ELECTRONICS & COMMUNICATION ENGINEERING
COURSE STRUCTURE
B.TECH I SEMESTER

S. No.	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC1T01	BSC	Linear Algebra and Differential Equations	3	-	-	3	3
2	20EC1T02	BSC	Applied Physics	3	-	-	3	3
3	20EC1T03	HSMC	English	3	-	-	3	3
4	20EC1T04	ESC	Electronic Devices	2	-		2	2
5	20EC1T05	ESC	Problem solving through C	3	-	-	3	3
6	20EC1L06	HSMC	English Communication Skills Lab	-	-	3	3	1.5
7	20EC1L07	BSC	Applied Physics Lab	-	-	3	3	1.5
8	20EC1L08	ESC	Problem solving through C Lab	-	-	3	3	1.5
9	20EC1L09	ESC	Electronic Devices Lab	-	-	2	2	1
Total number of Credits								**19.5**

B.TECH II SEMESTER

S.No.	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC2T01	BSC	Transform Techniques	3	-	-	3	3
2	20EC2T02	BSC	Applied Chemistry	3	-	-	3	3
3	20EC2T03	ESC	Network Theory	3	-	-	3	3
4	20EC2T04	ESC	Basic Electrical Technology	3	-	-	3	3
5	20EC2T05	ESC	Engineering Drawing	1	-	4	5	3
6	20EC2L06	BSC	Applied Chemistry Lab	-	-	3	3	1.5
7	20EC2L07	ESC	Engineering & IT Workshop	-	-	3	3	1.5
8	20EC2L08	ESC	Basic Electrical Technology Lab	-	-	3	3	1.5
9	20EC2M09	MC	Environmental Science	3	-	-	3	0
Total number of Credits								**19.5**

B.TECH III SEMESTER

S.No.	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC3T01	BSC	Complex Variables	3	0	0	3	3
2	20EC3T02	PCC	Probability Theory and Stochastic Processes	3	0	0	3	3
3	20EC3T03	PCC	Digital Electronics	3	0	0	3	3
4	20EC3T04	PCC	Signals & Systems	3	0	0	3	3
5	20EC3T05	PCC	Electronic Circuits Analysis	3	0	0	3	3
6	20EC3L06	PCC	Electronics Circuits Analysis Lab	0	0	3	3	1.5
7	20EC3L07	PCC	Signals & Systems Lab	0	0	3	3	1.5
8	20EC3L08	PCC	Digital Electronics Lab	0	0	3	3	1.5
9	20EC3S09	SC	Data Structures through C	0	0	4	4	2
Total number of credits								**21.5**

B.TECH IV SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC4T01	BSC	Numerical Methods and Vector Calculus	3	0	0	3	3
2	20EC4T02	ESC	Control Systems	2	0	0	2	2
3	20EC4T03	PCC	Analog Integrated Circuits	3	0	0	3	3
4	20EC4T04	PCC	Electromagnetic Waves and Transmission lines	3	0	0	3	3
5	20EC4T05	HSMC	Managerial Economics and Financial Analysis	3	0	0	3	3
6	20EC4T06	PCC	Analog and Digital Communications	3	0	0	3	3
7	20EC4L07	PCC	Analog Integrated Circuits lab	0	0	2	2	1
8	20EC4L08	PCC	Analog and Digital Communications Lab	0	0	3	3	1.5
9	20EC4S09	SC	Python Programming	0	0	4	4	2
10	20EC4M10	MC	Constitution of India	2	0	0	2	0
Total number of credits								**21.5**
Honors/Minor courses				**4**	**0**	**0**	**4**	**4**

B. Tech V SEMESTER

S. No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC5T01	PCC	Microprocessors and Microcontrollers	3	-	-	3	3
2	20EC5T02	PCC	Antennas and Wave Propagation	3	-	-	3	3
3	20EC5T03	PCC	Digital system Design using VHDL& Verilog	3	-	-	3	3
4	**Open Elective–I**			3	-	-	3	3
Professional Elective–I								
5	20EC5T07	PEC-I	Computer Architecture and Organization	3	-	-	3	3
	20EC5T08		Telematics					
	20EC5T09		Cellular and Mobile Communications					
6	20EC5L10	PCC	Microprocessors and Micro-controllers Lab	-	-	3	3	1.5
7	20EC5L11	PCC	Digital system Design using VHDL & Verilog Lab	-	-	3	3	1.5
8	20EC5S12	SC	JAVA Programming	-	-	4	4	2
9	20EC5M13	MC	Essence of Indian Traditional knowledge	2	-	-	2	-
10	20EC5I14	I	Summer internship	-	-	-	-	1.5
Total number of credits								**21.5**
Honors/Minor courses				**4**	**0**	**0**	**-**	**4**

B. Tech VI SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC6T01	PCC	VLSI Design	3	-	-	3	3
2	20EC6T02	PCC	Digital Signal Processing	3	-	-	3	3
3	20EC6T03	PCC	Microwave Engineering	3	-	-	3	3
Professional Elective-II								
4	20EC6T04	PEC-II	Embedded systems	3	-	-	3	3
	20EC6T05		Electronics Measurements and Instrumentation					
	20EC6T06		Digital Modulation Techniques					
5	**Open Elective–II**			3	-	-	3	3
6	20EC6L10	PCC LAB	Microwave Engineering and optical communications Lab	-	-	3	3	1.5
7	20EC6L11	PCC LAB	VLSI Design lab	-	-	3	3	1.5
8	20EC6L12	PCC LAB	Digital Signal Processing Lab	-	-	3	3	1.5
9	20EC6S13	SC	Soft Skills	-	-	4	4	2
10	20EC6M14	MC	Disaster Management	2	-	-	2	-
11	20EC6P15	P	Community Service Project	-	-	-	-	4
Total number of credits								**25.5**
Honors/Minor courses				**4**	**-**	**-**	**-**	**4**

B. Tech VII SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
Professional Elective-III				3	0	0	3	3
1	20EC7T01	PEC-III	CMOS Analog IC Design					
	20EC7T02		Data Communications And Networks					
	20EC7T03		Information theory and Coding					
Professional Elective-IV				3	0	0	3	3
2	20EC7T04	PEC-IV	Digital Image processing					
	20EC7T05		Low power VLSI Design					
	20EC7T06		Optical Communications					
Professional Elective-V				3	0	0	3	3
3	20EC7T07	PEC-V	Radar Engineering					
	20EC7T08		Embedded real time Operating Systems					
	20EC7T09		Satellite Communications					
4	**Open Elective-III**			3	0	0	3	3
5	**Open Elective-IV**			3	0	0	3	3
6	20EC7T16	HSMC	Universal Human values 2 Understanding Harmony	3	0	0	3	3
7	20EC7S17	SC	Internet of things applications with Latest Boards	-	-	4	4	2
8	20EC7I18	I	Industrial Internship	-	-	-	-	3
Total number of credits								**23**
Honors/Minor courses				4	0	0	-	**4**

B. Tech VIII SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC8P01	P	Project work	-	-	-	-	8
Total number of credits								**8**

OPEN ELECTIVE –I:

S. No.	Course Code	Course Name	L	T	P	C	Offered by
1	20CE5T04	Architecture and Town Planning	3	0	0	3	CE
2	20CE5T05	Elements of Civil Engineering	3	0	0	3	CE
3	20EE5T04	Basics of Control Systems	3	0	0	3	EEE
4	20EE5T05	Special Electrical Machines	3	0	0	3	EEE
5	20ME5T04	Design Thinking & Product Innovation	3	0	0	3	ME
6	20ME5T05	Nanotechnology	3	0	0	3	ME
7	20EC5T04	Linear System Analysis	3	0	0	3	ECE
8	20EC5T05	Digital Logic Design	3	0	0	3	ECE
9	20EC5T06	Solid State Devices	3	0	0	3	ECE
10	20CS5T07	Introduction to Artificial Intelligence	3	0	0	3	CSE
11	20CS5T08	Operating System	3	0	0	3	CSE
12	20CS5T09	Software Engineering	3	0	0	3	CSE
13	20IT5T07	Computer Networks	3	0	0	3	IT
14	20IT5T08	Computer Graphics	3	0	0	3	IT
15	20HS5T01	Quantitative Aptitude and Reasoning	3	0	0	3	BED
16	20MB5T01	Principles of Management	3	0	0	3	DMS
17	20MB5T02	Technology Management	3	0	0	3	DMS
18	20AD5T07	Foundations of Data Science	3	0	0	3	AIDS
19	20AM5T07	Introduction to Machine Learning	3	0	0	3	AIML

OPEN ELECTIVE –II:

S. No.	Course Code	Course Name	L	T	P	C	Offered by
1	20CE6T08	Remote Sensing and GIS	3	0	0	3	CE
2	20CE6T09	Environmental Impact Assessment	3	0	0	3	CE
3	20EE6T08	Renewable Energy Sources	3	0	0	3	EEE
4	20EE6T09	Energy Audit, Conservation and Management	3	0	0	3	EEE
5	20ME6T07	Industrial Robotics	3	0	0	3	ME
6	20ME6T08	3D Printing	3	0	0	3	ME
7	20EC6T07	Electronic Circuits and Networks	3	0	0	3	ECE
8	20EC6T08	Principles of Communications	3	0	0	3	ECE
9	20EC6T09	Microcontrollers and its Applications	3	0	0	3	ECE

