

SEMESTER III

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22BST302	Probability and Random Process	L	3	2	0	0	5	4	BSC
2	22EST401	Environmental Sciences and Sustainability	L	2	0	0	0	2	2	ESC
3	22ECT301	Electronics Circuits	L	3	0	0	0	3	3	PCC
4	22ECT302	Signals and Systems	L+P	3	0	2	0	5	4	PCC
5	22ECT303	Digital Electronics	L	3	0	0	0	3	3	PCC
6	22HST301	Entrepreneurship and startups*	L	2	0	0	0	2	2	HSMC
PRACTICAL COURSES										
7	22ECP301	Electronic Circuits Laboratory	P	0	0	3	0	3	1.5	PCC
8	22ECP302	Digital Electronics Laboratory	P	0	0	3	0	3	1.5	PCC
EMPLOYABILITY ENHANCEMENT COURSE										
9	22EEP301	Soft Skills*	P	0	0	2	0	2	1	EEC
			TOTAL	**16**	**2**	**10**	**0**	**28**	**22**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category

*** Common to all branches**

SEMESTER IV

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22ECT401	Communication Systems	L	3	0	0	0	3	3	PCC
2	22ECT402	Linear Integrated Circuits and Applications	L	3	0	0	0	3	3	PCC
3	22ECT403	Electromagnetic Field Theory	L	3	2	0	0	5	4	PCC
4	22ECT404	Control Systems	L	3	0	0	0	3	3	PCC
5	22ECT405	Microcontroller based system design	L+J	3	0	0	2	5	4	PCC
MANDATORY COURSE										
6	22NXP401	NCC/NSS/YRC Credit Course Level-II #	-	1	0	0	0	1	1#	-
PRACTICAL COURSES										
7	22ECP401	Linear Integrated Circuits Laboratory	P	0	0	3	0	3	1.5	PCC
8	22ECP402	Communication Systems Laboratory	P	0	0	3	0	3	1.5	PCC
EMPLOYABILITY ENHANCEMENT COURSE										
9	22EEP401	Quantitative Analysis and Logical Reasoning – I *	P	0	0	2	0	2	1	EEC
			TOTAL	**16**	**02**	**8**	**2**	**28**	**21**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
 # NCC Credit Course level II is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER V

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22ECT501	VLSI Design	L	3	0	0	0	3	3	PCC
2	22ECT502	Discrete Time Signal Processing	L+P+J	2	0	2	2	6	4	PCC
3	22ECT503	Wireless Communication	L	3	0	0	0	3	3	PCC
PROFESSIONAL ELECTIVE										
4		Professional Elective I	L	3	0	0	0	3	3	PEC
EMPLOYABILITY ENHANCEMENT COURSE										
5	22HST501	Engineering Economics and Financial Management*	L	3	0	0	0	3	3	HSMC
MANDATORY COURSE										
6		Mandatory Course - I	L	3	0	0	0	3	0	MCC
ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)										
7		Minor/ Honour/ Remedial class **	L	3	0	0	0	3	3**	PEC**
PRACTICAL COURSES										
8	22ECP501	VLSI Laboratory	P	0	0	3	0	3	1.5	PCC
9	22ECP502	Simulation Lab	P	0	0	3	0	3	1.5	PCC
EMPLOYABILITY ENHANCEMENT COURSE-										
10	22EEP501	Internship*	P	0	0	0	0	0	1	EEC
			TOTAL	**20**	**00**	**08**	**02**	**30**	**20**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**

SEMESTER VI

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22ECT601	Transmission Lines and RF Systems	L	3	2	0	0	5	4	PCC
2	22ECT602	Embedded Systems and IoT Design	L	3	0	0	0	3	3	PCC
OPEN ELECTIVE										
3		Open Elective-I	L	3	0	0	0	3	3	OEC
PROFESSIONAL ELECTIVE										
4		Professional Elective - II	L	3	0	0	0	3	3	PEC
5		Professional Elective - III	L	3	0	0	0	3	3	PEC
MANDATORY COURSE										
6		Mandatory Course - II	L	3	0	0	0	3	0	MCC
7	22NXP601	NCC/NSS/YRC Credit Course Level- III #	-	1	0	0	0	1	1#	-
ENROLLMENT FOR B.E. / B.TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)										
8		Minor/Honour/remedial class**		3	0	0	0	3	3**	PEC**
PRACTICAL COURSES - EMPLOYABILITY ENHANCEMENT COURSE										
9	22EEP601	Quantitative Analysis and Logical Reasoning – II *	P	0	0	2	0	2	1	EEC
10	22EEP602	Comprehensive Assessment*		0	0	2	0	2	1	EEC
PRACTICAL COURSES										
11	22ECP601	Embedded Systems Laboratory	P	0	0	4	0	4	2	PCC
			TOTAL	**22**	**2**	**8**	**0**	**32**	**20**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**
 # NCC Credit Course level III is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER VII

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES										
1	22ECT701	Antennas and Microwave Engineering	L	3	0	0	0	3	3	PCC
OPEN ELECTIVE										
2		Open Elective-II	L	3	0	0	0	3	3	OEC
PROFESSIONAL ELECTIVE										
3		Professional Elective – IV	L	3	0	0	0	3	3	PEC
4		Professional Elective – V	L	3	0	0	0	3	3	PEC
5		Professional Elective – VI	L	3	0	0	0	3	3	PEC
ENROLLMENT FOR B.E. / B.TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)										
6		Minor/ Honour/ Remedial class **	L	3	0	0	0	3	3**	PEC**
PRACTICAL COURSES										
7	22ECP701	Advanced Communication Laboratory	P	0	0	4	0	4	2	PCC
PRACTICAL COURSES - EMPLOYABILITY ENHANCEMENT COURSE										
8	22EEP701	Product Design and Development *	P	0	0	0	4	4	2	EEC
9	22EEP702	Internship *	P	0	0	0	0	0	1	EEC
			TOTAL	**18**	**0**	**04**	**04**	**26**	**20**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category
*** Common to all branches**
**** Common to all branches, selection from one minor vertical/approved honors subjects**

SEMESTER VIII

S.No	COURSE CODE	COURSE TITLE	MODE	PERIODS PER WEEK				TCP	C	CAT
				L	T	P	J			
THEORY COURSES - PROFESSIONAL ELECTIVE										
1		Management Elective	L	3	0	0	0	3	3	PEC
ENROLLMENT FOR B.E. / B.TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)										
2		Minor/Honour/remedial class **	L	3	0	0	0	3	3**	PEC**
PRACTICAL COURSES - EMPLOYABILITY ENHANCEMENT COURSE										
3	22ECJ801	Project Work	J	0	0	0	16	16	08	EEC
			TOTAL	**06**	**00**	**00**	**16**	**22**	**11**	

L- Lecture T- Tutorial P- Practical J- Project TCP- Total Contact Periods
C- Credits CAT- Category

**** Common to all branches, selection from one minor vertical/approved honors subjects**

CREDIT DISTRIBUTION

Semester	HSMC	BSC	ESC	PCC	PEC	OEC	EEC	MC	TOTAL	Total PER %
I	5	12	5				3		25	15.43
II	5	4	7.5	4.5			2		23	14.20
III	2	4	2	13			1		22	13.58
IV				20			1		21	12.96
V	3			13	3		1		20	12.35
VI				9	6	3	2		20	12.35
VII				5	9	3	3		20	12.35
VIII					3		8		11	6.79
TOTAL	15	20	14.5	64.5	21	6	21		162	100

CATEGORY		Breakup of Credits	PER % in Total
HSMC	Humanities & Social Science Including Management	15	9
BSC	Basic Science Courses	20	12
ESC	Engineering Science Courses	14.5	9
PCC	Professional Core Courses	64.5	40
PEC	Professional Elective Courses	21	13
OEC	Open Elective Courses	6	2
EEC	Employment Enhancement Courses	21	25
MCC	Mandatory Courses		0
	Total Credits	162	162

PROFESSIONAL ELECTIVES COURSES: VERTICALS

VERTICAL I	VERTICAL II	VERTICAL III	VERTICAL IV	VERTICAL V	VERTICAL VI	VERTICAL VII
Semiconductor Chip Design and Testing	**Signal Processing**	**RF Technologies**	**Bio Medical Technologies**	**Sensor Technologies and IoT**	**Underwater Technologies**	**High Speed Communications**
Wide Bandgap Devices	Advanced Digital Signal Processing	RF Transceivers	Wearable Devices	IoT Processors	Underwater Instrumentation System	Optical Communication & Networks
Validation and Testing Technology	Image Processing	Signal Integrity	Human Assist Devices	IoT Based System Design	Underwater Imaging Systems and Image Processing	Wireless Broad Band Networks
Low Power IC Design	Speech Processing	Antenna Design	Therapeutic Equipment	Wireless Sensor Network and Design	Underwater Communication	Software Defined Networks
VLSI Testing and Design For Testability	Software Defined Radio	MICs and RF System Design	Medical Imaging Systems	Industrial IoT and Industry 4.0	Ocean Observation Systems	Massive MIMO Networks
Mixed Signal IC Design Testing	DSP Architecture and Programming	EMI/EMC Pre Compliance Testing	Brain Computer Interface and Applications	MEMS Design	Underwater Navigation Systems	Advanced Wireless Communication Techniques
Analog IC Design	Computer Vision	RF ID System Design and Testing	Body Area Networks	Fundamentals of Nano electronics	Ocean Acoustics	4G/ 5G Communication Networks

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI. The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulation.

VERTICAL I Semiconductor Chip Design and Testing								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE01	Wide Bandgap Devices	3	0	0	0	3	3
2	22ECPE02	Validation and Testing Technology	3	0	0	0	3	3
3	22ECPE03	Low Power IC Design	3	0	0	0	3	3
4	22ECPE04	VLSI Testing and Design For Testability	3	0	0	0	3	3
5	22ECPE05	Mixed Signal IC Design Testing	3	0	0	0	3	3
6	22ECPE06	Analog IC Design	3	0	0	0	3	3

VERTICAL II Signal Processing								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE07	Advanced Digital Signal Processing	3	0	0	0	3	3
2	22ECPE08	Image Processing	3	0	0	0	3	3
3	22ECPE09	Speech Processing	3	0	0	0	3	3
4	22ECPE10	Software Defined Radio	3	0	0	0	3	3
5	22ECPE11	DSP Architecture and Programming	3	0	0	0	3	3
6	22ECPE12	Computer Vision	3	0	0	0	3	3

VERTICAL III RF Technologies								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE13	RF Transceivers	3	0	0	0	3	3
2	22ECPE14	Signal Integrity	3	0	0	0	3	3
3	22ECPE15	Antenna Design	3	0	0	0	3	3
4	22ECPE16	MICs and RF System Design	3	0	0	0	3	3
5	22ECPE17	EMI/EMC Pre Compliance Testing	3	0	0	0	3	3
6	22ECPE18	RF ID System Design and Testing	3	0	0	0	3	3

VERTICAL IV Bio Medical Technologies								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE19	Wearable Devices	3	0	0	0	3	3
2	22ECPE20	Human Assist Devices	3	0	0	0	3	3
3	22ECPE21	Therapeutic Equipment	3	0	0	0	3	3
4	22ECPE22	Medical Imaging Systems	3	0	0	0	3	3
5	22ECPE23	Brain Computer Interface and Applications	3	0	0	0	3	3
6	22ECPE24	Body Area Networks	3	0	0	0	3	3

VERTICAL V Sensor Technologies and IoT								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE25	IoT Processors	3	0	0	0	3	3
2	22ECPE26	IoT Based System Design	3	0	0	0	3	3
3	22ECPE27	Wireless Sensor Network and Design	3	0	0	0	3	3
4	22ECPE28	Industrial IoT and Industry 4.0	3	0	0	0	3	3
5	22ECPE29	MEMS Design	3	0	0	0	3	3
6	22ECPE30	Fundamentals of Nano electronics	3	0	0	0	3	3

VERTICAL VI Underwater Technologies								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE31	Underwater Instrumentation System	3	0	0	0	3	3
2	22ECPE32	Underwater Imaging Systems and Image Processing	3	0	0	0	3	3
3	22ECPE33	Underwater Communication	3	0	0	0	3	3
4	22ECPE34	Ocean Observation Systems	3	0	0	0	3	3
5	22ECPE35	Underwater Navigation Systems	3	0	0	0	3	3
6	22ECPE36	Ocean Acoustics	3	0	0	0	3	3

VERTICAL VII High Speed Communications								
S.No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE37	Optical Communication & Networks	3	0	0	0	3	3
2	22ECPE38	Wireless Broad Band Networks	3	0	0	0	3	3
3	22ECPE39	Software Defined Networks	3	0	0	0	3	3
4	22ECPE40	Massive MIMO Networks	3	0	0	0	3	3
5	22ECPE41	Advanced Wireless Communication Techniques	3	0	0	0	3	3
6	22ECPE42	4G/ 5G Communication Networks	3	0	0	0	3	3

ELECTIVE – MANAGEMENT (Semester VIII)								
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**J**	**Contact Hours**	**Credits**
1	22ECPE37	Marketing Management	3	0	0	0	3	3
2	22ECPE38	Total Quality Management	3	0	0	0	3	3
3	22ECPE39	Entrepreneurship Development	3	0	0	0	3	3
4	22ECPE40	Project Management	3	0	0	0	3	3
5	22ECPE41	Principles of Management	3	0	0	0	3	3

MANDATORY COURSE I								
S.No.	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22MCT001	Introduction to Women and Gender Studies	3	0	0	0	3	0
2	22 MCT002	Elements of Literature	3	0	0	0	3	0
3	22 MCT003	Film Appreciation	3	0	0	0	3	0
4	22MCT004	Well Being with Traditional Practices (Yoga, Ayurveda and Siddha)	3	0	0	0	3	0
5	22MCT006	Indian Constitution	3	0	0	0	3	0
6	22MCT007	Industrial Safety	3	0	0	0	3	0