10	20CS6T07	Introduction to Machine Learning	3	0	0	3	CSE
11	20CS6T08	Information Security	3	0	0	3	CSE
12	20CS6T09	Agile Technologies	3	0	0	3	CSE
13	20IT6T07	Fundamentals of Machine Learning	3	0	0	3	IT
14	20IT6T08	Database Management Systems	3	0	0	3	IT
15	20HS6T01	Operations Research	3	0	0	3	BED
16	20MB6T01	Organizational Behaviour	3	0	0	3	DMS
17	20MB6T02	Project Management	3	0	0	3	DMS
18	20AD6T07	Visual Analytics	3	0	0	3	AIDS
19	20AM6T07	Big data Analytics	3	0	0	3	AIML

OPEN ELECTIVE –III:

S. No.	Course code	Course Name	L	T	P	C	Offered by
1	20CE7T13	Construction Technology and Management	3	0	0	3	CE
2	20CE7T14	Green Buildings	3	0	0	3	CE
3	20EE7T13	Concept of Power System Engineering	3	0	0	3	EEE
4	20EE7T14	Instrumentation	3	0	0	3	EEE
5	20ME7T10	Green Engineering Systems	3	0	0	3	ME
6	20ME7T11	Hybrid Electric Vehicles	3	0	0	3	ME
7	20EC7T10	Data Communications	3	0	0	3	ECE
8	20EC7T11	Mechatronics	3	0	0	3	ECE
9	20EC7T12	Bio Medical Instrumentation	3	0	0	3	ECE
10	20CS7T10	Artificial Neural Networks	3	0	0	3	CSE
11	20CS7T11	Cyber Security	3	0	0	3	CSE
12	20CS7T12	Software Testing Methodologies	3	0	0	3	CSE
13	20IT7T10	Internet of Things	3	0	0	3	IT
14	20IT7T11	Computer Vision	3	0	0	3	IT
15	20HS7T01	Fuzzy sets	3	0	0	3	BED
16	20MB7T01	Digital Media management	3	0	0	3	DMS
17	20MB7T02	Entrepreneurship Development	3	0	0	3	DMS
18	20AD7T10	Data Analysis and Visualization with Python	3	0	0	3	AIDS
19	20AM7T10	NoSQL Databases	3	0	0	3	AIML

OPEN ELECTIVE –IV:

S. No.	Course Code	Course Name	L	T	P	C	Offered by
1	20CE7T15	Waste water treatment	3	0	0	3	CE
2	20CE7T16	Repair and Rehabilitation of Concrete Structures	3	0	0	3	CE
3	20EE7T15	Power Quality	3	0	0	3	EEE
4	20EE7T16	Electric Vehicles	3	0	0	3	EEE
5	20ME7T12	Micro-Electro- Mechanical Systems	3	0	0	3	ME
6	20ME7T13	Solar Energy Systems	3	0	0	3	ME
7	20EC7T13	Introduction to Embedded Systems	3	0	0	3	ECE
8	20EC7T14	Internet of Things	3	0	0	3	ECE
9	20EC7T15	Analog and Digital IC applications	3	0	0	3	ECE
10	20CS7T13	Data Analytics	3	0	0	3	CSE
11	20CS7T14	Block Chain Technology	3	0	0	3	CSE
12	20CS7T15	Software Project Management	3	0	0	3	CSE
13	20IT7T13	Cloud Computing	3	0	0	3	IT
14	20IT7T14	Business Intelligence	3	0	0	3	IT
15	20HS7T02	Polymer Chemistry	3	0	0	3	BED
16	20MB7T03	Total Engineering Quality Management	3	0	0	3	DMS
17	20MB7T04	Stress Management	3	0	0	3	DMS
18	20AD7T11	Natural Language Processing	3	0	0	3	AIDS
19	20AM7T11	Deep Learning	3	0	0	3	AIML

HONORS/MINOR COURSES OFFERED BY THE DEPARTMENT

Honors/ Minor Course Fulfillments:

- The 20 additional credits need to be acquired, 16 credits can be earned by undergoing specified courses, with each carrying 4 credits.
- The remaining 4 credits must be acquired through two online MOOCs (SWAYAM /NPTEL), which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of Studies.
- Minor Engineering subjects are offered to other branches by ECE Department (except for ECE Students).
- Honors engineering subjects are offered to ECE Students.
- The head of the department will float the list of allowed MOOC electives in each academic year, based on the list floated by MOOCs (SWAYAM/NPTEL).

HONORS COURSES

S.No.	Course code	Course Name	L	T	P	C
		Pool-1				
1	20ECHN01	Micro Electronic Devices	4	0	0	4
2	20ECHN02	Wireless sensor Networks	4	0	0	4
3	20ECHN03	CMOS Digital IC Applications	4	0	0	4
4	20ECHN04	Image and Video Processing	4	0	0	4
		Pool-2				
5	20ECHN05	Analog VLSI Design	4	0	0	4
6	20ECHN06	Spread spectrum Communications	4	0	0	4
7	20ECHN07	Advanced Digital Signal processing	4	0	0	4
8	20ECHN08	Optical Networks	4	0	0	4
		Pool-3				
9	20ECHN09	VLSI Signal Processing	4	0	0	4
10	20ECHN10	Wireless Communications	4	0	0	4
11	20ECHN11	Adaptive Signal Processing	4	0	0	4
12	20ECHN12	Software Design Radio	4	0	0	4
		Pool-4				
13	20ECHN13	FPGA Design	4	0	0	4
14	20ECHN14	DSP Processors & Architecture	4	0	0	4
15	20ECHN15	Soft Computing Techniques	4	0	0	4
16	20ECHN16	RF and Mixed signals Circuits	4	0	0	4

MINOR COURSES

S.No.	Course code	Course Name	L	T	P	C	Offered by
1	20ECMN01	Systems and Signal Processing	4	0	0	4	**ECE**
2	20ECMN02	Networks and Transmission Lines	4	0	0	4	**ECE**
3	20ECMN03	Modulation Techniques	4	0	0	4	**ECE**
4	20ECMN04	Analog Electronics	4	0	0	4	**ECE**
5	20ECMN05	Sensors and Actuators	4	0	0	4	**ECE**
6	20ECMN06	Antenna Theory	4	0	0	4	**ECE**
7	20ECMN07	Digital Electronics	4	0	0	4	**ECE**
8	20ECMN08	Mobile Communications	4	0	0	4	**ECE**
9	20ECMN09	Advanced Microcontrollers	4	0	0	4	**ECE**
10	20ECMN10	Statistical Signal Processing	4	0	0	4	**ECE**
11	20ECMN11	Mixed System Design	4	0	0	4	**ECE**
12	20ECMN12	Nano Technology	4	0	0	4	**ECE**

		L	T	P	C
B.TECH I SEMESTER	**BSC**	**3**	**0**	**0**	**3**

20EC1T01 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Pre-requisite: Basic knowledge about matrices, differentiation and integration

Course Objective: Objective of the course is to impart

- Basic understanding of mathematical methods to solve simultaneous linear systems
- Understanding of formation and solutions of ordinary differential equations
- Knowing the mathematical methods to solve applications of differential equations

Course Outcomes:

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

CO1: Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

CO2: Illustrate the methods of computing eigen values and eigen vectors

CO3: Able to analyze the real life situations, formulate the differential equations and then applying the methods

CO4: Determine the solutions of linear differential equations

CO5: Optimize functions of several variables and able to find extreme values of constrained functions

SYLLABUS

UNIT-I: Linear systems of equations:

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence of vectors, Consistency of linear system of equations, System of linear homogeneous equations, Gauss-elimination and Gauss -Jordan methods.

UNIT-II: Eigen values & Eigen vectors:

Eigen values, Eigen vectors, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix using

C-H theorem, Reduction to diagonal form, reduction of quadratic form to canonical form using orthogonal reduction, nature of quadratic forms.

UNIT-III: Ordinary Differential Equations of first order:

Linear equations, Bernoulli's equation, Exact differential equations. Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay &growth., R-L series circuits.

UNIT-IV: Linear Differential Equations higher order:

Definitions, Complete solution (without proof), Operator D, Rules to find complementary function, Inverse operator, Rules to find the particular integral(nonhomogeneous term of the form e^{ax} , sin(ax+b), cos(ax+b), polynomials in x^m, e^{ax} V(x), any other function), Method of variation of parameters.

UNIT-V: Partial Differentiation:

Functions of two variables, Partial derivatives, Homogeneous functions, Euler's theorem, Total derivative, Jacobian and functional dependence, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI &Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH I SEMESTER **BSC**

L	T	P	C
3	0	0	3

20EC1T02 APPLIED PHYSICS

Pre-requisite: Knowledge of basic concepts of waves, Optics, Electricity and Magnetism

Course Objective: Objective of the course is to impart

- ***Knowledge*** of fundamentals of Physics which helps them in the study of advanced topics of Engineering.
- ***Develop*** analytical capability and understand various Engineering concepts.

Course Outcomes:

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

CO1: ***Impart*** knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes

CO2: ***Gain*** knowledge of applications of lasers and optical fibers in various fields .

CO3: ***Classify*** magnetic and dielectric materials and their Engineering applications.

CO4: ***Understand*** basic quantum mechanics and free electron theories.

CO5: ***Obtain*** the concept of concept of holes and electrons in semiconductors.

SYLLABUS

UNIT-I: Wave Optics:

Interference: Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Colors in thin films-Newton's rings-Determination of wave length nd refractive index.

Diffraction: C Introduction- Fresnel and Fraunhofer diffraction - Fraunhofer Diffraction due to Single slit, Double slit, N –slits(Qualitative) - Diffraction Grating – Resolving Power of Grating(Qualitative).

Polarizations: Introduction- Types of polarization-polarization by reflection, refraction and Double refraction-Nicol's prism –Half and Quarter wave plates.

UNIT-II: Lasers and Fiber Optics:

Lasers:: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

Fiber optics: Introduction –Principle of optical fiber-Construction- - Acceptance Angle - Numerical Aperture -Classification of optical fibers based on refractive index profile and modes .

UNIT-III: Magnetic and Dielectric Materials:

Magnetic Materials: Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para ferro, anti ferro&ferri – Domain concept of Ferromagnetism(Qualitative) - Hysteresis – soft and hard magnetic materials .

Dielectric Materials: Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation.

UNIT-IV: Quantum Mechanics, Free Electron Theory:

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution- Density of States(3D),Fermi energy.

UNIT-V: Band Theory of Solids and Semiconductors:

Band theory of Solids: Introduction- Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - V vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

Semiconductors::Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Drift and Diffusion currents – Einstein's equation-Hall effect- Hall coefficient - Applications of Hall effect.

Text Books

1. "A Text book of Engineering Physics" by M.N.Avadhanulu, P.G.Kshirsagar - S.ChandPublications, 2019.
2. "Engineering Physics" by D.K.Bhattacharya and PoonamTandon, Oxford press (2015).
3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - DhanpatRai publishers, 2012.

Reference Books

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
3. Physics for Engineers by M.R. Srinivasan, New Age international publishers (2009).

B.TECH I SEMESTER **HSMC**

L	T	P	C
3	0	0	3

20EC1T03 ENGLISH

Pre-requisite:

Course Objective:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes: At the end of the course, student will be able to

CO1 understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

CO2 ask and answer general questions on familiar topics

CO3 employ suitable strategies to master the art of letter writing and email writing

CO4 recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

CO5 form sentences using proper grammatical structures and correct word forms

SYLLABUS

UNIT-I A Drawer full of happiness (Detailed Study)

	Deliverance (Non-detailed Study)
UNIT-II	Nehru's letter to his daughter Indira on her birthday(Detailed Study) Bosom Friend (Non-detailed Study)
UNIT-III	Stephen Hawking-Positivity 'Benchmark' (Detailed Study) Shakespeare's Sister(Non-detailed Study)
UNIT-IV	Liking a Tree, Unbowed: Wangari Maathai-biography (Detailed Study) Telephone Conversation(Non-detailed Study)
UNIT-V	Stay Hungry-Stay foolish (Detailed Study) Still I Rise(Non-detailed Study)

Text Books

1. "Infotech English", Maruthi Publications. (Detailed)
2. "The Individual Society", Pearson Publications.(Non-detailed)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition,2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) MacmillanEducational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP,2012.

B.TECH I SEMESTER **ESC**

L	T	P	C
2	0	0	2

20EC1T04 ELECTRONIC DEVICES

Pre-requisite: Physics

Course Objective: the students can able to Analyze the characteristics electronic devices such as diodes, transistors in different modes etc., and simple circuits like rectifiers, clippers and clampers.

Course Outcomes: At the end of the course, student will be able to

CO1: Understand basic semiconductor devices

CO2: Observe characteristics diodes

CO3: Analyze applications of Semiconductor diodes

CO4: Characterize the Bipolar Junction Transistor in different modes

CO5: Understand the construction and working of Field Effect Transistor

SYLLABUS

UNIT-I: Semi-Conductor Physics

Introduction, Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors, Charge density, current components in semiconductors, Continuity equation. Active and passive components.

UNIT-II: Diodes

PN junction diode- Energy band diagram of PN junction Diode- V-I Characteristics - Current components in PN junction Diode- Diode equation- Diode resistance and capacitance- Characteristics of Zener Diode- Varactor Diode- SCR ,UJT ,Photodiode and LED

UNIT-III: Diode Applications

Half wave, Full wave Rectifier and Bridge rectifier- Derivations of characteristics of rectifiers- Filters- Inductive and Capacitive filters, Clipping& Clamping Circuits.

UNIT-IV: Bipolar Junction Transistor

Bipolar Junction Transistor- Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB,CC& CE configurations- junction biasing condition for active, saturation and cut-off modes, current gain α, β and γ.h-parameter representation of a transistor.

UNIT-V: Field Effect Transistors (FET):

Junction Field Effect Transistor construction & operation- characteristics CS, CD & CG- - **MOSFET:** Metal Oxide Semiconductor Field Effect Transistor- Types- Construction- Operation & characteristics

Text Books:

1. 1.Electronic Devices & Circuits –J.Millman, C.Halkias, Tata Mc-graw Hill,2nd Edition
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, 2ndEdition
3. D.P. Kothari andI. J. Nagrath, -Basic Electrical Engineering‖, Tata McGraw Hill, 2010.

Reference Books:

1. D.C.Kulshreshtha,-Basic Electrical Engineering‖, McGraw Hill, 2009.
2. Basic Electronic Circuits -V.K.Mehta,S-chandPublications,2008.
3. Electronic Devices & Circuits-David-A-Bell, oxford University Press 5thEdition.

		L	T	P	C
B.TECH I SEMESTER	**ESC**	**3**	**0**	**0**	**3**

20EC1T05 PROBLEM SOLVING THROUGH C

Pre-requisite:

Course Objective:

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. To assimilate about File I/O and significance of functions

Course Outcomes: At the end of the course, student will be able to

CO1: Understand the basic concepts of programming

CO2: Understand and Apply loop construct for a given problem

CO3: Demonstrate the use pointers

CO4: Understand the use of functions and develop modular reusable code

CO5: Understand File I/O operations

SYLLABUS

UNIT-I:

INTRODUCTION TO COMPUTERS: Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process, Computer Numbering system

BASICS OF C PROGRAMMING: Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT-II:

Decision making statements: if, if else, nester if. Multi way decision making statements: else if, Switch statement. **Loop statements**: while, do while, for, Compilation process.

UNIT-III:

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, two dimensional arrays, Matrix Operations, Multi-dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT-IV:

FUNCTIONS: Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS: Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation

UNIT-V:

STRUCTURES AND UNIONS: Structure, Nested structures, Pointer and Structures, Array of structures, Example Program using structures and pointers, Self-referential structures, Unions.

FILE PROCESSING: Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

Text Books:

1. Krnighan. B.W and Ritche, D.M, “The C Programming Language”, Second Edition, Pearson Education, 2006
2. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.

References:

1. Pradepdey, Manas Ghosh, “Fundamentals of Computing and programming in C”, First Edition, Oxford University Press, 2009.
2. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh Edition, Pearson Publication.
3. E Balagursamy, “Programming in C, Sixth Edition, Tata McGraw Hill.
4. Ajay Mittal, “Programming in C A practical Approach”, Pearson education

		L	T	P	C
B.TECH I SEMESTER	**HSMC**	**0**	**0**	**3**	**1.5**

20EC1L06 ENGLISH COMMUNICATION SKILLS LAB

Course Objectives:

- Facilitate effective usage of functional English through role plays
- Focus on vocabulary enhancement
- Foster various nuances of phonetics and accent neutralization

Course Outcomes: At the end of the course, student will be able to

CO1: Acquire basic proficiency in English by learning functional aspects of English language

CO2: Learn the methods of enhancing vocabulary

CO3: Acquaint himself/herself with nuances of Phonetics

LIST OF EXPERIMENTS

1 Greetings and Introductions

2 Requesting Permission & Giving Directions

3 Inviting/Complaining/Congratulating

4 Root Words

5 Phonetics-Sounds and Symbols

6 Pronunciation Rules

References:

1. Strengthen Your Steps, Maruti Publications

2. Interact, Orient Blackswan

3. Word Power Made Easy, Pocket Books

B.TECH I SEMESTER	BSC	L	T	P	C
		0	0	3	1.5

20EC1L07 APPLIED PHYSICS LAB

Pre-requisite: Fundamental understanding of usage of an instrument with proper care.

Course Objective: Objective of the course is to impart

- Training Engineering graduates to handle instruments and their usage methods to improve the accuracy of measurements.

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

CO1: **Outcomes**:The student is exposed to different methodsof chemical analysis and use of some commonly employed instruments. They thus acquire someexperimentalskills.

CO2: Implement the basic principles of Mechanics to measure different physical parameters.

CO3: Enhance the knowledge of Usage of electronic devices in various applications

SYLLABUS

1. Newton's rings –Determination of radius of curvature of Plano Convex Lens.
2. Determination of wavelength of spectral lines -Diffraction Grating
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating
5. Determination of Numerical Aperture and bending loss of a given Optical Fiber.
6. Determination of dispersive power of prism.
7. Determination of Rigidity modulus of a material- Torsional Pendulum.
8. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
9. Determination of Young's modulus by method of single cantilever oscillations
10. Verification of laws of vibrations in stretched strings – Sonometer.
11. Estimation of Planck's Constant using Photo electric Effect

12. Study of I /V Characteristics of Semiconductor diode.
13. I/V characteristics of Zener diode.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
15. Energy Band gap of a Semiconductor using p - n junction diode

ReferenceBooks

1.A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017.

B.TECH I SEMESTER		ESC	L	T	P	C
			0	0	3	1.5
20EC1L08	PROBLEM SOLVING THROUGH C LAB					

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers &functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

- Demonstrate Knowledge on various concepts of a C language.
- Able to draw flowcharts and write algorithms.
- Able design and development of C problem solving skills.
- Able to design and develop modular programming skills.
- Able to trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( )function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name
3. Write a program in C to remove a file from the disk.