MANDATORY COURSE II								
S.No.	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22 MCT008	Essential of Indian Traditional Values	3	0	0	0	3	0
2	22 MCT009	History of Science and Technology in India	3	0	0	0	3	0
3	22MCT010	Political and Economic Thought for a Humane Society	3	0	0	0	3	0
4	22MCT011	State, Nation Building and Politics in India	3	0	0	0	3	0
5	22MCT012	Disaster Management	3	0	0	0	3	0

LANGUAGE ELECTIVE (SEMESTER II)								
S. No.	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22LET201	Functional English	3	0	2	0	5	4
2	22LET202	French Language	3	0	2	0	5	4
3	22LET203	German Language	3	0	2	0	5	4
4	22LET204	Japanese Language	3	0	2	0	5	4

OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

OPEN ELECTIVE I

S.No	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22RAO001	Robotics	3	0	0	0	3	3
2	22RAO002	Selection of Materials	3	0	0	0	3	3
3	22RAO003	Testing of Materials	3	0	0	0	3	3
4	22RAO004	Marine Vehicles	3	0	0	0	3	3
5	22RAO005	Introduction To Nanotechnology	3	0	0	0	3	3
6	22RAO006	Lean Manufacturing	3	0	0	0	3	3
7	22ADO001	Ethics in Data Science	3	0	0	0	3	3
8	22ADO002	Software Testing	3	0	0	0	3	3
9	22ADO003	Principles of Programming Language	3	0	0	0	3	3
10	22ADO004	Digital Marketing	3	0	0	0	3	3
11	22BMO001	Biology for Engineer	3	0	0	0	3	3
12	22BMO002	Basic of Biomedical Instrumentation	3	0	0	0	3	3
13	22BMO003	Basics of Bioinformatics	3	0	0	0	3	3
14	22BMO004	Biomedical Nanotechnology	3	0	0	0	3	3
15	22ECO001	Arduino for Engineers	3	0	0	0	3	3
16	22ECO002	Introduction to Embedded system	3	0	0	0	3	3
17	22ECO003	Space Time Wireless Communication	3	0	0	0	3	3
18	22ECO004	Telecommunication Network Management	3	0	0	0	3	3
19	22CSO001	System Software	3	0	0	0	3	3
20	22CSO002	Computer Graphics	3	0	0	0	3	3
21	22CSO003	Mobile Application Development	3	0	0	0	3	3

OPEN ELECTIVE II

S.No	Course Code	Course Name	L	T	P	J	Contact Hours	Credits
1	22RAO007	Fundamentals of Combustion	3	0	0	0	3	3
2	22RAO008	Basics in Manufacturing and Metal Cutting Process	3	0	0	0	3	3
3	22RAO009	Fundamentals of Planetary Remote Sensing	3	0	0	0	3	3
4	22RAO010	Lean Six Sigma	3	0	0	0	3	3

5	22RAO011	Low Cost Automation	3	0	0	0	3	3
6	22RAO012	Production of Automotive Components	3	0	0	0	3	3
7	22ADO005	Professional Ethics	3	0	0	0	3	3
8	22ADO006	Cloud Computing	3	0	0	0	3	3
9	22ADO007	Cloud Service Management	3	0	0	0	3	3
10	22ADO008	Operating System	3	0	0	0	3	3
11	22BMO005	Troubleshooting in Medical Devices	3	0	0	0	3	3
12	22BMO006	Quality Assurance and Safety in Hospitals	3	0	0	0	3	3
13	22BMO007	Medical Electronics	3	0	0	0	3	3
14	22BMO008	Assist Devices	3	0	0	0	3	3
15	22ECO005	Introduction to Industrial Engineering	3	0	0	0	3	3
16	22ECO006	Space Engineering	3	0	0	0	3	3
17	22ECO007	Wavelet and its Applications	3	0	0	0	3	3
18	22ECO008	Introduction to Control Systems	3	0	0	0	3	3
19	22CSO004	Ubiquitous Computing	3	0	0	0	3	3
20	22CSO005	User Interface Design	3	0	0	0	3	3
21	22CSO006	Multimedia Systems	3	0	0	0	3	3

SEMESTER I

Course Code	Course Title	L	T	P	J	C
22HST101	PROFESSIONAL ENGLISH	2	0	4	0	4
		Syllabus version			v. 1.1	

COURSE OBJECTIVES:

The course enables the learner to

1. Provide learners with basic vocabulary and grammar to recognise and use in real time contexts
2. Improve communicative competence
3. Help use the language effectively in academic /work contexts
4. Build language skills by engaging in listening, speaking, vocabulary and grammar learning activities relevant to authentic contexts
5. Develop the ability to read and write complex texts, summaries, articles, blogs, definitions, essays, and user manuals

COURSE OUTCOME:

After the completion of this course, the students should be able to

1. Become accustomed to the basic vocabulary and grammar
2. Listen and comprehend complex academic texts
3. Read and infer the denotative and connotative meanings of technical texts
4. Write definitions, descriptions, narrations, and essays on various topics
5. Speak fluently and accurately in formal and informal communicative contexts

UNIT-1	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	6 HOURS

Reading – Newspaper- sports/health; technical Brochures
Writing – Professional emails; Formal letters - Requisition & Business letters
Grammar – Word formation, Parts of speech, Framing questions
Vocabulary – Synonyms and Antonyms, One word substitution, Abbreviations and Acronyms

UNIT-2	NARRATION AND SUMMATION	6 HOURS

Reading – Biographies/ Travelogues
Writing - Guided writing- Paragraph; Short Report on an event (field trip etc.)
Grammar – Tenses; Subject-Verb Agreement; Prepositions
Vocabulary – Narrative vocabulary; Phrasal verbs

UNIT-3	DESCRIPTION OF A PROCESS / PRODUCT	6 HOURS

Reading – Gadget reviews; Advertisements
Writing - Product description, Process description; Instruction writing
Grammar – Imperatives; Degrees of comparison
Vocabulary – Compound words; Homonyms, homophones; discourse markers- Connectives and Sequence words

UNIT-4	CLASSIFICATION ND RECOMMENDATIONS	6 HOURS

Reading – Newspaper articles; journal reports **Writing** – Note-making; Interpretation of charts; Recommendations **Gramma**r – Articles; Modal verbs **Vocabulary** - Collocations; Fixed / Semi fixed expressions.		
UNIT-5	**EXPRESSION**	**6 HOURS**
Reading – Editorials; opinion blogs **Writing** – Reports – Accident & Survey; Business letters **Grammar** – Punctuation; Negations; Simple, Complex and Compound sentences **Vocabulary** - Cause & Effect Expressions; Content vs Function words		
	TOTAL HOURS:	**30 HOURS**

TEXT BOOK(S):

1.	Hewings, Martin Advanced Grammar in Use. New Delhi: CUP,2008 MLA Handbook for Writers of Research Papers, 7th Edition
2.	English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCE BOOKS:

1.	Technical Communication – Principles And Practices, Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2.	A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3.	Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.

LIST OF EXPERIMENTS :

1. Listening to introductions of successful people
2. Self-Introduction and introducing a friend
3. Listening and filling out a form
4. Narrating a story using hints
5. Listening to telephone conversation
6. Telephonic Interview- Role play
7. Listening to podcasts, anecdotes/event narration
8. Narrating personal experiences/ events
9. Listening to celebrity interviews
10. Conversation Skills- Politeness strategies
11. Listening to process descriptions

12. Describing a process
13. Listening to travelogues
14. Narrating travel experiences
15. Listening to educational videos
16. Group discussion
17. Listening to TED Talks
18. Mini Presentations
19. Listening to description of art work
20. Picture description
21. Listening to scientific lectures
22. Summarizing a lecture
23. Listening to definitions/ descriptions of objects
24. One minute speech - Describing an object
25. Listening to Tv shows
26. Anchoring a reality show
27. Listening to advertisements
28. Adzap
29. Listening to autobiography
30. Visume
TOTAL HOURS: 60 HOURS

Course Code	Course Title	L	T	P	J	C
22BST101	BASIC MATHEMATICS FOR ENGINEERS	3	2	0	0	4
		Syllabus version			v. 1.0	
COURSE OBJECTIVES:						

After studying this course, you should be able to:

1. To develop the use of matrix algebra techniques that are needed by engineers for practical applications.
2. To acquaint the students with differential calculus.
3. To explain the student with functions of several variables.
4. To make the students understand various techniques of integration and its applications.
5. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

COURSE OUTCOME:

After completion of this course, the students should be able to

1. Use the matrix algebra methods for solving practical problems.
2. Apply differential calculus tools in solving various application problems.
3. Able to use differential calculus ideas on several variable functions.
4. Apply different methods of integration in solving practical problems.
5. Apply multiple integral ideas in solving areas, volumes and other practical problems.

UNIT-1	**MATRICES**	**9+3 HOURS**

Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation

UNIT-2	**DIFFERENTIAL CALCULUS**	**9+3 HOURS**

Representation of functions - Limit of a function- Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Logarithmic differentiation - Maxima and Minima of functions of one variable.

UNIT-3	**FUNCTIONS OF SEVERAL VARIABLES**	**9+3 HOURS**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Taylor's series for functions of two variables – Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT-4	**INTEGRAL CALCULUS**	**9+3 HOURS**

Definite and Indefinite integrals - Substitution rule - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction

UNIT-5	**MULTIPLE INTEGRALS**	**9+3 HOURS**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids

TOTAL LECTURE AND TUTORIAL HOURS:	**45+15 HOURS**

TEXT BOOK(S):

1.	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons,10th Edition, New Delhi, 2016.
2.	Grewal.B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition , 2018.
3.	James Stewart, “Calculus: Early Transcendentals”, Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].
REFERENCE BOOKS:	
1.	Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016
2.	Bali. N., Goyal. M. and Watkins. C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3.	Jain. R.K. and Iyengar. S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2016.
4.	Narayanan. S. and Manicavachagom Pillai. T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5.	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6.	Srimantha Pal and Bhunia. S.C, “Engineering Mathematics" Oxford University Press, 2015.
7.	Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus", 14th Edition, Pearson India, 2018.

Course Code	Course Title	L	T	P	J	C
22BST102	ENGINEERING PHYSICS	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To make the students effectively achieve an understanding of mechanics.
2. To enable the students to gain knowledge of electromagnetic waves and its applications.
3. To introduce the basics of oscillations, optics and lasers.
4. Equipping the students to successfully understand the importance of quantum physics.
5. To motivate the students towards the applications of quantum mechanics.

COURSE OUTCOME:

After completion of this course, the students should be able to

CO1: Understand the importance of mechanics.

CO2: Express their knowledge in electromagnetic waves.

CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers.

CO4: Understand the importance of quantum physics.

CO5: Comprehend and apply quantum mechanical principles towards the formation of energy bands

UNIT I	MECHANICS	9 hours
Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of the system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - MI of a diatomic molecule - theorems of MI – moment of inertia of continuous bodies –- torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule.		
UNIT II	**ELECTROMAGNETIC WAVES**	**9 hours**
The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure – basic introduction to Satellite Communication (qualitative treatment)		
UNIT III	**OSCILLATIONS, OPTICS AND LASERS**	**9 hours**
Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave -– interference–Michelson interferometer – Theory of laser – characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO2 laser, semiconductor laser –Basic applications of lasers in industry.		
UNIT IV	**BASIC QUANTUM MECHANICS**	**9 hours**
Photons and light waves - Electrons and matter waves – Photoelectric effect - The Schrodinger equation (Time dependent and time independent forms) - interpretation of wave function –Free particle - particle in an infinite potential well: 1D,2D and 3D Boxes- Normalization and probabilities – Bohr's correspondence principle (concept only).		
UNIT V	**APPLIED QUANTUM MECHANICS**	**9 hours**
The harmonic oscillator(qualitative)- Barrier penetration and quantum tunnelling (qualitative)- Tunnelling microscope - Resonant diode – Principle of quantum superposition – concept of quantum entanglement – concepts of quantum communication and quantum teleportation		
	Total Lecture hours:	**45 hours**

Text Book(s)

1.	D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2.	E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3.	Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.

Reference Books

1.	R. Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2.	Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3.	K. Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4.	D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5.	N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer Verlag, 2012.

Course Code	Course Title	L	T	P	J	C
22BST103	ENGINEERING CHEMISTRY	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To inculcate a sound understanding of water quality parameters and water treatment techniques.
2. To impart knowledge on the basic principles and preparatory methods of nanomaterials.
3. To introduce the different polymers and composites for engineering applications.
4. To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
5. To familiarize the students with the operating principles, working processes and applications of storage devices and computational chemistry that are essential for chemistry.

COURSE OUTCOME:

1. To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
2. To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
3. To analyse the properties of different polymers and distinguish the polymers which can be degraded and demonstrate their usefulness and composites for material selection requirements.
4. To recommend suitable fuels for engineering processes and applications.
5. To solve chemical problems by simulating chemical systems (molecular, biological, materials) in order to provide reliable, accurate and comprehensive information at an atomic level.

Unit-1	**WATER AND ITS TREATMENT**	9 hours

Water: Sources and impurities, Requirements of portable water, Desalination of brackish water: Reverse Osmosis. Requirements of water for industrial use, Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment -Ion exchange demineralization and zeolite process. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination).