B.TECH I SEMESTER		**ESC**	**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**

20EC1L09 ELECTRONIC DEVICES LAB

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

Course objectives:

- To study basic electronic components
- To observe characteristics of electronic devices

Course outcomes:

At the end of the course the students can able to

- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
- Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers,

LIST OF EXPERIMENTS
(All Experiments has to be performed)

1. Identification of circuit Components
2. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multi meter, Function
3. Generator, Regulated Power Supply and CRO.
4. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
5. Soldering Practice- Simple circuits using active and passive components.
6. CRO Operation and its Measurements
7. **Characteristics of Semiconductor Diode and Zener Diode:** Determination of forward and reverse resistance from VI characteristics.
8. **Static Characteristics of BJT under CE Mode:** Transistor Biasing **Determination** of h-parameters h_{ie}, $h_{re}$from input characteristics and

h_{fe}& h_{oe} from outputcharacteristics.

9. **Static Characteristics of JFET:** Determination of $r_d$from drain characteristics and $g_m$from mutual characteristics and hence obtain μ.
10. **Characteristics of UJT and SCR:** Determination of intrinsic standoff ratio from emitter characteristics.
11. **Resonant Circuits:** Characteristics of Series and Parallel Circuits, Determination of quality factor and bandwidth.
12. **Half Wave and Full Wave Rectifier with and Without Filter**: Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.
13. **Bridge Rectifier with and without C-Filter:** Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.
14. **Diode Clipping Circuits:** Design and display the transfer characteristics of single ended series, shunt type and double ended shunt type clipping circuits.

B.TECH II SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC2T01 TRANSFORM TECHNIQUES

Pre-requisite: Linear Algebra and Differential Equations

Course Objective: Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

Course Outcomes: At the end of the course, student will be able to

CO1: Able to analyze a class of integrals in terms of beta and gamma functions

CO2: Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

CO3: Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

CO4: Illustrate the methods to solve the boundary value problems

CO5: Determine a solution of a discrete system using Z- transforms

SYLLABUS

UNIT-I: Special functions:

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-II: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t, Evaluation of improper integrals. Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). Application: Application to differential equations.

UNIT-III: Fourier Series &Fourier Transforms:

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of inerval, Even and odd functions, Half-range series.

Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem(without proof), finite & infinite Fourier sine & cosine transforms.

UNIT-IV: Partial Differential Equations:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

UNIT-V: Z-Transforms: (all properties without proofs)

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting U_n to the right, multiplication by n, initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

3. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
4. N. P. BALI &Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH II SEMESTER	BSC	L	T	P	C
		3	0	0	3

20EC2T02 APPLIED CHEMISTRY

Pre-requisite: Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

Course Objective: Objective of the course is to impart

- Importance of usage of plastics in house hold appliances and composites(FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of green chemistry and molecular switches

Course Outcomes: At the end of the course, student will be able to

CO1: Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.

CO2: Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

CO3: Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.

CO4: Design models for energy by different natural sources. Analyzetheprinciplesofdifferentanalyticalinstrumentsandtheirapplications.

CO5: Obtain the knowledge of green chemistry and molecular machines

SYLLABUS

UNIT-I: Polymer Technology:

Polymerisation: Introduction, methods of polymerization (addition and Condensation), Physical and mechanical properties.

Plastics: Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

Elastomers: Natural rubber-Drawbacks-vulcanization, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics – GFRP and Aramid FRP

Conducting polymers: Intrinsic and extrinsic conducting polymers

Biodegradable polymers: preparation and applications

UNIT-II: Electrochemical Cells And Corrosion:

Part I*: ELECTROCHEMICAL CELLS:* Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H2-O2, CH3OH-O2, phosphoric acid and molten carbonate).

Part II: *Corrosion:* Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (cathodic protection), Protective coatings (cathodic coatings, anodic coatings, electroplating and electroless plating)

UNIT-III: Material Chemistry:

Part I*: Non-elemental semiconducting materials*: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Super conductors:-Type –I, Type II-characteristics and applications

Part II: *Nano materials:* Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals: Introduction-types-applications.

UNIT-IV: Non-Conventional Energy Sources & Spectroscopy:

Part I: NON-CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

Part II: **SPECTROSCOPY**

UV spectroscopy- Basic principle-Instrumentation-Applications

IR spectroscopy- Basic principle-Instrumentation-Applications

NMR spectroscopy- Basic principle-Instrumentation-Applications

UNIT-V: Advanced Concepts/Topics In Chemistry:

Part-I*: Green chemistry*: Introduction, Principles of green chemistry, Green synthesis-Aqueous Phase method-Microwave method-Phase transfer catalysis method, R4M4 principles (Econoburette).

PART-II: *Molecular switches*: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid- base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor.

TextBooks:

1. P.C. Jainand M.Jain “Engineering Chemistry”,15/e, Dhanpat Rai &Sons, Delhi,(Latest edition).
2. Shikha Agarwal,“Engineering Chemistry”, Cambridge University Press, New Delhi,(2019).
3. S.S. Dara, “A Text book of Engineering Chemistry ”,S. Chand &Co,(2010).
4. Shashi Chawla, “Engineering Chemistry”, Dhanpat Rai Publicating Co.(Latest edition).

References:

1. K.SeshaMaheshwarammaandMridulaChugh,“EngineeringChemistry”,PearsonIndia
2. O.G.Palana,“EngineeringChemistry”,TataMcGrawHillEducationPrivateLimited,(2009).
3. CNR Rao and JM Honig (Eds) “Preparation and characterization of materials” Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, “Textbook of Nano science and Nanotechnology”, University press (latest edition)

B.TECH II SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC2T03 NETWORK THEORY

Pre-requisite:

Course objectives:

The primary objective of this course is:

- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To know the basic Laplace transforms techniques in periods‘ waveforms.
- To understand the two port network parameters.
- To understand the properties of LC networks and filters

Course Outcomes: At the end of the course, student will be able to

CO1: Gain the knowledge on basic network elements and graph theory.

CO2: Understand Network Theorems and applications

CO3: Analyze Coupled circuits and Resonance.

CO4: Will analyze the RLC circuit‘s behavior in detailed.

CO5: Gain the knowledge in characteristics of two port network parameters

SYLLABUS

UNIT-I: Introduction to Electrical Circuits

Network Elements- Sources- Sources Conversions- Kirchhoff‘s laws- RMS value, Average value, Form factor and peak factor- Phasor representation. **Graph Theory:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule.

UNIT-II: Network Theorems:

Thevinin‘s, Norton‘s, Milliman‘s, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens and Duality.

UNIT-III: Coupled Circuits:

Self inductance, Mutual inductance, Coefficient of coupling, Natural current, conductively coupled equivalent circuits- **Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, current in anti resonance, anti resonance at all frequencies.

UNIT-IV: Time and Frequency Domain Analysis of Electrical Circuits :

Time domain analysis of R-L R-C and RL-C circuits, initial and final conditions of Network elements, steady state and transient response, Analysis of electrical circuits using Laplace Transform, steady state analysis using phasors, solutions of network equations using Laplace Transform, frequency domain analysis of RL-Circuit.

UNIT-V: Two-port networks

Relationship of two port networks, Z-parameters, Y parameters Transmission line parameters, h-parameters, Inverse h parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks.

Text books:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition,2000.
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning,2ndEdition,2005

References:

1. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.2002
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers pearson publishers 2005

B.TECH II SEMESTER **ESC**

L	T	P	C
3	0	0	3

20EC2T04 BASIC ELECTRICAL TECHNOLOGY

Pre-requisite: Fundamental in Engineering Mathematics and Physics

Course Objective:

- To understand the principle of operation and construction details of DC machines.
- To understand the principle of operation and construction details of transformer.
- To understand the principle of operation and construction details of 3-Phase induction motor.
- To Understand the principles and construction of special machines

Course Outcomes: At the end of the course, student will be able to

CO1: Understand the operation of DC generators.

CO2: Able to understand the operation of DC motors, Speed control methods.

CO3: Analyse the performance of transformer.

CO4: Explain the operation of 3-phase induction motors.

CO5: Able to explain the operation of Stepper & BLDC motors.

SYLLABUS

UNIT-I: DC GENERATORS:

Principle of operation and construction of DC generators - EMF equation – types of generators – magnetization and load characteristics of DC generators.

UNIT-II: DC MOTORS:

Principle of operation of DC Motors – types of DC Motors –Characteristics of DC motors – losses and efficiency – Swinburne's test – speed control of DC shunt motor – flux and Armature voltage control methods.

UNIT-III: TRANSFORMERS:

Principle of operation and construction of single phase transformer– types- phasor diagram on no load and load –equivalent circuit, losses and efficiency of transformer - regulation of transformer – OC and SC tests.

UNIT-IV: INDUCTION MACHINES:

Principle of operation and construction of three phase induction motors –slip ring and squirrel cage motors – slip-torque characteristics –efficiency calculation – starting methods.

UNIT-V: SPECIAL MACHINES:

STEPPER MOTOR: Principle of Operation and construction of stepper motor, Classification of stepper motors – Hybrid and Variable Reluctance Motor (VRM) – Different configuration for switching the phase windings.

BLDC MOTOR: Principle of Operation and Types of constructions – Surface mounted and interior type permanent magnet, Torque speed characteristics.

Text Book(s)

1. Principles of Electrical Machines by V.K. Mehta &Rohit Mehta, S.Chand publications.

2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria& Sons.

References

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications.

2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.

3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.

4. Brushless Permanent magnet and reluctance motor drives, Clarenden press,T.J.E. Miller, 1989, Oxford.

5. Special electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.

B.TECH II SEMESTER	ESC	L	T	P	C
		1	0	4	3

20EC2T05 ENGINEERING DRAWING

Course Objective: Engineering drawing being the principal method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons and curves. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scalingetc.

Course Outcomes:

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

1. Understand the techniques of constructing various polygons and curves
2. Understand the concepts of projections and draw projections for simple entities such as points and lines.
3. Draw orthographic projections of planes and simple solids
4. Analyze the 2D drawings and convert to 3D isometric views

UNIT I

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangents & normal for the curves.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

UNIT III

Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT IV

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one plane

UNITV

Conversion of orthographic views to isometric view for Simple Solids such as prism, pyramid, cylinder and cone; Conversion of isometric view to orthographic views.

Text books:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L. Narayana& P. Kannaiah, Scitech Publishers

Reference books:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Graphics by PI Varghese, McGraw Hill Publishers
3. Engineering Drawing + Auto Cad – K Venugopal, V. Prabhu Raja, NewAge
4. Engineering Drawing by Agarwal & Agarwal, Tata McGraw HillPublishers

		L	T	P	C
B.TECH II SEMESTER	**BSC**	**0**	**0**	**3**	**1.5**

20EC2L06 APPLIED CHEMISTRY LAB

Pre-requisite: Acquire some experimental skills.

Course Objective: Objective of the course is to impart

- The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations.
- A few instrumental methods of chemical analysis.

Course Outcomes:

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

CO1: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire som experimental skills.

LIST OF EXPERIMENTS

1 Determination of HCl using standard Na2CO3 solution.

2 Determination of alkalinity of a sample containing Na2CO3 and NaOH.

3 Determination of Mn+2 using standard oxalic acid solution.

4 Determination of ferrous iron using standard K2Cr2O7 solution.

5 Determination of Cu+2 using standard hypo solution.

6 Determination of temporary and permanent hardness of water using standard EDTA solution.

7 Determination of Fe+3 by a colorimetric method.

8 Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).

9 Determination of iso-electric point of amino acids using pH-metry method/conductometric method

10 Determination of the concentration of strong acid vs strong base (by conductometric method).

11 Determination of strong acid vs strong base (by potentiometric method).

12 Determination of Mg+2 present in an antacid.

13 Determination of CaCO3 present in an egg shell.

14 Estimation of Vitamin C.

15 Determination of phosphoric content in soft drinks.

16 Adsorption of acetic acid by charcoal.

17 Preparation of nylon-6, 6 and Bakelite (demonstration only).

B.TECH II SEMESTER	ESC	L	T	P	C
		0	0	3	1.5

20EC2L07: ENGINEERING & IT WORKSHOP

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Trade:

1. **Carpentry**
   a. T-Lap Joint
   b. Cross Lap Joint
   c. Dovetail Joint
   d. Mortise and Tenon Joint
2. **Fitting**
   a. Vee Fit
   b. Square Fit
   c. Half Round Fit
   d. Dovetail Fit
3. **House Wiring**
   a. Parallel / Series Connection of three bulbs
   b. Stair Case wiring
   c. Florescent Lamp Fitting
   d. Measurement of Earth Resistance
4. **Tin Smithy**
   a. Taper Tray
   b. Square Box without lid
   c. Opens coop
   d. Funnel
5. **Product prototyping using 3D Printing**
6. **IT Workshop**
   Task 1: Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

   Task 2: Practicing disassembling and assembling components of a PC

   Note: At least two exercises to be done from each trade.

B.TECH II SEMESTER **ESC**

L	T	P	C
0	0	3	1.5

20EC2L08 BASIC ELECTRICAL TECHNOLOGY LAB

Course Objectives: To understand the operation of network elements &electrical machines

Course Outcomes:

CO 1 Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.

CO 2 Determination of time constant and steady state error & Two port network parameters

CO 3 Experimentation of network theorems

CO 4 Compute the efficiency of DC shunt machine without actual loading of the machine

CO 5 Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests.

CO 6 Analyze the performance characteristics and to determine efficiency of DC shunt motor &3-Phase induction motor.

LIST OF EXPERIMENTS

1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
7. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
8. Speed control of D.C. Shunt motor by Armature & flux control methods

9 Brake test on DC shunt motor. Determination of performance characteristics.

10 OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).

11 Brake test on 3-phase Induction motor (performance characteristics).

12 Swimburne's test on DC shunt machine

B.TECH II SEMESTER

		L	T	P	C
	MC	2	0	--	--

20EC2M09 ENVIRONMENTAL SCIENCE

Course objective:

- To understand the importance of Environment and the importance of biodiversity

Course outcomes:

- The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- The concepts of the ecosystem and its function in the environment.
- 3.The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- The environmental legislations of India and Social issues and the possible means
- Environmental assessment and the stages involved in EIA.

SYLLABUS

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^{o}production& 2^{o}production- Major ecosystems: Forest ecosystem- Grassland ecosystem, Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

UNIT-II: NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources-Forest resources**:** Use and over-exploitation- Deforestation-Timber extraction-Mining- Conservation-Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources**:** renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

UNIT-III: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-IV: ENVIRONMENTAL PROBLEMS

Global warming, Climate change- Acid rain, Ozone depletion- Air pollution-Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures-Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTALLEGISLATION&MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks-Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks-Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi

2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCES:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

B.TECH III SEMESTER		**L**	**T**	**P**	**C**
	BSC	**3**	**0**	**0**	**3**

20EC3T01 COMPLEX VARIABLES

Pre-requisite: Basic knowledge about Calculus and Differential Equations

Course Objective: Objective of the course is to impart

- basic understanding of complex variable theory
- knowing the theory of line integral together with the theory of power series
- understanding the geometrical nature of analytic functions

Course Outcomes:

S. No.	**At the end of the course, student will be able to**
CO 1:	Determine analytic and non-analytic functions
CO 2:	Analyze the analytic function into a power series which is useful in the study of communication systems.
CO 3:	Illustrate the techniques of the contour integration to determine the real integrals
CO 4:	Determine the solution of boundary value problems by mapping complex domains into the standard domains
CO 5:	Analyze the solutions of Bessel’s and Legendre’s equations using power series

SYLLABUS

UNIT-I: Analytic Functions:

Introduction, Complex function, Limit and continuity of a complex function, Derivative of f(z), Analytic functions, Harmonic functions & orthogonal system, finding analytic functions by Milne-Thomson method. Applications to flow problems.

UNIT-II: Complex Integration:

Complex integration, Cauchy’s theorem and Cauchy’s integral formula (without proofs), Series of complex terms, Taylor’s series and Laurent’s series (without proofs).

UNIT-III: Residues:

Zeros and singularities of an analytic function, Residues and Cauchy-Residue theorem (without proof). Evaluation of real definite integrals-Integration around the unit circle, Integration around a small semi-circle and indenting the contours having poles on real axis.

UNIT-IV: Conformal Mappings:

Transformation by e^z, lnz, z^2, z^n (n positive integer), sin z, cosz, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points.

UNIT-V: Bessel's and Legendre's Equations:

Bessel's equation, Recurrence formulae for $J_n(x)$, Expansions for J_0 and J_1, Value of $J_{1/2}$. Legendre's equation, Rodrigue's formula, Legendre polynomials, Recurrence formulae for $P_n(x)$.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH III SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC3T02 PROBABILITY THEORY AND STOCHASTIC PROCESSES

Pre-requisite: Basic knowledge about linear algebra, set theory, matrices, differentiation, and integration

COURSE OBJECTIVES:
The main objectives of this course are given below:

- To introduce elementary probability theory, in preparation for courses on statistical analysis, random variables.
- To introduce special random variables and study operations on single random variables.
- To introduce vector random variables and study operations on multiple random variables.
- To introduce random process and study temporal characteristics
- To study spectral characteristics of random process and relation between correlation and power spectrum.

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Define and estimate probability of any random experiment and analyze random variable.

CO2: Analyze and apply special random variables to find moments, perform different operations on single random variable.

CO3: Perform several operations on multiple random variables.

CO4: Analyze random process and apply time averages.

CO5: Analyze relation between correlation and power spectrum.

SYLLABUS

UNIT-I: Probability and Random Variable:

INTRODUCTION: Overview of Probability Theory: Sets, sample space and events, Axioms of Probability, Baye's Rule.

RANDOM VARIABLES: Types, Distribution and Density function of Random Variables and Properties, Conditional distribution and density function.

UNIT-II: Some special random variables and operation on single random variable:

SOME SPECIAL RANDOM VARIABLES: Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh. Monotonic transformation of random variables. **OPERATION ON SINGLE RANDOM VARIABLE:** Mean of random variable, moments about mean, central moments, moment generating function, characteristic function

UNIT-III: Operations on Multiple Random Variables

Joint Moments about origin, Joint central moments, properties, Marginal distribution and density functions. Central limit theorem. Distribution and Density function of sum of two Independent Random variables.

UNIT-IV: Random Processes and temporal characteristics

Concept and classification of Random Process, Concept of Stationary Random Process, Wide Sense Stationary. Time Averages, Ergodicity, Auto Correlation function, Cross Correlation function, Covariance function and their properties

Unit-V Spectral Characteristics of Random Process

Response of linear Systems with Random Inputs. Power Spectrum-Properties, Relation between PSD and Autocorrelation function of a Random Process, Cross spectral Density and its relation with Cross Correlation function.