Unit-2	**NANOCHEMISTRY**	9 hours

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.		
Unit-3	**POLYMERS AND COMPOSITES**	9 hours
Definition of biodegradable polymers- Classification of biodegradable Polymers – Advantages, conducting polymers-polyaniline, polyacetylene, recycling of e-plastic waste (waste to wealth). Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer, matrix, metal matrix and ceramic matrix) and Reinforcement (fibre, particulates, flakes and whiskers). Properties and applications of Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.		
Unit-4	**FUELS AND COMBUSTION**	9 hours
Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel, Knocking - octane number, diesel oil-cetane number; Power alcohol and biodiesel. Combustion of fuels: Calorific value - higher and lower calorific values, Flue gas analysis - ORSAT Method. CO2 emission and carbon footprint.		
Unit-5	**COMPUTATIONAL CHEMISTRY AND STORAGE DEVICES**	9 hours
Computational chemistry-molecular dynamics and chemical reactivity. Cheminformatics and Green IOT in biomedical applications, Artificial intelligence and machine learning methods to predict physicochemical properties. Batteries: a brief introduction to electrochemical cell (Daniel cell), Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; battery used in Electric vehicles; Fuel cells: H2-O2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.		
	Total Lecture hours:	45 hours
Text Book(s)		
1.	P. C. Jain and Monica Jain, “Engineering Chemistry”, 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.	
2.	Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.	
3.	S.S. Dara, “A Text book of Engineering Chemistry”, S. Chand Publishing, 12th Edition.	
Reference Books		
1.	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Textbook of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018.	
2.	O.G. Palanna, “Engineering Chemistry” McGraw Hill Education (India) Private	

	Limited, 2nd Edition, 2017.
3.	Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4.	ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5.	O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

Course Code	Course Title	L	T	P	J	C
22EST101	PROBLEM SOLVING AND PYTHON PROGRAMMING	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. To understand the basics of algorithmic problem solving.
2. To learn to solve problems using Python conditionals and loops.
3. To define Python functions and use function calls to solve problems.
4. To use Python data structures - lists, tuples, dictionaries to represent complex data.
5. To do input/output with files in Python.

COURSE OUTCOME:

After completion of this course, the students should be able to

1. Develop algorithmic solutions to simple computational problems.
2. Develop and execute simple Python programs.
3. Write simple Python programs using conditionals and loops for solving problems.
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries etc.
6. Read and write data from/to files in Python programs.

UNIT-1	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9 HOURS

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT-2	DATA TYPES, EXPRESSIONS, STATEMENTS	9 HOURS

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.		
UNIT-3	**CONTROL FLOW, FUNCTIONS, STRINGS**	**9 HOURS**
Conditionals: Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.		
UNIT-4	**LISTS, TUPLES, DICTIONARIES**	**9 HOURS**
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.		
UNIT-5	**FILES, MODULES, PACKAGES**	**9 HOURS**
Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).		
	TOTAL LECTURE HOURS:	**45 HOURS**
TEXT BOOK(S):		
1.	Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.	
2.	Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017	
REFERENCE BOOKS:		
1.	Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition,2021.	
2.	G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.	
3.	John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021	
4.	Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.	
5.	Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.	

Course Code	Course Title	L	T	P	J	C
		1	0	0	0	1
22HSM101	HERITAGE OF TAMILS	Syllabus version			v. 1.0	

Unit-1	LANGUAGE AND LITERATURE	03 hours

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

Unit-2	HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	03 hours

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

Unit-3	FOLK AND MARTIAL ARTS	03 hours

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

Unit-4	THINAI CONCEPT OF TAMILS	03 hours

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

Unit-5	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	03 hours

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books

Total Lecture hours:	15 hours

TEXT BOOK(S)

1.	The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies.)
2.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
3.	Tamilaga Varalaru, Makalum Panpadum- Dr. K.K. Pillai
4.	Kanini Tamil- Munaivar L. Sundaram

REFERENCE BOOKS

1.	Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2.	Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies.
3.	Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr. K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4.	Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)
5.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

Course Code	Course Title	L	T	P	J	C
22EET101	ENGINEERING AND PROFESSIONAL SKILLS	1	0	2	0	2
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. Understand the characteristics of 'engineering' and the quality engineers have played in shaping engineering up to the present and into the future
2. Understand a range of principles in science, mathematics, and engineering in order to make well-founded decisions as part of a design process
3. To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the present ability and overall utility value of content
4. To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered
5. To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, present ability, aesthetics, using media elements and enhance the overall quality of presentations

COURSE OUTCOME:

After completion of this course, the students should be able to

1. Understand the basic knowledge in evolution of engineering
2. Understand the basic knowledge in Engineering approach
3. Use the MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
4. Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
5. Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

UNIT-1	EVOLUTION OF ENGINEERING	6 HOURS

Evolution of Engineering: Description of Engineering, Early stages of Engineering, Outline of Ancient Engineering, Case studies of historic engineers. Introduction to Engineering Career: Engineering as a career and common qualities of employable engineers History of Engineering Domains Impact of engineering on society. Roles of Engineers and Career Paths.		
UNIT-2	**ENGINEERING APPROACH**	**6 HOURS**
Introduction, problem statement: Detailing Customer Requirements, Setting Objectives, Identifying Constraints, Establishing Functions, generating solution Alternatives and Choosing a solution. Steps in problem-solving: Problem Solving Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. seven steps in solving engineering problems, reverse engineering, forward engineering, concurrent engineering, and Value Engineering.		
UNIT-3	**MS WORD**	**6 HOURS**
Create and format a document, Working with tables, Working with Bullets and Lists, Working with styles, shapes, smart art, charts Inserting objects, charts and importing objects from other office tools, Creating and Using document templates, Inserting equations, symbols and special characters, Working with Table of contents and References, citations Insert and review comments, Create bookmarks, hyperlinks, endnotes footnote, Viewing document in different modes, Working with document protection and security, Inspect document for accessibility.		
UNIT-4	**MS EXCEL**	**6 HOURS**
Create worksheets, insert and format data, Work with different types of data: text, currency, date, numeric etc. Split, validate, consolidate, Convert data Sort and filter data Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,) Work with Lookup and reference formulae, Create and Work with different types of charts, Use pivot tables to summarize and analyse data, Perform data analysis using own formulae and functions, Combine data from multiple worksheets using own formulae and built-in functions to generate results, Export data and sheets to other file formats, Working with macros, Protecting data and Securing the workbook		
UNIT-5	**MS POWERPOINT**	**6 HOURS**
Hours Select slide templates, layout and themes, Formatting slide content and using bullets and numbering, Insert and format images, smart art, tables, charts Using Slide master, notes and handout master, Working with animation and transitions, Organize and Group slides Import or create and use media objects: audio, video, animation, Perform slideshow recording and Record narration and create presentable videos.		
	TOTAL LECTURE HOURS:	**30 HOURS**
TEXT BOOK(S):		

1.	Remesh S., Vishnu R. G., Life Skills for Engineers, Ridhima Publications, 1 stEdition,2016.
2.	Barun K. Mitra, Personality Development & Soft Skills, Oxford Publishers, Third impression, 2017.
3.	Dorothy House, Microsoft Word, Excel, and PowerPoint: Just for Beginners, Import, 29 January 2015
REFERENCE BOOKS:	
1.	Paul H. Wright, Introduction to Engineering, School of Civil and Environmental Engineering, 3rd Edition, John Wiley & Sons, Inc,

Course Code	Course Title	L	T	P	J	C
22ESP101	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	0	0	4	0	2
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. To understand the problem solving approaches.
2. To learn the basic programming constructs in Python.
3. To practice various computing strategies for Python-based solutions to real world problems.
4. To use Python data structures - lists, tuples, dictionaries.
5. To do input/output with files in Python.

COURSE OUTCOME:

On completion of the course, students will be able to:

1. Develop algorithmic solutions to simple computational problems
2. Develop and execute simple Python programs.
3. Implement programs in Python using conditionals and loops for solving problems. Deploy functions to decompose a Python program.
4. Process compound data using Python data structures.
5. Utilize Python packages in developing software applications.

LIST OF EXPERIMENTS:

1. Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern) Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials

required for construction of a building –operations of list & tuples)

5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL LECTURE HOURS:	**60 HOURS**

Course Code	Course Title	L	T	P	J	C
22BSP101	**PHYSICS AND CHEMISTRY LABORATORY**	**0**	**0**	**4**	**0**	**2**
		Syllabus version			v. 1.0	

PHYSICS LABORATORY
(Any Seven Experiments)

COURSE OBJECTIVES:

1. To learn the proper use of various kinds of physics laboratory equipment.
2. To learn how data can be collected, presented and interpreted in a clear and concise manner.
3. To learn problem solving skills related to physics principles and interpretation of experimental data.
4. To determine error in experimental measurements and techniques used to minimize such error.
5. To make the student an active participant in each part of all lab exercises.

COURSE OUTCOME:

1. Understand the functioning of various physics laboratory equipment.
2. Use graphical models to analyse laboratory data.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyse scientific information.
5. Solve problems individually and collaboratively.

LIST OF EXPERIMENTS (Any Seven Experiments)

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wavelength of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL LECTURE HOURS:	**30 HOURS**

Course Code	Course Title	L	T	P	J	C
22BSP101	**PHYSICS AND CHEMISTRY LABORATORY**	**0**	**0**	**4**	**0**	**2**
		Syllabus version			v. 1.0	

CHEMISTRY LABORATORY

(Any seven experiments to be conducted)

Course Objectives:

1. To impart practical skills in the estimation of water quality parameters by volumetry and gravimetry.
2. To familiarize the students with the estimation of impurities in aqueous solutions through electro-analytical techniques such as pH metre, potentiometry and conductometry.
3. To demonstrate the analysis of metals by UV-Visible spectroscopy.

Course Outcome:

1. To independently estimate the water quality parameters, such as acidity, alkalinity, hardness, DO, TDS, chloride and copper contents by appropriate wet chemical analyses.
2. To quantitatively analyze the impurities in aqueous solution by electroanalytical techniques.
3. To determine the amount of metal ions in aqueous samples by spectroscopic techniques.

LIST OF EXPERIMENTS: ANY SEVEN

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of TDS of a water sample by gravimetry.
7. Determination of strength of given hydrochloric acid using pH meter.
8. Determination of strength of acids in a mixture of acids using conductivity meter.
9. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
10. Estimation of iron content of the given solution using potentiometer.
11. Estimation of iron content of the water sample using spectrophotometer (1,10-Phenanthroline / thiocyanate method).

Total Lecture hours:	**30 HOURS**

Course Code	Course Title	L	T	P	J	C
22EEP101	PRODUCT TINKERING LABORATORY	0	0	2	0	1
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. Hands on practical training, maintenance and troubleshooting on mechanical and electrical appliances in day-to-day life.
2. Analyse single phase and three phase residential building wiring (Energy meter, fuse, earthing)
3. Understand the internal structure and layout of the computer system.
4. Learn to diagnose minor problems with the computer functioning.
5. Know the proper usage and threats of the world wide web.

COURSE OUTCOME:

1. Students will able to understand domestic wiring procedures practically.
2. Students are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
3. Students can detect and perform minor hardware and software level troubleshooting.
4. Capacity to work on Internet & World Wide Web and make effective usage of the internet

for academics.

LIST OF EXPERIMENTS:

1. **MECHANICAL EQUIPMENT STUDY**

(a) Hand drilling machine, Screw Jack and centrifugal pump

(b) Two wheeler, Refrigeration and Air Conditioning system.

2. **ELECTRICAL EQUIPMENT STUDY**

Light fittings, LED, Stabilizer, UPS, Iron box, calling bell, Fan regulator

3. ELECTRONIC EQUIPMENT STUDY

a) Study the elements of a smart phone.

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

4. COMPUTER PERIPHERALS STUDY

PC HARDWARE Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral. Functions of Motherboard. Assembling and Disassembling of PC. System Software and application software installation.

5. BIOMEDICAL EQUIPMENT

a) Assembly and dismantle of Electrocardiogram (ECG)

b) Assembly and dismantle of ventilator.

c) Assembly and dismantle of Doppler Ultra sound Scanner.

TROUBLESHOOTING

Hardware Troubleshooting: Students are to be given a PC which does not boot due to proper assembly or defective peripherals and the students should be taught to identify and correct the problem.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Internet: Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus downloads, Protection from various threats.

TOTAL LECTURE HOURS:	**30 HOURS**

SEMESTER II

Course Code	Course Title	L	T	P	J	C
22BST203	TRANSFORMS AND NUMERICAL METHODS	3	2	0	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
2. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
3. To acquaint the student with Z transform techniques used in wide variety of situations.
4. To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
5. To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

COURSE OUTCOME:

Upon completion of the course, the students should be able to

1. Apply the concept of testing of hypothesis for small and large samples in real life problems.
2. Apply the basic concepts of classifications of design of experiments in the field of agriculture.
3. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems
4. Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
5. Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

UNIT-1	FOURIER SERIES	9+3 HOURS

Dirichlet's conditions — General Fourier series — Odd and even functions — Half range sine series — Half range cosine series — Parseval's identity — Harmonic analysis.

UNIT-2	FOURIER TRANSFORMS	9+3 HOURS

Fourier transform pair — Fourier sine and cosine transforms — Properties — Transforms of simple functions — Convolution theorem – Parseval's identity.

UNIT-3	Z — TRANSFORMS	9+3 HOURS

Z-transforms — Elementary properties — Inverse Z-transform (using partial fraction and residues)— Convolution theorem.		
UNIT-4	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION**	**9+3 HOURS**
Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.		
UNIT-5	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	**9+3 HOURS**
Taylor's series method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order differential equations - Milne's forth predictor corrector methods for solving first order differential equations.		
	Total Lecture hours:	**60 HOURS**

TEXT BOOK(S)

1.	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2	Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
3	Narayanan S., Manicavachagom Pillay.T. K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S. Viswanathan Publishers Pvt. Ltd, Chennai, 1998.