Text Books:

1. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles - TMH, 4Ed.2001.
2. Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variables and Stochastic Processes – PMI, 4 Ed., 2002.

Reference Books:

1. Henry Stark and John W. Woods, Probability and Random Processes with Application to Signal Processing –, 3 Ed., PE 2002

2. George R. Cooper, Clave D. MC Gillem, Probability Methods of Signal and System Analysis - 3 Ed., 1999,Oxford.

B.TECH III SEMESTER **PCC**

L	T	P	C
3	0	0	3

20EC3T03 DIGITAL ELECTRONICS

COURSE OBJECTIVES:
The primary objectives of this course are given below:

- To represent numbers and conversion between different representations.
- To analyze logic processes and implement logical operations.
- To develop the combinational logic circuits.
- To understand concept of programmable logic devices like PROM, PLA, PAL.
- To design and analyze the concepts of sequential circuits.

COURSE OUTCOMES:
Upon completion of the course student will be able to:

CO1: Understand different number systems and their conversions.

CO2: Analyze the logical operations and Boolean algebra

CO3: Develop combinational circuits, perform logical operations and different programmable logic devices.

CO4: Design the sequential logic functions.

CO5: Know finite state machines and Mealy and Moore Models for reduction.

SYLLABUS

UNIT-I: Number Systems

INTRODUCTION: Binary- Octal- Decimal- Hexadecimal Number Systems- Conversion of Numbers from One Radix to Another Radix- r‘s Complement- (r-1)‘s Complement- Subtraction of Unsigned Numbers- Problems- Signed Binary Numbers- Weighted and Non weighted codes.

UNIT-II: Logic Gates and Boolean Algebra

Boolean Theorems- Dual of Logical Expressions- Minimizations of Logic Functions Using Boolean Theorems- SOP- POS- K Map Method- Minimization of Boolean Functions. Basic Gates- Universal Gates- Ex-OR and Ex-NOR Gates.

UNIT-III: Combinational Logic Circuits

Design of Half Adder- Full Adder- Half Subtractor- Ripple Adder, Carry Look Ahead adder and Binary Adder-Subtractor- Magnitude Comparator - Design of Decoders- Cascading of Decoders -Code Converters- BCD -7 Segment, BCD-

Gray and Gray –BCD converters, Encoders- Multiplexers- Cascading of Multiplexers, Realization of Functions Using MUX, Demultiplexers.

Introduction to Programmable Logic Devices (PLDs):

PLA- PAL- PROM- Realization of Switching Functions Using PROM, PAL - Comparison of PLA, PAL and PROM.

UNIT-IV: Introduction to Sequential Logic Circuits

Basic Sequential Logic Circuits- Latch and Flip-Flop- RS- Latch Using NAND and NOR Gates- RS, JK, T and D Flip Flops- Conversion of Flip Flops- Flip Flops With Asynchronous Inputs (Preset and Clear).

Registers and Counters: Design of Registers- Control Buffer Registers- Bidirectional Shift Registers- Universal Shift Register- Design of Ripple Counters- Synchronous Counters and Variable Modulus Counters- Ring Counter- Johnson Counter.

Unit-V: Finite state Machine

Analysis of clocked sequential circuits- state Equations-state diagrams- state tables- design procedures- Realization of circuits using various flip-flops- Mealy and Moore Models of Finite State Machines- Mealy to Moore conversion and vice-versa.

TEXT BOOKS

1. Digital Design , M. Morris Mano, Michael D Ciletti, 4th Edition,PEA,2003
2. Fundamentals of Logic Design, ROTH, C. H. 5th ed . St. Paul, MN: Brooks/Cole, 2004 .

REFERENCE BOOKS

1. Switching and Finite Automata Theory, Kohavi, Jha, 3rd Edition, Cambridge, 2005.
2. Digital Logic Design, Leach, Malvino, Saha, TMH,2000.

B.TECH III SEMESTER **PCC**

L	T	P	C
3	0	0	3

20EC3T04 SIGNALS & SYSTEMS

Pre-requisite: Basic knowledge about linear algebra, differentiation and integration

COURSE OBJECTIVES:
The main objectives of this course are given below:

- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Characterize the signals and systems and principles of vector spaces, Concept of Orthogonality.

CO2: Analyze the Fourier series, Fourier transform and Laplace transform.

CO3: Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.

CO4: Understand the relationships among the various representations of LTI systems

CO5: Apply z-transform to analyze discrete-time signals and systems.

SYLLABUS

UNIT-I: Introduction and Fourier Series

INTRODUCTION: Definition of Signals and Systems, Elementary signals, Operations on signals, classification and characteristics of Signals, Analogy between vectors and signals, and Orthogonality concepts.

FOURIER SERIES: Fourier series representation of continuous time periodic signals, properties of Fourier series.

UNIT-II: Fourier transform and Laplace Transform

FOURIER TRANSFORM: Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms and Hilbert Transform.

LAPLACE TRANSFORMS: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept ROC, Relation between L.T‘s, and F.T. of a signal.

UNIT-III: ANALYSIS OF LINEAR SYSTEMS

Linear system, impulse response, Concept of convolution in time domain and frequency domain, Transfer function of a LTI system, **Concept of Correlation**, Distortion less transmission through a system, Ideal LPF, HPF and BPF characteristics, Causality and Poly- Wiener criterion for physical realization

UNIT-IV: SAMPLING THEOREM

Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal, effect of under sampling – Aliasing and Band Pass sampling.

Unit-V Z–TRANSFORMS

Z–TRANSFORMS: Difference between continuous-time and discrete-time, Concept of Z- Transform of sequences. ROC in Z-Transform, constraints on ROC, Inverse Z-transform and properties of Z-transforms. Differences between Transforms(F.T,L.T and Z.T)

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications,2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2ndEdn.2002

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2ndEdition.2002
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press,2015

B.TECH III SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC3T05 ELECTRONIC CIRCUIT ANALYSIS

Pre-requisite: Basic knowledge about electronics devices and circuits

COURSE OBJECTIVES:

The main objectives of this course are given below:

- Small signal low and high frequency BJT transistor amplifier models and the expressions for therespective parameters are derived.
- Cascading of single stage amplifiers is discussed. Expressions for overall voltage gain are derived.
- The concept of feedback is introduced. Effect of negative feedback on amplifier characteristics is explained and necessary equations are derived.
- Basic principle of oscillator circuits is explained, and different oscillator circuits are given with their analysis.
- Power amplifiers Class A, Class B, Class C, Class AB and other types of amplifiers are analyzed.

COURSE OUTCOMES:

At the end of this course the student will able to:

CO1: Design and analyze the small signal low and high frequency transistor amplifier using BJT

CO2: Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT Identify and analyze the different feedback topologies.

CO3: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.

CO4: Know the classification of the power amplifiers and their analysis with performance comparison.

.

SYLLABUS

UNIT-I: BJT-SMALL SIGNAL TRANSISTOR AMPLIFIER MODELS

Low Frequency Transistor Amplifier Models: Two port networks, Transistor hybrid model, determination of h-parameters, generalized analysis of transistor amplifier model using h-parameters.

High Frequency Transistor Amplifier models: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II: MULTISTAGE AMPLIFIERS

Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascade amplifier, Boot-strap emitter follower, Analysis of multistage amplifiers using FET, Differential amplifier using BJT.

UNIT-III: FEEDBACK AMPLIFIERS & OSCILLATORS

Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

Conditions for oscillations, Classification, RC phase shift oscillator, Wien bridge oscillator, generalized analysis of LC oscillators, Quartz, Hartley and Colpitts Oscillators, Frequency stability-simple problems.

UNIT-IV: POWER AMPLIFIERS

Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Distortion in amplifiers.

Unit-V TUNED AMPLIFIERS & MULTIVIBRATORS

Introduction, Q-Factor, single stage Tuned Amplifiers, double tuned amplifiers- frequency response of tuned amplifiers.

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Text Books:

1. J. MILLMAN AND C.C. HALKIAS, Integrated Electronics, Tata Mc Graw-Hill, 2009.
2. SALIVAHANAN, N.SURESSH KUMAR, A. VALLAVARAJ, Electronic Devices and Circuits, TATA McGraw Hill, Second Edition.

Reference Books:

1. DONALD A. NEAMAN, Electronic Circuit Analysis and Design, Mc Graw Hill.
2. ROBERT L. BOYLESTAD AND LOUIS NASHELSKY, Electronic Devices and Circuits, Pearson/Prentice Hall, Tenth Edition.

B.TECH III SEMESTER **PCC**

L	T	P	C
0	0	3	1.5

20EC3L06 ELECTRONIC CIRCUIT ANALYSIS LAB

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Understand how the amplification under small signal models.

CO2: Analyzing frequency response of amplifiers.

CO3: Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.

CO4: Utilize the Concepts of negative feedback to improve and importance of multivibrators.

CO5: Understand the concepts of sampling gates.

LIST OF EXPERIMENTS:
(Minimum of Ten Experiments has to be performed)

1 Evaluation of h-parameters of BJT
2 Darlington Amplifier
3 Class A Power Amplifiers Analysis & Efficiency
4 RC Coupled Single-stage BJT Amplifier: Determination of lower and upper cutoff frequencies, mid band voltage gain, gain bandwidth product from the frequency response
5 Emitter Follower: Determination of mid band voltage gain, input and output impedances at mid frequency range
6 Class-B Complementary Symmetry Power Amplifier: Display of input and output waveforms
7 Voltage series and current shunt feedback amplifiers
8 Hartley/Colpitt's Oscillator: Design and test the performance for a given frequency
9 RC Phase Shift Oscillator: Design and test the performance for a given frequency
10 Design of Bistable Multivibrator
11 Design of Monostable Multivibrator
12 Design of Astable Multivibrator

EQUIPMENT REQUIRED:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Millimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

B.TECH III SEMESTER	PCC	L	T	P	C
		0	0	3	1.5

20EC3L07 **SIGNALS AND SYSTEMS LAB**

COURSE OUTCOMES:

After studying this course the students would gain enough knowledge

CO1: Have a thorough understanding of the fundamental concepts and techniques used

CO2: To understand and examine the signals and its operations.

CO3: The ability to understand and analyze sampling process.

CO4: Ability to identify basic requirements for a transformation techniques in continuous and discrete time

LIST OF EXPERIMENTS

((Minimum of Ten Experiments has to be performed)

1. Basic Operations on Matrices
2. Generation of Various Signals and Sequences (Periodic and A periodic), such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
3. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power
4. Finding the even and odd parts of signal/ sequence and real and imaginary parts of signal
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum
11. Waveform synthesis using Laplace Transform.
12. Locating the zeros and poles and plotting the pole-zero maps in S plane

and Z-plane for the given transfer function

13 Generation of Gaussian noise (real and complex), computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function

14 Sampling theorem verification

15 Removal of noise by autocorrelation / cross correlation

16 Extraction of periodic signal masked by noise using correlation.

17 Verification of Winer- Khinchin relations

18 Checking a random process for stationarity in wide sense.

Equipment & Software required:

Software:

i. Computer Systems with latest specifications
ii. Connected in Lan (Optional)
iii. Operating system (Windows XP)

Simulations software (Simulink & MATLAB signal Processing Toolbox)

B.TECH III SEMESTER	PCC	L	T	P	C
		0	0	3	1.5

20EC3L08 DIGITAL ELECTRONICS LAB

COURSE OBJECTIVES:

The primary objectives of this course are given below:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
- Verifying and analyzing the practical digital electronic circuits.
- To implement simple logical operations using combinational logic circuits
- Enabling students to take up application specific sequential circuit to specify the finite state machine and designing the logic circuit.

COURSE OUTCOMES:

Upon completion of the course student will be able to:

CO1: Understand working of logic gates and verify Boolean theorems.

CO2: Design, Test and evaluate various combinational circuits such as adders, Decoders, multiplexers, and de-Multiplexers.

CO3: Construct flips-flops, counters and shift registers and verify its functionality

LIST OF EXPERIMENTS

1. Verification of Basic Logic Gates.
2. Implementing all individual gates with universal gates NAND & NOR.
3. Design a circuit for the given canonical form, draw the circuit diagram and verify the De-Morgan laws.
4. Construct Half Adder and Full Adder and verify the truth table.
5. Construct Full Adder using 2 Half Adders and verify the truth table.
6. Design a combinational logic circuit for 4 * 1 MUX and verify the truth table.
7. Design a combinational logic circuit for 1 * 4 De -MUX and verify the truth table.
8. Design a combinational logic circuit for BCD - 7 Segment Decoder
9. Verification of truth tables of the basic Flip -Flops
10. Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for Race Around condition.
11. Design the Mod 6 counter and verify the truth table.

12. Design a Decade Counter and verify the truth table.
13. Design a Up Down Counter and verify the truth table.
14. Construct 4-Bit Ring counter and verify the truth table.
15. Design a 8- Bit Shift Register and verify the truth table.

Equipment Required:

1. Hardware kits using Various digital IC's

TEXT BOOKS:

1. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

B.TECH III SEMESTER **SC**

L	T	P	C
0	0	4	2

20EC3S09 DATA STRUCTURES THROUGH C (Skill Oriented Course)

Course Objectives:

- Understand different Data Structures
- Apply Data Structures to real world problems using C.

Course Outcomes:

CO1: Use basic data structures such as arrays and linked list.

CO2: Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.

CO3: Use various searching and sorting algorithms.

CO4: Understand and use Trees for complex operations

Topics Covered: Searching, Sorting, Linked Lists, Stacks, Queues, Trees-Operations, Binary Search Trees- Operations

LIST OF EXPERIMENTS:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order.

Exercise -3 (Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order

b) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise -4 (Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked List.

Exercise -5 (Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -6 (Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write C program for implementing infix to postfix conversion

d) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -7 (Binary Tree)

Write a recursive C program for traversing a binary tree in preorder, in-order and post-order.

Exercise -8 (Binary Search Tree)

a) Write a C program to create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

Text Books:

1. Data Structures Using C. 2ndEdition. Reema Thareja, Oxford.

2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.

2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

3. Data Structures with C, Seymour Lipschutz TMH

B.TECH IV SEMESTER **BSC**

L	T	P	C
3	0	0	3

20EC4T01 NUMERICAL METHODS & VECTOR CALCULUS

Pre-requisite: Linear Algebra and Differential Equations & Transformation Techniques

Course Objective: Objective of the course is to impart

- understand the basic numerical methods to solve simultaneous linear equations
- knowledge of numerical methods to solve ordinary differential equations
- the types of integration over the lines, surfaces & volumes

Course Outcomes:

S. No.	At the end of the course, student will be able to
CO1:	Determine the solution of transcendental equations by different numerical methods
CO2:	Provide the interpolation techniques which analyze the data of an unknown function
CO3:	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO4:	Evaluate areas and volumes using double & triple integrals
CO5:	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.

SYLLABUS

UNIT-I: Numerical Solution of Equations:

Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method. Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT-II: Interpolation:

Forward and backward, relation between these operators, Differences of a polynomial, Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's forward & backward interpolation formulae & problems.

UNIT-III: Numerical Integration & Numerical Solutions of ordinary differential equations with initial conditions:

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4^{th} order.

UNIT-IV: Multiple Integrals:

Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Rectangular coordinates to Cylindrical & Rectangular coordinates to Spherical polar coordinate systems). **Applications:** Area enclosed by plane curves, Volume of solids.

UNIT-V: Vector Differentiation & Vector Integration:

Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, directional derivatives, Del applied to vector point functions-Div& Curl, physical interpretation of div & curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Line integral, Green's theorem in the plane (without proof), Surface integrals, Stoke's theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43^{rd} Edition, 2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1^{st} Edition, 2007.

Reference Books:

1. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10^{th} Edition, 2015.
2. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9^{th} Edition, 2014.

B.TECH IV SEMESTER **ESC**

L	T	P	C
2	0	0	2

20EC4T02 CONTROL SYSTEMS

Pre-requisite: Basic knowledge about linear algebra, Laplace Transformations, differentiation, integration and Matrices

COURSE OBJECTIVES:
The main objectives of this course are given below:

- Learn the fundamental concepts of Control systems and mathematical modelling of the system.
- Study the concepts of transfer functions of the system.
- Understand the basics of time response &stability analysis of the system.
- Understand the basics of Frequency domain analysis of the system.
- Know the Concept of State Variable Models

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Represent the mathematical model of a system.

CO2: Reduce the Block diagram and signal flow graph

CO3: Determine the response of different order systems for various inputs in time domains

CO4: Know the Frequency Response Using Different Graphical Networks

CO5: Decompose the transfer function and Test Controllability and observability of a system.

SYLLABUS

UNIT-I: Introduction to Control Systems

Concept of Control Systems-Classification, Open Loop and closed loop control systems and examples, Effects of feedback- Gain, Sensitivity, Stability, Noise. Mathematical models – Differential equations and transfer functions.

Translational and Rotational mechanical systems

UNIT-II: TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor-Field Controlled, Armature controlled - AC Servo motor-, Block diagram representation of systems -Block diagram algebra – Representation by Signal flow graph - Reduction using mason‘s gain formula. Conversion from Block diagram to signal flow graph

UNIT-III: TIME RESPONSE ANALYSIS&STABILITY ANALYSIS IN S-DOMAIN

Time response of first order systems and second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative and proportional integral systems.

The concept of stability – Routh‘s stability criterion The root locus concept - construction of root locus

UNIT-IV: FREQUENCY RESPONSE ANALYSIS

Bode diagrams-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Plots and Stability Analysis.

Unit-V CLASSICAL CONTROL DESIGN TECHNIQUES

Concepts of state, state variables and state model, derivation of state models from block diagrams, Transfer Function Decomposition, State Transition Matrix and its Properties – Concepts of Controllability and Observability. Test for Controllability and Observability.

TEXT BOOKS:

1. Automatic Control Systems– by B. C. Kuo– John wiley and son‘s. 8th edition, 2003.

2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.2002

REFERENCE BOOKS:

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd.,3rd ed,.2000

2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers
3. Linear Control systems by Prof.B.S.Manke Khanna Publishers

B.TECH IV SEMESTER **PCC**

L	T	P	C
3	0	0	3

20EC4T03 ANALOG INTEGRATED CIRCUITS APPLICATIONS

Pre-requisite: Basic knowledge about linear algebra, differentiation, and integration

COURSE OBJECTIVES:

The main objectives of this course are given below:

The student will be made

- To learn the working of logic families
- To understand the functioning of different types of Time-base Generators.
- To understand the analysis & design of different types of active filters using op-amps
- To learn the internal structure, operation and applications of different analog ICs
- To Acquire Knowledge of A/D and D/A Converter

COURSE OUTCOMES:

After going through this course the student will be able to

CO1: Understand about Logic Families with Diode-Transistor

CO2: Design different Time base generators.

CO3: Design circuits using operational Amplifier for various applications

CO4: Understand the concept of A/D & D/A Converters

CO5: Analyze and design amplifiers and active filters using Op-amp.