REFERENCE BOOKS

1.	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2.	Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3.	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4.	Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5.	Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
6.	Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016

Course Code	Course Title	L	T	P	J	C
22ECT201	ELECTRONIC DEVICES	3	0	0	0	3
		Syllabus version			v. 1.0	
COURSE OBJECTIVES:						

After studying this course, you should be able to:

1. To make the students understand the fundamentals of electronic devices.
2. To acquaint the semiconductor properties and formation of PN Junction diode and its characteristics
3. To explain the operation and applications of BJT and FET
4. To study the operation of special diodes and examine their characteristics
5. To describe the functionality of power semiconductor devices and classify various types of optoelectronic devices

COURSE OUTCOME:

Upon completion of the course, the students should be able to

1. Understand the basics of electron devices
2. Explain the basics of device physics and working principle of PN Junction diode
3. Describe the construction, operation and applications of BJT, JFET and MOSFET
4. Understand the device physics of metal-semiconductor junctions and working principle of special semiconductor devices
5. Explain the construction and working principle of power semiconductor devices and optoelectronic and display devices

UNIT-1	PN JUNCTION DIODE	9 HOURS

Theory of PN junction diode – Energy band structure of open-circuited PN junction – Quantitative theory of PN diode currents – Diode current equation– Static and dynamic resistance levels – Transition and diffusion capacitances, Temperature dependence of V-I characteristics of diode – Switching characteristics, Breakdown in PN junction diodes – Diode as a circuit element – Piecewise Linear diode model – PN diode applications

UNIT-2	BIPOLAR JUNCTION TRANSISTOR	9 HOURS

BJT: Construction of BJT – Transistor biasing – Operation of NPN and PNP transistors– Types of configurations– Transistor as an amplifier - Large signal, dc and small signal CE values of current gain –Breakdown in transistors – Hybrid -π model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

UNIT-3	FIELD EFFECT TRANSISTOR	9 HOURS

Construction and operation of N-channel JFET – Characteristic parameters of JFET– Expression for saturation drain current – Slope of V-I characteristics – Biasing for zero current drift - Comparison of BJT and JFET – Applications of JFET, Construction and operation of N Channel and P-Channel MOSFET – Enhancement and depletion type MOSFET – Characteristics – Threshold voltage – Channel length modulation – Comparison of N-channel and P- channel MOSFETs–Comparison of MOSFET with JFET –Applications of MOSFETs in CMOS circuits.

UNIT-4	**SPECIAL SEMICONDUCTOR DEVICES**	**9 HOURS**
Construction, Principle of operation, characteristics and applications of Zener diode, Varactor diode – Metal-Semiconductor junction – Schottky diode – Tunnel diode – Gunn Diode – IMPATT Diode – PIN Diode – PIN Photodiode - Avalanche Photodiode - DUAL GATE MOSFET – FINFET– MESFET.		
UNIT-5	**POWER SEMICONDUCTOR AND OPTOELECTRONIC DEVICES**	**9 HOURS**
Power Semiconductor Devices: Construction, Principle of operation, characteristics and applications of UJT, PNPN Diode, SCR, LASER, DIAC, TRIAC, GTO Thyristors – Power BJT – Power MOSFET – DMOS – VMOS. Optoelectronic Devices: Photoconductive sensors – Photoconductive cell – Photovoltaic sensors – Photo emissive sensors –Light emitters - LCD, Alpha numeric displays, LCD Panels, Plasma display Panels - Optocoupler, CCD, BBD.		
	Total Lecture hours:	**45 HOURS**

TEXT BOOK(S)

1.	Donald A Neaman, Semiconductor Physics and Devices, McGraw Hill, Fourth Edition, 2017.
2.	Salivahanan S and Sureshkumar N, Electronic Devices and Circuits, McGraw Hill Education, Fourth Edition, 2017.

REFERENCE BOOKS

1.	Robert Boylestad and Louis Nashelsky, Electron Devices and Circuit Theory, Pearson, Eleventh Edition, 2013.
2.	Thomas L. Floyd, Electronic Devices, Pearson, Ninth Edition, 2016.
3.	Jacob Millman, Christos C. Halkias and SatyabrataJit, Electronic Devices and Circuits, McGraw Hill, Fourth Edition, 2015.

Course Code	Course Title	L	T	P	J	C
22EST203	**BASICS OF ELECTRICAL ENGINEERING AND CIRCUITS**	**3**	**0**	**0**	**0**	**3**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. To develop an understanding of the fundamental laws, theorems, elements of electric circuits and to analyze dc and ac circuits
2. To understand transient response behavior of electric circuits.
3. To introduce different methods of circuit analysis using network theorems, duality and topology

COURSE OUTCOME:

Upon completion of the course, the students should be able to

1. Design, understand and evaluate the AC and DC circuits
2. Apply the circuit theorems in real time
3. Analyse resonance and coupled circuits
4. Analyse the transient response for DC circuits
5. Explain the two port networks and parameters

UNIT-1	**FUNDAMENTALS OF ELECTRICAL ENGINEERING**	**9 hours**
Fundamental concepts of dc and ac circuits, Steady state solution of DC circuits, Circuit laws and their applications in solving problems Introduction to AC Circuits, Sinusoidal steady state analysis, Power and Power factor, Single phase and three phase balanced circuits.		
UNIT-2	**NETWORK THEOREMS FOR DC AND AC CIRCUITS**	**9 hours**
Source transformation, Superposition theorem, Thevenin's & Norton's theorems, Reciprocity and Maximum power transfer theorem, Application of Network theorems - Network reduction: voltage and current division, source transformation – star delta conversion.		
UNIT-3	**RESONANCE AND COUPLED CIRCUITS**	**9 hours**
Resonance - Series resonance - Parallel resonance, Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency, Bandwidth - Q factor – Selectivity, Self-inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multi winding coupled circuits, Series, parallel connection of coupled inductors - Single tuned and double tuned coupled circuits		
UNIT-4	**TRANSIENT ANALYSIS**	**9 hours**
Natural response - Forced response Transient response of RC, RL and RLC circuits to excitation by step signal, impulse signal and exponential sources Complete response of RC, RL and RLC circuits to sinusoidal excitation.		
UNIT-5	**TWO PORT NETWORKS**	**9 hours**
Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid(H) parameters Interconnection of two port networks.		
	Total Lecture hours:	**45 hours**

TEXT BOOK(S)

1.	Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 2017, Sixth Edition, Tata McGraw Hill Education Private Limited, India.
2.	Abhijit Chakrabarti, Circuit Theory Analysis and Synthesis, 2018, Seventh Edition, Dhanpat Rai and Co.

REFERENCE BOOKS

1.	Joseph Edminister and Mahmood Nahvi, “Electric Circuits”, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.
2.	Charles K. Alexander, Mathew N.O. Sadiku, “Fundamentals of Electric Circuits”, 5th Edition, McGraw Hill, 9th Reprint, 2015.
3.	Allan H.Robbins, Wilhelm C.Miller, “Circuit Analysis Theory and Practice”, Cengage Learning, 5th Edition, 1st Indian Reprint, 2013.

Course Code	Course Title	L	T	P	J	C
22EST202	ENGINEERING GRAPHICS	1	0	4	0	3
		Syllabus version		v. 1.0		

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. To develop students, graphic skills for communication of concepts, ideas and design of engineering products.
2. To expose them to existing National standards related to technical drawings.
3. To Familiarize with basic geometrical constructions and orthographic projections.
4. To make the students to draw the different projections of the solids.
5. To view the true shape and apparent shape of the sectioned solids and their developments.
6. To get an idea about 3D views through isometric projections.

COURSE OUTCOME:

Upon completion of the course, the students should be able to

1. Perform basic geometrical constructions and principles of orthographic projections.
2. Project orthographic projections of lines and plane surfaces.
3. Draw projections of solids and development of surfaces.
4. Visualize and to project isometric views and conversion of Isometric views to Orthographic views.
5. Understand the basics of AUTO CAD and fundamentals of perspective projections.

UNIT-0	CONCEPTS AND CONVENTIONS (Not for Examination)	3+9 HOURS

Importance of graphics in engineering applications — Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT-1	PLANE CURVES,	3+9 HOURS

Conic Sections - Construction of Ellipse, Parabola & hyperbola by eccentricity method – Construction of cycloid. Introduction of Orthographic projection - free hand sketch.
First angle projection - projection of points and Projection of Lines (only for understanding)

UNIT-2	PROJECTION OF PLANES AND SOLIDS	3+9 HOURS

Projection of simple planes (Square, circular, Hexagon, Pentagon) inclined to both the principal planes by rotating object method. Projection of simple solids like Prism, Pyramid, Cylinder& Cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT-3	SECTION OF SOLIDS AND DEVELOPMENT SURFACES	3+9 HOURS
Sectioning of simple solids (Prism, Pyramid, Cylinder& Cone) in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of surfaces of right regular sectioned solids		
UNIT-4	**ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS**	**3+9 HOURS**
Principles of Isometric Projections-Isometric scale- Isometric Views of simple and truncated solids. Conversion of Isometric views of the objects to Orthographic views Exercises using free hand sketching.		
UNIT-5	**COMPUTER AIDED DRAFTING (Only for Internal Evaluation)**	**3+9 HOURS**
Introduction to engineering graphics CAD tools, Drawing Orthographic views from Isometric views using CAD tools--Floor plans of simple buildings- Exercise of circuit diagram (2D Orthographic Views) and 3D modeling (Isometric Views) using AutoCAD Software.		
Special points applicable to University Examinations on Engineering Graphics: 1. There will be five questions, each of either or type covering all units of the syllabus. 2. All questions will carry equal marks of 20 each making a total of 100. 3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size. 4. The examination will be conducted in appropriate sessions on the same day.		
	TOTAL LECTURE HOURS:	**60 HOURS**

TEXT BOOK(S):

1.	Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.
2.	Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.
3.	Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015

REFERENCE BOOKS:

1.	Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill, 2nd Edit ion, 2019.
2.	Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3.	Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

4.	Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
5.	Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009.
6.	Venugopal K. and Prabhu Raja V., “Engineering Graphics", New Age International (P) Limited, 2008.

Course Code	Course Title	L	T	P	J	C
22HSM201	TAMILS AND TECHNOLOGY	1	0	0	0	1
		Syllabus version			v. 1.0	

Unit-1	WEAVING AND CERAMIC TECHNOLOGY	03 hours
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		

Unit-2	DESIGN AND CONSTRUCTION TECHNOLOGY	03 hours
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.		

Unit-3	MANUFACTURING TECHNOLOGY	03 hours
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.		

Unit-4	AGRICULTURE AND IRRIGATION TECHNOLOGY	03 hours
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		

Unit-5	SCIENTIFIC TAMIL & TAMIL COMPUTING	03 hours
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.		
	Total Lecture hours:	15 hours

TEXT BOOK(S)

1.	The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies.)

2.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
3.	Tamilaga Varalaru, Makalum Panpadum- Dr. K.K. Pillai
4.	Kanini Tamil- Munaivar L. Sundaram
5.	Porunai- Attrangarai Nagarigam
REFERENCE BOOKS	
1.	Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2.	Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies.
3.	Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr. K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4.	Studies in the History of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by: The Author)
5.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6.	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) – Reference Book

Course Code	Course Title	L	T	P	J	C
22EET201	INNOVATIONS AND DESIGN THINKING	2	0	0	0	2
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

After studying this course, you should be able to:

1. Learn design thinking concepts and principles
2. Use design thinking methods in every stage of the problem
3. Learn the different phases of design thinking
4. Apply various methods in design thinking to different problems

COURSE OUTCOME:

Upon completion of the course, the students should be able to

1. Innovation of the new environmental conditions
2. Define key concepts of design thinking
3. Practice design thinking in all stages of problem-solving
4. Apply design thinking approach to real-world problems

UNIT-1	INNOVATIONS	6 HOURS

Introduction, innovation in current environment, types of innovation, schools of innovation, analyzing the current business scenario, challenges of innovation, steps of innovation management, experimentation in innovation management, participation for innovation, co-creation for innovation, prototyping to incubation. blue ocean strategy –I, blue ocean strategy-II. marketing of innovation, technology innovation process.

UNIT-2	DESIGN THINKING	6 HOURS
Design Thinking Approach:-Introduction to Design Thinking, Iterative Design Thinking Process Stages. Design Thinking as Divergent-Convergent Questioning. Design Thinking in a Team Environment, System Thinking, Product Thinking.		
UNIT-3	**UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM**	**6 HOURS**
Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.		
UNIT-4	**IDEATION AND PROTOTYPING**	**6 HOURS**
Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.		
UNIT-5	**TESTING AND IMPLEMENTATION**	**6 HOURS**
Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking. Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.		
	Total Lecture hours:	**30 hours**

Text Book(s)

1.	Christian Mueller-Rotenberg, Handbook of Design Thinking - Tips & Tools for how to design thinking.
2.	Designing for Growth: a design thinking tool kit for managers by Jeanne Liedtka and Tim Ogilvie.
3.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.
4.	John. R. Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage Learning (International edition) Second Edition, 2013

Reference Books

1.	Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017.
2.	Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
3.	HassoPlattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2014.

4.	Yousef Haik and Tamer M.Shahin, “Engineering Design Process”, Cengage Learning, Second Edition, 2011.

Course Code	Course Title	L	T	P	J	C
22ESP201	ENGINEERING PRODUCT LABORATORY	0	0	3	0	1.5
		Syllabus version			v. 1.0	

COURSE OBJECTIVES: The main learning objective of this course is to provide hands on training to the students in:

After studying this course, you should be able to:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work
5 Making a tray out of metal sheet using sheet metal work.
6. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

COURSE OUTCOME: At the end of the course, the student will be able to

At the end of the course, the student will be able to

1. Able to Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work
2. Able to make various electrical wiring joints in common household electrical wire work.
3. Able to Weld various joints in steel plates using arc welding work;
4. Able to Make a tray out of metal sheet using sheet metal work.
5. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

LIST OF EXPERIMENTS:

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

PART II ELECTRICAL ENGINEERING PRACTICES

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin sockets

b) Staircase wiring

c) Fluorescent Lamp wiring with introduction to CFL and LED types.

d) Energy meter wiring and related calculations/ calibration

e) Residential house wiring using fuse, switch, indicator, lamp and energy meter Diac/Triac/quadrac)

g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL ENGINEERING)

PART III MECHANICAL ENGINEERING PRACTICES

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

SHEET METAL WORK:

Making of a square tray, cylinder, prism

DEMO of 3D Printing, Smithy, Foundry

MACHINING – XTurning, drilling

PART IV ELECTRONIC ENGINEERING PRACTICES

a) Soldering simple electronic circuits and checking continuity
b) Printed circuit board making, soldering of electronic components,
c) Fabrication of equipment using of Simple drive systems-electrical/mechanical/pneumatic.
d) Fabrication of equipment using different types of sensors Piezo Electric Sensor, LVDT, Thermistors, Moisture sensor, LDR, Optical Encoders, Pneumatic Position Sensors, Range Sensors, Laser Range Meters, Proximity Sensors, Touch Sensors.
e) Fabrication of equipment using Arduino and Microcontrollers.
f) Fabrication of IoT based equipment

Total Laboratory hours:	**45 hours**

Course Code	Course Title	L	T	P	J	C
22ECP201	**CIRCUITS AND DEVICES LABORATORY**	**0**	**0**	**3**	**0**	**1.5**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To gain hands- on experience in Thevenin & Norton theorem, KVL & KCL, and Superposition Theorems.
2. To understand the working of RL, RC and RLC circuits
3. To learn the characteristics of PN Junction diode and Zener diode

COURSE OUTCOME:

At the end of the course, the student will be able to

1. Design RL and RC circuits.
2. Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems.
3. Characteristics of PN Junction Diode and Zener diode.

LIST OF EXPERIMENTS:
1. Verifications of KVL & KCL. 2. Verifications of Thevenin & Norton theorem. 3. Verification of Superposition Theorem. 4. Verification of maximum power transfer Theorem 5. Determination of Resonance Frequency of Series & Parallel RLC Circuits. 6. Characteristics of PN Junction Diode and Zener diode. 7. Design of Zener diode Regulator. 8. BJT Characteristics.

TOTAL LABORATORY HOURS:	**45 HOURS**

LANGUAGE ELECTIVE

Course Code	Course Title	L	T	P	J	C
22LET201	**FUNCTIONAL ENGLISH**	**3**	**0**	**2**	**0**	**4**
		Syllabus version			v. 1.1	

COURSE OBJECTIVES:

The course enables the learner to:

1. Gain confidence to respond in English in both academic and professional contexts
2. Improve presentation skills to make effective presentations
3. Foster the ability to write effectively in all contexts
4. Strengthen the skills related to teamwork and leadership roles in society as well as in the workplace

COURSE OUTCOME:

After the completion of this course, the students should be able to

1. Communicate fluently in professional situations
2. Express flexibility and appropriacy in Technical Events
3. Demonstrate complex forms and sentence structures with adequate vocabulary
4. Report events and the processes of technological & Industrial firms.
5. Present effective Profile in the context of job search

UNIT-1	**COMMUNICATIVE COMPETENCE**	**9 HOURS**

Speaking: Interactive skills- Initiation & turn taking; relevance to the topic, puzzles & riddles
Reading – Skimming, Scanning, Churning & Assimilation
Writing – Paragraphs; Free writing & opinion paragraphs
Grammar – Order of Adjectives, Primary Auxiliary Verbs
Vocabulary – Phonetics – sounds and symbols; Vocabulary used in letters and emails

UNIT-2	**SITUATIONAL CONVERSATIONS**	**9 HOURS**

Speaking – Practicing fluency- cohesion, coherence, and speed of delivery **Reading** – Reading social media messages **Writing** – Checklist; Letter to the editor **Grammar** – Infinitives, Gerunds and Participles, Interrogative and Reflexive Pronoun **Vocabulary** – Verbal Analogies, Same words used as different parts of speech		
Unit-3	**REPORT ON TECHNICAL EVENTS**	**9 hours**
Speaking –Mock TV news Reading/ anchoring **Reading** – Motivational essays on famous Engineers and Technologists **Writing** – Dialogue writing; Minutes of Meeting **Grammar** – Reported Speech, Modal Verbs **Vocabulary** – Technical Vocabulary, Jargon		
Unit-4	**DEVELOPING DISCUSSION SKILLS**	**9 hours**
Speaking – Giving short talks on technical topics **Reading -** Descriptive passages – magazines/ articles **Writing** – Recommendations; Job application **Grammar** – If conditional sentences, Articles **Vocabulary -** Purpose statements		
Unit-5	**PRESENTATION SKILLS**	**9 hours**
Speaking – Presentations using visual aids-Visume using appropriate body language and gestures; stating and asking for opinions and clarifications **Reading** – Predicting the content, speed reading techniques **Writing** – Precis Writing, Profile Writing **Grammar** – Mixed Tenses, Embedded Clause **Vocabulary** – Error Spotting, Sentence Completion		
	TOTAL LECTURE HOURS:	**45 HOURS**
List of Experiments :		
1. Initiation and turn taking		
2. Writing opinion paragraph		
3. Situational conversations		
4. Writing Checklists		
5. Mock TV news reading		
6. Writing the project proposal or Project report		
7. Short talk on technical topics		
8. Writing recommendations		
9. PPT Presentation		
10. Profile writing		
	TOTAL PRACTICAL HOURS:	**30 HOURS**
Text Book(s)		

1.	English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University
2.	Functional English for Communication (2022 edition) Ujjwala Kakarla, Guru Nanak Institutions Technical Campus (Autonomous), Hyderabad.
Reference Books	
1.	Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2.	Hewings, Martin. Advanced Grammar In Use. New Delhi: CUP,2008 MLA Handbook for Writers of Research Papers, 7th Edition
3.	Klaus Bruhn Jensen. A handbook of Media and Communication Research. Routledge, 2003

Course Code	Course Title	L	T	P	J	C
22LET202	FRENCH LANGUAGE	3	0	2	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To acquire an understanding of basic French language parts of speech
2. To facilitate learner's ability to learn the French language grammar.
3. To nurture learner's ability to understand the sentence structure
4. To foster technical writing skills through tenses and numbers
5. To comprehend various lectures and talks

COURSE OUTCOME:

1. Read and write technical basic French language parts of speech
2. Speak appropriately learner's ability to learn the French language grammar.
3. Listen and comprehend lectures learner's ability to understand the sentence structure
4. Write correctly, clearly and concisely technical writing skills through tenses and numbers
5. Prepare self-introduction comprehend various lectures and talks

UNIT-1	PARTS OF SPEECH	12 Hours

1. inviter et répondre à une invitation, Pronomssujets 2. L'articledéfinis, l'articleindéfinis 3. Conjugation :présent, adjectifspossessifs 4. interrogation, décrire les personnes 5. La vie de quatreparisiens de professions différentes

UNIT-2	ELEMENTS OF GRAMMAR:	12 HOURS

1. Exprimerl'ordre et l'obligation demander et commander 51
2. l'adjectifpossessifs, l‟articlepartitif, l'articledémonstratif, négation ne
3. pas, l'articlecontracté 4. verbepronominaux 5. prepositions

UNIT-3	SENTENCE STRUCTURE:	12 HOURS

1. Raconter et reporter-donner son avis 2. Futur simple, pronomcomplètementd'objet direct, passé composé 3. plusieursrégion de France, imparfait, pronom y/en, imparfait		
UNIT-4	**TENSES AND NUMBERS**	**12 HOURS**
1. Demander l'autorisation-passé récent, futurproche 2. La vie administrative et régionale, Pluriel des noms, moyens de transport		
UNIT-5	**DISCOURSE**	**12 HOURS**
1. le discoursrapporté, décrire un lieu, exprimersespréférences 2. décrire la carrière, discuterd ‟systèmeéducation de France 3. parler de la technologie de l‟information		
	Total Lecture hours:	45 hours

TEXT BOOK(S)	
1.	Christine Andantétal "À propos (livre de l'élève", LANGER., NEW DELHI,2012
2.	Myrna Bell Rochester "Easy French Step By Step", MCGraw Hill Companies., USA, 2008
REFERENCE BOOKS	
1.	Michael D. Oates "Entre Amis: An Interactive Approach", 5 th Edition, Houghton Mifflin., 2005
2.	Bette Hirsch, Chantal Thompson "Moments Literaries : An Anthology for intermediate French"
3.	Simone Renaud, Dominique van Hooff "En bonne forme

Course Code	Course Title	L	T	P	J	C
22LET203	GERMAN LANGUAGE	3	0	2	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To acquire an understanding of basic German language parts of speech
2. To facilitate learner’s ability to learn the German language grammar.
3. To nurture learner’s ability to understand the sentence structure
4. To foster technical writing skills through tenses and numbers
5. To comprehend various lectures and talks

COURSE OUTCOME:

1. Read and write technical basic German language parts of speech
2. Speak appropriately learner’s ability to learn the German language grammar.
3. Listen and comprehend lectures learner’s ability to understand the sentence structure
4. Write correctly, clearly and concisely technical writing skills through tenses and numbers
5. Prepare self-introduction comprehend various lectures and talks

UNIT-1	**GUTEN TAG!**	**10 HOURS**
1. To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages 2. Vocabulary: related to the topic 3. 3. Grammar: W – Questions, Verbs & Personal pronouns I		
UNIT-2	**FREUNDE, KOLLEGEN UND ICH**	**10 HOURS**
1. To speak about hobbies, jobs, learn numbers from 20; build dialogues and frame simple questions & answers 2. Vocabulary: related to the topic 3. Grammar: Articles, Verbs & Personal pronouns II, sein &haben verbs, ja/nein Frage, singular/plural		
UNIT-3	**IN DER STADT**	**12 HOURS**
1. To know places, buildings, question, know transport systems, understand international words; build dialogues and write short sentences 2. Vocabulary: related to the topic 3. Grammar: Definite & indefinite articles, Negotiation, Imperative with Sien verbs		
UNIT-4	**GUTEN APPETIT!**	**13 HOURS**
1. To speak about food, shop, converse; Vocabulary: related to the topic; build dialogues and write short sentences 2. Grammar: Sentence position, Accusative, Accusative with verbs, personal pronouns & prepositions, Past tense of haben& sein verbs		
UNIT-5	**TAG FŸR TAG/ZEIT MIT FREUNDEN**	**15 HOURS**
1. To learn time related expressions, speak about family, about birthdays, understand & write invitations, converse in the restaurant; ask excuse, fix appointments on phone 2. Vocabulary: related to the topic 3. Grammar: Time related prepositions, Possessive articles, Modalverbs		
	TOTAL LECTURE HOURS:	**60 HOURS**

TEXT BOOK(S)	
1.	Dengler Stefanie "Netzwerk A1.1", Klett-Langenscheidt Gmbh., München,2013
2.	Sandra Evans, Angela Pude "Menschen A1", HueberVerlag., Germany, 2012
REFERENCE BOOKS	
1.	Stefanie Dengler "Netzwerk A1", Klett-Langenscheidt Gmbh., München, 2013
2.	Hermann Funk, Christina Kuhn "Studio d A1", Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2009
3.	Rosa-Maria Dallapiazza "Tangram Aktuell 1 (Deutsch alsFremdsprache)", Max HueberVerlag., Munchen, 2004
4.	Christiane Lemcke und Lutz Rohrmann ""Grammatik Intensivtrainer A 1", Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2012

Course Code	Course Title	L	T	P	J	C
22LET204	JAPANESE LANGUAGE	3	0	2	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To acquire an understanding of basic Japanese language parts of speech
2. To facilitate learner's ability to learn the Japanese language grammar.
3. To nurture learner's ability to understand the sentence structure
4. To foster technical writing skills through tenses and numbers
5. To comprehend various lectures and talks

COURSE OUTCOME:

1. Read and write technical basic Japanese language parts of speech
2. Speak appropriately learner's ability to learn the Japanese language grammar.
3. Listen and comprehend lectures learner's ability to understand the sentence structure
4. Write correctly, clearly and concisely technical writing skills through tenses and numbers
5. Prepare self-introduction comprehend various lectures and talks

UNIT-1	JAPANESE PEOPLE AND CULTURE	12 HOURS

1. Basic greetings and responses
2. Basic script–Method of writing hiragana and katakana –Combination sounds and simple words
3. Self-introductions:"Hajimemashite" -Demonstratives "Kore", "Sore", "Are"–Demonstrative "Kono","Sono","Ano"
4. Possessive noun particle "no" –Japanese apartments: Greeting your neighbor

UNIT-2	PATICLE "NI (AT)" FOR TIME	12 HOURS

1. kara (from) ~ made(until) – Particle "to (and)"
2. Time periods: Days of the week, months, time of day –Verbs (Present / future and pasttense)
3. Telephone enquiry: Asking for a phone no. And business hours- Destination particle "e".

UNIT-3	LIKES AND DISLIKES	12 HOURS

1. Potential verbs (wakarimasu and dekimasu) – "Kara (~ because)"
2. Adverbs –Asking some one out over the phone-Verbs denoting presence
3. Introduction to Adjectives (na and ii type) -Verb groups – I, II and III – Exercises to group verbs- Please do (tekudasai)
4. Present continuous tenses (teimasu) – Shall I? (~ mashouka) – Describing a natural phenomenon (It is raining) (12)

UNIT-4	DIFFERENT USAGES OF ADJECTIVES	12 HOURS

1. Comparison –Likes and dislikes –Going to a trip- Need and desire (gahoshii) –Wanting to…(Tabetidesu)- Going for a certain purpose (mi –niikimasu) 2. Choosing from a menu-Adjectives (“i” and “na” type) – Adjectives (Positive and negative useage)		
UNIT-5	**ROLE PLAYS IN JAPANESE**	**12 HOURS**
1. Framing simple questions & answers 2. Writing Short paragraphs & Dialogues 3. A demonstration on usage of chopsticks and Japanese tea party (12)		
	Total Lecture hours:	**60 hours**
TEXT BOOK(S)		
1.	Minna no Nihongo, Honsatsu Roma "ji ban (Main Textbook Romanized Version)", International publisher – 3A Corporation., Tokyo, 2012	
REFERENCE BOOKS		
1.	EriBanno et.al "Genki I: An Integrated Course in Elementary Japanese I -Workbook", ., 1999	
2.	Tae Kim "A Guide to Japanese Grammar: A Japanese Approach to Learning Japanese Grammar", 2014	
3.	Minna No Nihongo "Translation & Grammatical Notes In English Elementary",	

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**J**	**C**
22NXP201	**NCC Credit Course Level 1* (ARMY WING)**	**1**	**0**	**0**	**0**	**1**
		Syllabus version			**v. 1.0**	
UNIT-1	**NCC GENERAL**				**3 HOURS**	
NCC 1 Aims, Objectives & Organization of NCC NCC 2 Incentives NCC 3 Duties of NCC Cadet NCC 4 NCC Camps: Types & Conduct						
UNIT-2	**NATIONAL INTEGRATION AND AWARENESS**				**3 HOURS**	
NI 1 National Integration: Importance & Necessity NI 2 Factors Affecting National Integration NI 3 Unity in Diversity & Role of NCC in Nation Building NI 4 Threats to National Security						
UNIT-3	**PERSONALITY DEVELOPMENT**				**3 HOURS**	
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving PD 2 Communication Skills PD 3 Group Discussion: Stress & Emotions						
UNIT-4	**LEADERSHIP**				**2 HOURS**	

L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code L 2 Case Studies: Shivaji, Jhasi Ki Rani		
UNIT-5	**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT**	**4 HOURS**
SS 1 Basics, Rural Development Programmes, NGOs, Contribution o Youth SS 2 Protection of Children and Women Safety SS 3 Road / Rail Travel Safety SS 4 New Initiatives SS 5 Cyber and Mobile Security Awareness		
	TOTAL LECTURE HOURS	**15 HOURS**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**J**	**C**
22NXP202	**NCC Credit Course Level 1* (NAVAL WING)**	**1**	**0**	**0**	**0**	**1**
		Syllabus version			**v. 1.0**	

UNIT-1	**NCC GENERAL**	**3 HOURS**
NCC 1 Aims, Objectives & Organization of NCC NCC 2 Incentives NCC 3 Duties of NCC Cadet NCC 4 NCC Camps: Types & Conduct		
UNIT-2	**NATIONAL INTEGRATION AND AWARENESS**	**3 HOURS**
NI 1 National Integration: Importance & Necessity NI 2 Factors Affecting National Integration NI 3 Unity in Diversity & Role of NCC in Nation Building NI 4 Threats to National Security		
UNIT-3	**PERSONALITY DEVELOPMENT**	**3 HOURS**
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving PD 2 Communication Skills PD 3 Group Discussion: Stress & Emotions		
UNIT-4	**LEADERSHIP**	**2 HOURS**
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code L 2 Case Studies: Shivaji, Jhasi Ki Rani		
UNIT-5	**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT**	**4 HOURS**
SS 1 Basics, Rural Development Programmes, NGOs, Contribution o Youth SS 2 Protection of Children and Women Safety SS 3 Road / Rail Travel Safety SS 4 New Initiatives SS 5 Cyber and Mobile Security Awareness		

TOTAL LECTURE HOURS	**15 HOURS**

COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**J**	**C**
22NXP203	**NCC Credit Course Level 1* (AIR FORCE WING)**	**1**	**0**	**0**	**0**	**1**
		Syllabus version			**v. 1.0**	

UNIT-1	**NCC GENERAL**	**3 HOURS**
NCC 1 Aims, Objectives & Organization of NCC NCC 2 Incentives NCC 3 Duties of NCC Cadet NCC 4 NCC Camps: Types & Conduct		
UNIT-2	**NATIONAL INTEGRATION AND AWARENESS**	**3 HOURS**
NI 1 National Integration: Importance & Necessity NI 2 Factors Affecting National Integration NI 3 Unity in Diversity & Role of NCC in Nation Building NI 4 Threats to National Security		
UNIT-3	**PERSONALITY DEVELOPMENT**	**3 HOURS**
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving PD 2 Communication Skills PD 3 Group Discussion: Stress & Emotions		
UNIT-4	**LEADERSHIP**	**2 HOURS**
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code L 2 Case Studies: Shivaji, Jhasi Ki Rani		
UNIT-5	**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT**	**4 HOURS**
SS 1 Basics, Rural Development Programmes, NGOs, Contribution o Youth SS 2 Protection of Children and Women Safety SS 3 Road / Rail Travel Safety SS 4 New Initiatives SS 5 Cyber and Mobile Security Awareness		
TOTAL LECTURE HOURS		**15 HOURS**

SEMESTER III

Course Code	Course Title	L	T	P	J	C
22BST302	PROBABILITY AND RANDOM PROCESSES	3	2	0	0	4
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
2. To understand the basic concepts of probability, one- and two-dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
3. To understand the basic concepts of random processes which are widely used in IT fields.
4. To understand the concept of correlation and spectral densities.
5. To understand the significance of linear systems with random inputs.

COURSE OUTCOME:

1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
3. Apply the concept random processes in engineering disciplines.
4. Understand and apply the concept of correlation and spectral densities.
5. The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable. Able to analyse the response of random inputs to linear time invariant systems.

Unit-1	PROBABILITY AND RANDOM VARIABLES	12 hours

Probability – Axioms of probability – Conditional probability – Baye ‘s theorem – Discrete and continuous random variables – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

Unit-2	TWO – DIMENSIONAL RANDOM VARIABLES	12 hours

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables

Unit-3	RANDOM PROCESSES	12 hours

Classification – Stationary process – Markov process – Markov chain – Poisson process

Unit-4	CORRELATION AND SPECTRAL DENSITIES	12 hours

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density- Properties

Unit-5	**LINEAR SYSTEMS WITH RANDOM INPUTS**	12 hours
Linear time invariant system – System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.		
	Total Lecture hours:	60 hours

Text Book(s)

1.	Ibe, O.C.," Fundamentals of Applied Probability and Random Processes ", 1st Indian Reprint, Elsevier, 2007
2.	Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", Tata McGraw Hill, 4th Edition, New Delhi, 2002.

Reference Books

1.	Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", Oxford University Press, New Delhi, 3rd Indian Edition, 2012
2.	Hwei Hsu, "Schaum‘s Outline of Theory and Problems of Probability, Random Variables and Random Processes ", Tata McGraw Hill Edition, New Delhi, 2004.
3.	Miller. S.L. and Childers. D.G., —Probability and Random Processes with Applications to Signal Processing and Communications ", Academic Press, 2004.
4.	Stark. H. and Woods. J.W., —Probability and Random Processes with Applications to Signal Processing ", Pearson Education, Asia, 3rd Edition, 2002.
5.	Yates. R.D. and Goodman. D.J., —Probability and Stochastic Processes", Wiley India Pvt. Ltd., Bangalore, 2nd Edition, 2012.

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22EST401	**ENVIRONMENTAL SCIENCES AND SUSTAINABILITY**	**2**	**0**	**0**	**0**	**2**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To study the nature and facts about environment.
2. To finding and implementing scientific, technological, economic and political solutions to environmental problems.
3. To study the interrelationship between living organism and environment.
4. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
5. To study the dynamic processes and understand the features of the earth"s interior and surface.
6. To study the integrated themes and biodiversity, natural resources, pollution control and waste management

COURSE OUTCOME:

1. Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain

knowledge on the following after completing the course.

2. Public awareness of environmental is at infant stage.
3. Ignorance and incomplete knowledge has lead to misconceptions
4. Development and improvement in std. of living has lead to serious environmental disasters

UNIT-1	ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY	6 HOURS

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

UNIT-2	ENVIRONMENTAL POLLUTION	6 HOURS

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts .

UNIT-3	NATURAL RESOURCES	6 HOURS

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT-4	SOCIAL ISSUES AND THE ENVIRONMENT	6 HOURS

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols- Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT-5	HUMAN POPULATION AND THE ENVIRONMENT	6 HOURS

Population growth, variation among nations – population explosion – family welfare Programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

	TOTAL LECTURE HOURS:	30HOURS

TEXT BOOK(S)

1.	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2.	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006

3.	Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition,Pearson Education, 2004.

REFERENCE BOOKS

1.	Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi,2007.
2.	Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015
3.	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

Course Code	Course Title	L	T	P	J	C
22ECT301	ELECTRONICS CIRCUITS	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To understand the operation, design and Analysis of low and high frequency amplifiers.
2. To analyze feedback amplifiers.
3. To analyze and design the frequency of oscillators.
4. To explain the operation of power amplifiers.
5. To understand the analysis of tuned circuits and its stability.

COURSE OUTCOME:

1. Apply the knowledge of BJT to design practical amplifier circuits.
2. Design a feedback amplifiers and power amplifiers to meet the required specifications.
3. Understand the operation of oscillator circuit.
4. Analyze multi vibrators using transistors.
5. Analyze the application of tuned amplifiers.

UNIT-1	BIASING AND SMALL SIGNAL ANALYSIS OF AMPLIFIERS	9 HOURS

DC Load line, Operating point, Various Biasing Methods for BJT-Design and Stability factors - Bias Compensation, Thermal Stability, Small signal Analysis of Common Emitter amplifiers. Cascaded stages - Cascode Amplifier.

UNIT-2	HIGH FREQUENCY ANALYSIS AND POWER AMPLIFIERS	9 HOURS

Miller effect, High frequency Analysis of CE Amplifier. Short Circuit Current gain, Cut off frequency –fβ, fT Determination of Bandwidth of Single Stage and Multistage Amplifiers. Large Signal Amplifiers- Class A, Class B, Class AB, Class C.

UNIT-3	FEEDBACK AMPLIFIERS	9 HOURS

Concept of feedback Amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, voltage shunt, Current series and current shunt Feedback configurations.		
UNIT-4	**OSCILLATORS**	**9 HOURS**
Conditions for oscillations, Frequency and Amplitude Stability of Oscillators, Generalized analysis of LC Oscillators, Quartz, Hartley, Colpitts, RC–phase shift and Wein Bridge oscillators.		
UNIT-5	**TUNED AMPLIFIERS**	**9 HOURS**
Small signal tuned amplifiers – Analysis of capacitor coupled single tuned amplifier – double tuned amplifier – Stagger tuned amplifiers – Stability of tuned amplifiers – Neutralization – Hazeltine neutralization method		
	TOTAL LECTURE HOURS:	**45 HOURS**
TEXT BOOK(S)		
1.	David A. Bell, “Electronic Devices and Circuits”, Fifth Edition, Oxford University Press, 2008.	
2.	Robert L Boylestead and Louis Nashelsky, “Electronic Devices and circuit theory”, Pearson, Tenth edition 2009.	
REFERENCE BOOKS		
1.	Millman J, Halkias.C.andSathyabradaJit, Electronic Devices and Circuits, 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.	
2.	Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4th Edition, , Mc Graw Hill Education (India) Private Ltd., 2017.	
3.	Millman and Halkias. C., Integrated Electronics, TMH, 2007.	

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22ECT302	**SIGNALS AND SYSTEMS**	**3**	**0**	**2**	**0**	**4**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To understand the basic properties of signal & systems
2. To know the methods of characterization of LTI systems in time domain
3. To analyze continuous time signals and system in the Fourier and Laplace domain
4. To analyze discrete time signals and system in the Fourier and Z transform domain

COURSE OUTCOME:

1. Determine if a given system is linear/causal/stable
2. Determine the frequency components present in a deterministic signal.
3. Characterize continuous LTI systems in the time domain and frequency domain
4. Characterize discrete LTI systems in the time domain and frequency domain
5. Compute the output of an LTI system in the time and frequency domains

UNIT-1	CLASSIFICATION OF SIGNALS AND SYSTEMS	9 HOURS

Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.

UNIT-2	ANALYSIS OF CONTINUOUS TIME SIGNALS	9 HOURS

Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and Properties

UNIT-3	LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS	9 HOURS

Impulse response - convolution integrals- Differential Equation- Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.

UNIT-4	ANALYSIS OF DISCRETE TIME SIGNALS	9 HOURS

Sampling and Quantization, Fourier Transform of discrete time signals (DTFT)– Properties of DTFT - Z Transform & Properties.

UNIT-5	LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS	9 HOURS

Impulse response–Difference equations -Convolution sum- Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems-DT systems connected in series and parallel.

TOTAL LECTURE HOURS: 45 HOURS

PRACTICAL EXERCISES:

MATLAB / EQUIVALENT SOFTWARE PACKAGE.

1. Generation of elementary Discrete-Time sequences.
2. Linear and Circular convolutions.
3. Analyze the stability of a CT system with various inputs.
4. Analyze the stability of a DT system with various inputs
5. Construction of signals with different frequencies.
6. Reconstruct a signal from sample.

TOTAL PRACTICAL HOURS:30 HOURS

TOTAL HOURS :75 HOURS

TEXT BOOKS:

1.	Oppenheim, Willsky and Hamid, “Signals and Systems”, 2nd Edition, Pearson Education, New Delhi, 2015.(Units I - V)
2.	Simon Haykin, Barry Van Veen, “Signals and Systems”, 2nd Edition, Wiley, 2002
Reference Books:	
1.	B. P. Lathi, “Principles of Linear Systems and Signals”, 2nd Edition, Oxford, 2009.
2.	M. J. Roberts, “Signals and Systems Analysis using Transform methods and MATLAB”, McGraw- Hill Education, 2018.
3.	John Alan Stuller, “An Introduction to Signals and Systems”, Thomson, 2007.

Course Code	Course Title	L	T	P	J	C
22ECT303	DIGITAL ELECTRONICS	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To present the fundamentals of digital circuits and simplification methods
2. To practice the design of various combinational digital circuits using logic gates
3. To bring out the analysis and design procedures for synchronous and asynchronous sequential circuits
4. To learn integrated circuit families.
5. To introduce semiconductor memories and related technology

COURSE OUTCOME:

1. Use Boolean algebra and simplification procedures relevant to digital logic.
2. Design various combinational digital circuits using logic gates.
3. Analyse and design synchronous sequential circuits.
4. Analyse and design asynchronous sequential circuits.
5. Build logic gates and use programmable device

UNIT-1	BASIC CONCEPTS	9 HOURS

Review of number systems-representation-conversions, Review of Boolean algebra-theorems, sum of product and product of sum simplification, canonical forms min term and max term, Simplification of Boolean expressions - Karnaugh map, completely and incompletely specified functions, Basic Gates, Implementation of Boolean expressions using universal gates, Tabulation methods.

UNIT-2	COMBINATIONAL LOGIC CIRCUITS	9 HOURS

Problem formulation and design of combinational circuits - Code-Converters, Half and Full

Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/ Demux		
UNIT-3	**SYNCHRONOUS SEQUENTIAL CIRCUITS**	**9 HOURS**
Latches, Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis and design of clocked sequential circuits – Moore/Mealy models, state minimization, state assignment, Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.		
UNIT-4	**ASYNCHRONOUS SEQUENTIAL CIRCUITS**	**9 HOURS**
Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits		
UNIT-5	**PROGRAMMABLE LOGIC DEVICES**	**9 HOURS**
Implementation of combinational logic/sequential logic design using standard ICs, PROM, PLA and PAL, basic memory, static ROM, PROM, EPROM, EEPROM, EAPROM		
	TOTAL LECTURE HOURS:	**45 HOURS**

TEXT BOOK(S)	
1.	M. Morris Mano and Michael D. Ciletti, “Digital Design”, 5th Edition, Pearson, 2014.
2.	Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011
REFERENCE BOOKS	
1.	Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.
2.	S.Salivahanan and S.Arivazhagan“Digital Electronics”, Ist Edition, Vikas Publishing House pvt Ltd, 2012.
3.	Soumitra Kumar Mandal “ Digital Electronics”, McGraw Hill Education Private Limited,2016.

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22HST301	**ENTREPRENEURSHIP AND STARTUPS**	**2**	**0**	**0**	**0**	**2**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To provide practical, proven tools for transforming an idea into a product or service that creates value for others
2. To build a winning strategy, how to shape a unique value proposition, prepare a business plan
3. To impart practical knowledge on business opportunities

4. To inculcate the habit of becoming an entrepreneur
5. To know the financing, growth, and new venture & its problems

COURSE OUTCOME:

1. Transform ideas into real products, services, and processes by validating the idea, testing it, and turning it into a growing, profitable, and sustainable business.
2. Identify the major steps and requirements to estimate the potential of an innovative idea as the basis of an innovative project.
3. Reach creative solutions via an iteration of a virtually endless stream of world-changing ideas and strategies, integrating feedback and learning from failures along the way.
4. Apply the ten entrepreneurial tools in creating a business plan for a new innovative venture.
5. Apply methods and strategies learned from interviews with start-up entrepreneurs and innovators

UNIT-1	ENTREPRENEURIAL COMPETENCE	9 HOURS

Introduction to Entrepreneurship & Entrepreneur Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship, the role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management, and the Future of Entrepreneurship. The Entrepreneur: Means the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system.

UNIT-2	BUSINESS PLAN PREPARATION AND PROTOTYPING	9 HOURS

Business Opportunity Identification and Preparing a Business Plan Business ideas, methods of generating ideas, and opportunity recognition, Idea Generation Process, Feasibility study, preparing a Business Plan: Meaning and significance of a business plan, components of a business plan. Experimentation and incubation, Participation in Innovation & Co-creation, and Prototyping

UNIT-3	ENTREPRENEURIAL ENVIRONMENT	9 HOURS

Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services - Central and State Government Industrial Policies and Regulations

UNIT-4	LAUNCHING OF SMALL BUSINESS	9 HOURS

Financing & Launching the New Venture Importance of new venture financing, types of ownership, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks. Launching the New Venture: Choosing the legal form of the new venture, protection of intellectual property, and formation of the new venture

UNIT-5	MANAGEMENT OF SMALL BUSINESS	9 HOURS
Managing Growth & Rewards in New Venture Characteristics of high growth new ventures, strategies for growth, and building the new ventures. Managing Rewards: Exit Strategies for Entrepreneurs, Mergers and acquisitions, Succession and exit strategy, managing failures – bankruptcy - Business Sickness - Effective Management of Small Business - Case Studies		
	TOTAL LECTURE HOURS:	**45 HOURS**

TEXT BOOK(S)

1.	Stephen Key, "One Simple Idea for Start-ups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company", 1st Edition, Tata Mc Graw hill Company, New Delhi, 2013.
2.	Charles Bamford and Garry Bruton, "ENTREPRENEURSHIP: The Art, Science, and Process for Success", 2nd Edition, Tata Mc Graw hill Company, New Delhi, 2016.

REFERENCE BOOKS

1.	Philip Auerswald, "The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy", Oxford University Press, 2012.
2.	Janet Kiholm Smith; Richard L. Smith; Richard T. Bliss, "Entrepreneurial Finance: Strategy, Valuation, and Deal Structure, Stanford Economics and Finance", 2011.
3.	Edward D. Hess, "Growing an Entrepreneurial Business: Concepts and Cases", Stanford Business Books, 2011.

Course Code	Course Title	L	T	P	J	C
22ECP301	ELECTRONIC CIRCUITS LABORATORY	0	0	3	0	1.5
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To learn the Frequency response of CE, CB, CC, CS Amplifier.
2. To understand the Transfer characteristics of differential amplifier.
3. To study the various Oscillator circuits and power amplifiers.

COURSE OUTCOME:

1. Analyse the limitation in bandwidth and single stage and multistage amplifier.
2. Design and Testing of BJT and MOSFET amplifiers.
3. Operation of power amplifiers.

LIST OF EXPERIMENTS:

1. Frequency response of CE and CS amplifiers. 2. Frequency response of CB and CC amplifiers. 3. Frequency response of Cascade Amplifier 4. CMRR measurement of Differential Amplifier 5. Class A Transformer Coupled Power Amplifier 6. Series and Shunt feedback amplifiers - Frequency response, input and output impedance. 7. RC Phase shift oscillator and Wien Bridge Oscillator. 8. Hartley Oscillator and Colpitts Oscillator. 9. Single Tuned Amplifier.

TOTAL LABORATORY HOURS:	**45 HOURS**

Course Code	Course Title	L	T	P	J	C
22ECP302	**DIGITAL ELECTRONICS LABORATORY**	**0**	**0**	**3**	**0**	**1.5**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. Get practical experience in design, realisation and verification of Demorgan's Theorem
2. Design Full/Parallel Adders and Subtractors
3. Design and learn Multiplexer using logic gates, Demultiplexer and Decoder
4. Verify the function of Flip-Flops
5. Design Shift registers and Counters using Flip flops

COURSE OUTCOME:

1. Justify NAND and NOR as Universal gates and verify SOP and POS expressions using them.
2. Verify De Morgan's Theorem for 2 variables using logic gates.
3. Design, Build and test combinational circuits such as adders, Subtractor, comparators, multiplexers demultiplexers and decoders.
4. Construct flips-flops using NAND gates and verify their functionality.
5. Realize synchronous and asynchronous counters and its applications using flip-flop IC’s
6. Construct the types of shift registers using flip-flop IC’s and verify their functionality.

LIST OF EXPERIMENTS:

1. To realize Basic gates (AND, OR, NOT) From Universal Gates (NAND & NOR).
2. To verify

(a) Demorgan's Theorem for 2 variables
(b) The sum-of product and product-of-sum expressions using universal gates

3. To design and implement 4-bit Parallel Adder/ Subtractor using IC 7483
4. To realize (a) 4:1 Multiplexer using gates

   (b) 3-variable function using IC 74151(8:1 MUX)
5. To realize (a) 1:8 Demultiplexer and

   (b) 3:8 Decoder using IC74138
6. To design 4 bit comparator circuit using logic gates
7. To realize the following flip-flops using NAND Gates:

(a) Clocked SR Flip-Flop
(b) JK Flip-Flop

8. To realize the following shift registers using Ic7474:

(a) SISO (b) SIPO
(c) PISO (d) PIPO

9. To realize the Ring Counter and Johnson Counter using Ic7476
10. To realize the Mod-N Counter using Ic7490

TOTAL LABORATORY HOURS:	**45 HOURS**

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22EEP301	**SOFT SKILLS**	**0**	**0**	**2**	**0**	**1**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. Do self-introspection and develop right attitude
2. Understand the self-motivation and mange his abilities with time
3. Understand the inter personal skills
4. Know the leader’s qualities and develop as a leader
5.Undersating the conflict at work and make right decisions

COURSE OUTCOME:

1. Able to develop self-confidence through right attitude
2. Use self-motivation and to manage his abilities
3. Effectively use inter personal skills
4. Develop leadership qualities
5. Able to make right decisions and solving conflicts

UNIT-1	SELF ANALYSIS	6 HOURS
Introduction, SWOT analysis, self-introspection, self confidence and self-esteem, Creativity -Out of the box thinking, Creative thinking and Lateral thinking, Factors influencing attitude, Influence of attitude on behaviour, Synergy between knowledge, skill and attitude,		
UNIT-2	**GROWTH FACTORS**	**6 HOURS**
Motivation, Motivational factors, Self-motivation, Intrinsic and extrinsic motivators, Goal setting, SMART goals, Short, long, life time goals, Time management, Value of time, Test your Time management skill, Prioritizing work, Time management matrix		
UNIT-3	**INTERPERSONAL SKILLS**	**6 HOURS**
Gratitude, Secret of happiness, Understanding the integration of leadership, networking and teamwork, situation analysis, Importance of teamwork, Teamwork activity, Stress Management-Causes of stress and its impact, how to manage and de-stress		
UNIT-4	**LEADERSHIP**	**6 HOURS**
Skills needed for a good leader, Types of leadership style, Assessment of leadership skills, Wheel of leadership, Personal, social and professional etiquette Emotional intelligence, Emotional quotient and intelligence quotient, Emotion scale, Managing emotions		
UNIT-5	**CONFLICT RESOLUTION AND DECISION MAKING**	**6 HOURS**
Conflicts in human relations, Self-assessment test for conflict management, Approaches to conflict resolution, Case study **Decision making-** Importance of decision making, Impact of decision in life, Process and practical way of decision making.		
	TOTAL LECTURE HOURS:	**30 HOURS**

TEXT BOOK(S)	
1.	SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.
REFERENCE BOOKS	
1.	Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
2.	Carnegie Dale, How to Win Friends and Influence People, New York: Simon & Schuster, 1998.
3.	Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972.
4	Daniel Coleman, Emotional Intelligence, Bantam Book, 2006.
5	Carnegie Dale, How to stop worrying and start living, New York: Simon & Schuster, 1985.
6	http://empower.srmuniv.ac.in (online LMS)

SEMESTER – IV

Course Code	Course Title	L	T	P	J	C
22ECT401	COMMUNICATION SYSTEMS	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To introduce Analog Modulation Schemes
2. To understand the concept of narrowband and wide band FM and interpret the effect of noise in FM receiver
3. To impart knowledge of baseband pulse transmission, inter-symbol interference and its compensation methods
4. To study the scheme of passband digital transmission for band limited and wideband signals
5. To study the characteristics of discrete memory less channel and provide the solution for lossless, error free communications

COURSE OUTCOME:

At the end of the course the students will be able to

1. Gain knowledge in amplitude modulation techniques
2. Understand the concepts of FM
3. Gain knowledge in baseband pulse transmission
4. Understand the scheme of passband digital transmission
5. Understand the concepts of information theory and coding techniques.

UNIT-1	AMPLITUDE MODULATION	9 HOURS

Introduction: Modulation and its need– Linear modulation schemes: DSBSC, SSBSC and VSB-power spectrum – Frequency translation – Frequency division multiplexing – Super heterodyne receivers – Noise in AM receivers: coherent detection, envelope detection – Noise figure.

UNIT-2	ANGLE MODULATION	9 HOURS

Frequency modulation, Narrowband FM, Wideband FM – Generation of FM: indirect method – FM demodulation: frequency discriminator – Non-linear effects in FM systems – Noise in FM receivers – capture effect – pre-emphasis and de-emphasis in FM

UNIT-3	PULSE MODULATION AND BASEBAND PULSE TRANSMISSION	9 HOURS

Sampling process – PAM – Quantization process –PCM – TDM – Delta modulation, Line coding: unipolar NRZ, Polar NRZ, Unipolar RZ, Manchester – Matched Filter as optimum receiver – Intersymbol Interference – Eye patterns – Nyquist Criterion for distortion less baseband binary transmission – Pulse shaping with raised cosine filter – Duobinary signaling.		
UNIT-4	**PASSBAND DIGITAL TRANSMISSION AND SPREAD SPECTRUM COMMUNICATION**	**9 HOURS**
Introduction – Coherent Phase shift keying: BPSK, QPSK – QAM- BER analysis of BPSK and QPSK-concepts of MSK-Spread Spectrum: PN sequence and its properties- Direct Sequence Spread Spectrum ,Frequency Hopping Spread Spectrum.		
UNIT-5	**INFORMATION THEORY AND CODING:**	**9 HOURS**
Entropy and its properties – Source coding theorem : Huffman coding, Shannon coding, LZ coding – Discrete Memory less Channel – mutual information and its properties – Channel coding theorem – information capacity theorem; Hamming codes – Convolutional codes – Trellis diagram– Viterbi algorithm		
	TOTAL LECTURE HOURS:	**45 HOURS**
TEXT BOOK(S)		
1.	Simon Haykin, Michael Moher, "Introduction to Analog and Digital Communications", 2nd Edition, John Wiley & Sons, New Delhi, 2012.	
2.	B.P.Lathi, “Modern Digital and Analog Communication Systems”, 4th Edition, Oxford University Press, 2011	
REFERENCE BOOKS		
1.	D.Roody, J.Coolen, Electronic Communications, 4th edition PHI 2006	
2.	A.Papoulis, “Probability, Random variables and Stochastic Processes”, McGraw Hill, 3rd edition, 1991	
3.	B.Sklar, “Digital Communications Fundamentals and Applications”, 2nd Edition Pearson Education 2007	

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22ECT402	**LINEAR INTEGRATED CIRCUITS AND APPLICATIONS**	**3**	**0**	**0**	**0**	**3**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To introduce the basic building blocks of linear integrated circuits
2. To learn the linear and non-linear applications of operational amplifiers
3. To learn the theory of ADC and DAC
4. To introduce the concepts of waveform generation and introduce some special function ICs

5. To introduce the theory and applications of analog multipliers and PLL

COURSE OUTCOME:

At the end of the course the students will be able to

1. Design linear and nonlinear applications of OP – AMPS
2. Design applications using analog multiplier and PLL
3. Design ADC and DAC using OP – AMPS
4. Analyze special function ICs
5. Gain knowledge of Analog multiplier and PLL

UNIT-1	BASICS OF OPERATIONAL AMPLIFIERS	9 HOURS

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT-2	APPLICATIONS OF OPERATIONAL AMPLIFIERS	9 HOURS

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT-3	ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS	9 HOURS

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters, Sigma – Delta converters

UNIT-4	WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS	9 HOURS

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Switched capacitor filter, Frequency to Voltage and Voltage to Frequency converters.

UNIT-5	ANALOG MULTIPLIER AND PLL	9 HOURS

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, closed loop analysis, Voltage controlled oscillator, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing and clock synchronization	
TOTAL LECTURE HOURS:	**45 HOURS**
TEXT BOOK(S)	
1.	D.Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V)
2.	Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 4th Edition, Tata Mc Graw-Hill, 2016 (Unit I – V)
REFERENCE BOOKS	
1.	Ramakant A. Gayakwad, “OP-AMP and Linear ICs”, 4th Edition, Prentice Hall / Pearson Education, 2015
2.	Robert F.Coughlin, Frederick F.Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, Sixth Edition, PHI, 2001.
3.	S.Salivahanan & V.S. Kanchana Bhaskaran, “Linear Integrated Circuits”, TMH,2nd Edition, 4th Reprint, 2016

Course Code	Course Title	L	T	P	J	C
22ECT403	ELECTROMAGNETIC FIELD THEORY	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To impart knowledge on the basics of static electric field and the associated laws
2. To impart knowledge on the basics of static magnetic field and the associated laws
3. To give insight into coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations
4. To gain the behaviour of the propagation of EM waves
5. To study the significance of Time varying fields.

COURSE OUTCOME:

1. Relate the fundamentals of vector, coordinate system to electromagnetic concepts
2. Analyze the characteristics of Electrostatic field
3. Interpret the concepts of Electric field in material space and solve the boundary conditions
4. Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions.

5. Determine the significance of time varying fields

UNIT-1	INTRODUCTION	9 HOURS

Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Null identities, Helmholtz's theorem, Verify theorems for different path, surface and volume.

UNIT-2	ELECTROSTATICS	9 HOURS

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Boundary conditions, Electrostatics boundary value problems, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations, Uniqueness of electrostatic solutions, Current density and Ohm's law, Electromotive force and Kirchhoff's voltage law, Equation of continuity and Kirchhoff's current law.

UNIT-3	MAGNETOSTATICS	9 HOURS

Lorentz force equation, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Calculation of magnetic field intensity for various current distributions Magnetic circuits, Behaviour of magnetic materials, Boundary conditions, Inductance and inductors, Magnetic energy, Magnetic forces and torques

UNIT-4	TIME-VARYING FIELDS AND MAXWELL'S EQUATION	9 HOURS

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields, Observing the Phenomenon of wave propagation with the aid of Maxwell's equations

UNIT-5	PLANE ELECTROMAGNETIC WAVES	9 HOURS

Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

TOTAL LECTURE HOURS:	45 HOURS

TEXT BOOK(S)

1.	D.K. Cheng, Field and wave electromagnetics, 2nd ed., Pearson (India), 2002
2.	M.N.O.Sadiku and S.V. Kulkarni, Principles of electromagnetics, 6th ed., Oxford(Asian Edition), 2015

REFERENCE BOOKS	
1.	Edward C. Jordan & Keith G. Balmain,Electromagnetic waves and Radiating Systems, Second Edition, Prentice-Hall Electrical Engineering Series, 2012.
2.	W.H. Hayt and J.A. Buck, Engineering electromagnetics, 7th ed., McGraw-Hill (India), 2006
3.	B.M. Notaros, Electromagnetics, Pearson: New Jersey, 2011

Course Code	Course Title	L	T	P	J	C
22ECT404	CONTROL SYSTEMS	3	0	0	0	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To introduce the components and their representation of control systems
2. To learn various methods for analyzing the time response, frequency response and stability of the systems.
3. To learn the various approach for the state variable analysis.

COURSE OUTCOME:

1. Identify the various control system components and their representations.
2. Analyze the various time domain parameters.
3. Analysis the various frequency response plots and its system.
4. Apply the concepts of various system stability criterions.
5. Design various transfer functions of digital control system using state variable models.

UNIT-1	SYSTEMS COMPONENTS AND THEIR REPRESENTATION	9 HOURS

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory, mathematical modelling of physical systems; Transfer function, block diagrams, signal flow graphs, state-space models.

UNIT-2	TIME RESPONSE ANALYSIS	9 HOURS

Time domain analysis: performance specifications, steady state error, transient response of first and second order systems: proportional integral, PI, PD, and PID controllers.

UNIT-3	FREQUENCY RESPONSE AND SYSTEM ANALYSIS	9 HOURS

Closed loop frequency response-Performance specification in frequency domain-Frequency response of standard second order system-Bode Plot-Polar Plot, Design of compensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascade lag-lead compensation.

UNIT-4	CONCEPTS OF STABILITY ANALYSIS	9 HOURS
Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus-Nyquist stability criterion.		
UNIT-5	**CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS**	**9 HOURS**
State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer function and state variable representations-State variable analysis of digital control system-Digital control design using state feedback.		
TOTAL LECTURE HOURS:		**45 HOURS**
TEXT BOOK(S)		
1.	M.Gopal, “Control System – Principles and Design”, Tata McGraw Hill, 4th Edition, 2012.	
2.	J.Nagrath and M.Gopal, “Control System Engineering”, New Age International Publishers, 5th Edition, 2007.	
REFERENCE BOOKS		
1.	K.Ogata, “Modern Control Engineering”, PHI, 5th Edition, 2012.	
2.	S.K.Bhattacharya, “Control System Engineering”, Pearson, 3rd Edition, 2013.	
3.	Benjamin.C.Kuo, “Automatic Control Systems”, Prentice Hall of India, 7th Edition,1995.	

Course Code	Course Title	L	T	P	J	C
22ECT405	MICROCONTROLLER BASED SYSTEM DESIGN	3	0	0	1	3
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. Describe the architecture, Instruction sets and peripherals of the 8051 Microcontroller.
2. Write programs for 8051 Microcontroller to interfacing the peripheral devices
3. Describe the architecture, Instruction sets and peripherals of the PIC Microcontroller.
4. Write programs for PIC Microcontroller to interfacing the peripheral devices
5. Distinguish and Summarize the various components in System Design using Microcontrollers.

COURSE OUTCOME:

1. The student would be well versed on the layered communication architectures
2. The student would have gained an understanding of the need for different protocols at the different layers and their interworking.
3. The student will have an exposure to the various digital switching techniques.

UNIT-1	**8051 ARCHITECTURE**	**9 HOURS**
Architecture memory organization addressing modes - instruction set -Timers- Interrupts - I/O ports, Interfacing I/O Devices Assembly language programming - Serial Communication - LCD Display Interfacing Keypad interfacing.		
UNIT-2	**PIC MICROCONTROLLER**	**9 HOURS**
Architecture memory organization-addressing modes instruction set PIC programming in Assembly & C - MP-LAB Interrupts- I/O ports.		
UNIT-3	**PERIPHERAL OF PIC MICROCONTROLLER**	**9 HOURS**
I2C bus Timers -A/D converter D/A Converter -UART- CCP modules Flash and EEPROM memories		
UNIT-4	**INTERFACING WITH PIC**	**9 HOURS**
Interfacing LCD Display Keypad Interfacing - Generation of Gate signals for converters and Inverters - Motor Control Controlling AC appliances Measurement of frequency.		
UNIT-5	**SYSTEM DESIGN-CASE STUDY**	**9 HOURS**
Sensor Interfacing - Standalone Data Acquisition System - case study: Air condition machine - ATM - Ticket vending machine		
	TOTAL LECTURE HOURS:	**45 HOURS**

LIST OF PROJECTS

1. USING 8051 SORT THE ARRAY OF STRINGS
2. TRAFFIC LIGHT CONTROLLER
3. STEPPER MOTOR CONTROLLER
4. A/D AND D/A CONVERTER
5. DIGITAL TACHOMETER

TOTAL PROJECT HOURS: 30 HOURS
TOTAL HOURS :75 HOURS

TEXT BOOK(S)

1.	Ayala, Kenneth, “The 8051 Microcontroller” Delmar Cengage Learning, 2004.

2.	John Iovine, “PIC Microcontroller Project Book”, McGraw Hill 2004.
REFERENCE BOOKS	
1.	Myke Predko, “Programming and customizing the 8051 Microcontroller”, Tata McGraw Hill 2001.
2.	Michael Slater, “Microcontroller based desing a comprehensive guide to effective Hardware Design”, Prentice Hall, 1989, New Jersey.
3.	Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, “PIC Microcontroller and Embedded System using Assembly and C for PIC18”, Pearson Education, 2008.

Course Code	Course Title	L	T	P	J	C
22ECP401	LINEAR INTEGRATED CIRCUITS LAB	0	0	3	0	1.5
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To gain hands on experience in designing electronic circuits.
2. To learn simulation software used in circuit design.
3. To learn the fundamental principles of amplifier circuits.
4. To differentiate feedback amplifiers and oscillators.
5. To differentiate the operation of various multivibrators.

COURSE OUTCOME:

1. Analyze various types of feedback amplifiers.
2. Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators.
3. Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave-shaping circuits and multivibrators, filters using SPICE Tool.
4. Design amplifiers, oscillators, D-A converters using operational amplifiers.
5. Design filters using op-amp and perform an experiment on frequency response.

LIST OF EXPERIMENTS:

Design and Analysis of the Following Circuits

1. Series and Shunt feedback amplifiers-Frequency response, Input and output impedance
2. RC Phase shift oscillator and Wien Bridge Oscillator
3. Hartley Oscillator and Colpitts Oscillator
4. RC Integrator and Differentiator circuits using Op-Amp
5. Clippers and Clampers
6. Instrumentation amplifier
7. Active low-pass, High pass & Band pass filters
8. R-2R ladder type D-A converter using Op-Amp

Simulation Using SPICE (Using Transistor):

1. Tuned Collector Oscillator
2. Twin -T Oscillator / Wein Bridge Oscillator
3. Double and Stagger tuned Amplifiers
4. Astable Multivibrator

5. Schmitt Trigger circuit with Predictable hysteresis	
Total Lecture hours:	**45 hours**

Course Code	**Course Title**	**L**	**T**	**P**	**J**	**C**
22ECP402	**COMMUNICATION SYSTEMS LAB**	**0**	**0**	**3**	**0**	**1.5**
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. To study the AM & FM Modulation and Demodulation.
2. To learn and realize the effects of sampling and TDM.
3. To understand the PCM & Digital Modulation.
4. To Simulate Digital Modulation Schemes.
5. To Implement Equalization Algorithms and Error Control Coding Schemes.

COURSE OUTCOME:

1. Design AM, FM & Digital Modulators for specific applications.
2. Compute the sampling frequency for digital modulation**.**
3. Simulate & validate the various functional modules of Communication system.
4. Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes.
5. Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of Communication system.

LIST OF EXPERIMENTS:

1. AM- Modulator and Demodulator
2. FM - Modulator and Demodulator
3. Pre-Emphasis and De-Emphasis.
4. Signal sampling and TDM.
5. Pulse Code Modulation and Demodulation.
6. Pulse Amplitude Modulation and Demodulation.
7. Pulse Position Modulation and Demodulation and Pulse Width Modulation and Demodulation.
8. Digital Modulation – ASK, PSK, FSK.
9. Delta Modulation and Demodulation.
10. Simulation of ASK, FSK, and BPSK Generation and Detection Schemes.
11. Simulation of DPSK, QPSK and QAM Generation and Detection Schemes.
12. Simulation of Linear Block and Cyclic Error Control coding Schemes.

Total Laboratory hours:	**45 hours**

Course Code	Course Title	L	T	P	J	C
22EEP401	QUANTITATIVE APTITUDE AND LOGICAL REASONING -1	0	0	2	0	1
		Syllabus version			v. 1.0	

COURSE OBJECTIVES:

1. This module would train the students on the quick ways to solve quantitative aptitude problems and questions applying logical reasoning, within a short time span given during the placement drives.

COURSE OUTCOME:

1. Solve quantitative aptitude problems
2. Apply logical Reasoning
3. Developing quantitative literacy skills

LIST OF EXPERIMENTS:

1. Mock interviews on one-on-one basis
2. Quantitative aptitude
3. Partnership
4. Simple Interest, Compound Interest
5. Profit and Loss
6. Problems on Clock, Calendar and Cubes
7. Permutation and Combination
8. Allegation and mixtures
9. Logical Reasoning
10. Letter and Symbol series
11. Number series
12. Analyzing arguments
13. Making judgments

TOTAL LECTURE HOURS:	**30 Hours**