SYLLABUS

UNIT-I: LOGIC FAMILIES

INTRODUCTION: Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor-Transistor Logic, Emitter Coupled Logic, AOI Logic and Comparison of Logic Families.

UNIT-II: TIME BASE GENERATORS:

General features of a time base signal, Methods of generating time base waveform- Exponential Sweep Circuits, Negative Resistance Switches, Miller and Bootstrap time base generators.

UNIT-III: OPERATIONAL AMPLIFIER

Classification; IC Chip Size and Circuit Complexity; the Ideal Operational Amplifier; Operational Amplifier Internal Circuit. Op-Amp parameters & Measurement, DC Characteristics, input & output off set voltages & currents, slew rate, CMRR, PSRR, drift, AC Characteristics and Compensation Techniques.

UNIT-IV: OPERATIONAL AMPLIFIER APPLICATIONS

Basic Op-Amp Applications; Inverting and Non-inverting amplifier,. Integrator and differentiator, Difference amplifier, Instrumentation Amplifier; AC Amplifier; V to I & I to V Converters. Op-Amp Circuits using Diodes, Sample and Hold Circuit, Comparator, Regenerative Comparator (Schmitt Trigger).

D-A AND A-D CONVERTERS Introduction; Series Op-Amp Regulator; Basic DAC Techniques Weighted Resistor DAC,R-2R DAC ; AD Converters, Flash ADC and Successive approximation Converter.

Unit-V FILTERS USING OP-AMP & 555 TIMERS

Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters .

Description of Functional Diagram of 555 Timer; Monostable Operation; Astable Operation and its Applications and PLL, Applications PLL. VCO and its applications.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGrawHill,4th Edition,2005

2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.

REFERENCES:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill,Second Edition, 2007.

2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

B.TECH IV SEMESTER	PCC	L	T	P	C
		3	0	0	3

20EC4T04 ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES

COURSE OBJECTIVES:

The students will be introduced to

- Vector algebra coordinate systems
- Electro statics and magneto statics principles.
- Maxwell Equations in time varying fields.
- Electromagnetic wave and propagation characteristics.
- Transmission lines characteristics and different loading concepts.

COURSEOUTCOMES:

Upon completion of this course students will be able to

CO1: Know the basic principles of electrostatics

CO2: Understand the primary laws in magneto statics and its importance

CO3: Gain knowledge on functionalities of time varying fields

CO4: Determine the parameters in EM Wave propagating conditions

CO5: Derive and determine the conditions and constants in transmission lines

SYLLABUS:

UNITI Electrostatics: Coulomb's Law, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitances, Problems.

UNIT-II Magneto Statics: Biot- Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances, Problems.

UNIT III: Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms, Boundary Conditions, Problems.

UNITIV:EM Wave Characteristics: Wave Equations, Uniform Plane Waves – Relations between E & H. Wave Propagation in Lossless and Conducting Media, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, Brewster Angle, Critical Angle and Poynting Theorem, Problems.

UNIT V: Transmission Lines: - Transmission Line Equations, Primary & Secondary Constants, Phase and Group Velocities, Condition for Distortion less and Minimum Attenuation, Loading-Types of Loading. Reflection Coefficient, VSWR. λ/4, λ/2,λ/8LinesSmithChart, Stub Matching, Problems.

TEXTBOOKS:

1. Elements of Electromagnetic–Matthew N.O. Sadiku, Oxford Univ. Press, 3rd Edition, 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G.Balmain, PHI,2nd Edition,2000.

REFERENCES:

1. Electromagnetic Fields and Wave Theory G.S.N. Raju, Pearson Education, 2006.
2. Engineering Electromagnetics– Nathan Ida, Springer (India)Pvt. Ltd., New Delhi, 2nd Edition,2005.

B.TECH IV SEMESTER	HSMC	L	T	P	C
		3	0	0	3

20EC4T05 **MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

Course Objectives:

- The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals

Course Outcomes:

CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs

CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units

CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis

CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

SYLLABUS

UNIT I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT II

Theories of Production and Cost Analyses: Theories of Production function-Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

UNIT III

Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson’s models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

UNIT IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

UNIT V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1) A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

Reference Books:

1) Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd.

2) JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition

3) N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd.

4) MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd

5) I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd

6) V. Maheswari, Managerial Economics, S. Chand & Company Ltd.

B.TECH IV SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC4T06 ANALOG AND DIGITAL COMMUNICATIONS

Course Objectives: Students undergoing this course, are expected to

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Familiarize with the fundamentals of digital communication systems
5. Familiarize with various techniques for digital modulation and demodulation of signals

Course Outcomes: After undergoing the course, students will be able to

CO1: Differentiate various Analog modulation schemes

CO2: Analyze demodulation schemes and their spectral characteristics

CO3: Analyze noise characteristics of various analog modulation methods

CO4: Differentiate various Digital modulation schemes

CO5: Analyze demodulation schemes and their spectral characteristics

UNIT I: AMPLITUDE MODULATION

Introduction to communication system, need for modulation, , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Detection of AM Waves;, Envelope detector, SNR Calculations of AM waves.

UNIT II: DSB & SSB MODULATION

DSB SC (Double side band suppressed carrier) modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Coherent detection of DSB-SC Modulated waves, SNR Calculations of DSB SC.

SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves. SNR of SSB.

UNIT III: ANGLE MODULATION

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, zero crossing detector, Phase locked loop, SNR Calculations.

UNIT IV: PULSE DIGITAL MODULATION

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT V: DIGITAL MODULATION TECHNIQUES

Introduction, ASK, FSK, PSK, DPSK, QPSK Transmitter and receivers Probability of error calculations.

TEXT BOOKS:

1. Principles of Communication Systems – H Taub& D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.,.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

B.TECH IV SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

20EC4L07 ANALOG INTEGRATED CIRCUITS LAB

Course Outcomes

After going through this course the student will be able to

CO1: Understand about Logic Families with Diode-Transistor

CO2: Design different Time base generators.

CO3: Design circuits using operational Amplifier for various applications

CO4: Analyze and design amplifiers and active filters using Op-amp.

CO5: Understand the concept of A/D & D/A Converters

LIST OF EXPERIMENTS
(Minimum Twelve Experiments to be conducted)

1. Study of Logic families using Diodes and Transistors.
2. Bootstrap sweep circuit.
3. Active Filter Applications – LPF, HPF (first order)
4. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
5. Study of Basic Op-Amp Circuits: Design and verification of inverting amplifier, non-inverting amplifier, voltage follower,
6. Study of Integrator and differentiator circuits using IC741.
7. Op-Amp Schmitt Trigger: Design, testing, and display of waveforms.
8. Op-Amp RC Phase-Shift Oscillator: Design and test the performance for the given frequency.
9. Op-Amp Wein Bridge Oscillator: Design and test the performance for the given frequency.
10. Study of 555 Timer: Design and test the performance of Monostable multivibrator circuit for a given pulse width.
11. Study of 555 Timer: Design and test the performance of Astable multivibrator circuit for a given frequency.
12. Study of Voltage Regulator: Design and study of IC7805 voltage regulator, calculation of line and load regulation.
13. A/D Converter

Equipment required for Laboratory:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 MHz.
3. Function Generators - 0 – 1 MHz
4. Components
5. MultiMeters
6. IC Trainer Kits(Optional)
7. BreadBoards
8. Components: - IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
9. Analog ICTester

B.TECH IV SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

20EC4L08 ANALOG AND DIGITAL COMMUNICATIONS LAB

LIST OF EXPERIMENTS

All the experiments should be performed in Hardware and software (MATLAB)

1. Amplitude modulation (AM)- Modulation and demodulation
2. DSB-SC Modulation and demodulation
3. SSB-SC Modulation and demodulation
4. Frequency Modulation and demodulation
5. PCM Modulation and demodulation
6. DPCM Modulation and demodulation
7. DM Modulation and demodulation
8. ASK Modulation and demodulation
9. FSK Modulation and demodulation
10. PSK Modulation and demodulation
11. Sampling theorem
12. Time division Multiplexing

Equipment required for Laboratories:

1. RPS – 0 – 30 V
2. CRO – 0 – 20 M Hz.
3. Function Generators – 0 – 1 M Hz
4. RF Generators – 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for analog and Digital Communication
7. Components

B.TECH IV SEMESTER **SC**

L	T	P	C
0	0	4	2

20EC4S09: **PYTHON PROGRAMMING (Skill Oriented Course)**

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1: Structure simple Python programs for solving problems.
CO2: Decompose a Python program into functions.
CO3: Represent compound data using Python lists, tuples, and dictionaries.
CO4: Read and write data from/to files in Python Programs.
CO5: To build software for real needs.

Concepts to be covered:

- Introduction: Variables, Assignment, Keywords, Comments, Input-Output, Indentation
- Types, Operators and Expressions: Data types, Operators, Control flow statements
- Data Structures: Lists, Tuples, Sets, Dictionary, Sequences, Comprehensions
- Functions: Types of Arguments, Anonymous, Fruitful and Lambda Functions.
- Python Packages: Installation and Importing packages, Brief tour of packages like System, math, random, date and time, Numpy, Matplotlib, Multi-threading, scikit-learn and Internet Access.
- Object Oriented Programming Concepts in Python.
- Exception handling in python

Lab Exercises:

1. Write a program to perform various list of operations(eg: Arithmetic, logical, bitwise etc) in python.

2. Write a program to implement control flow statements. 3. Write a programs implementing various predefined function of Lists, Sets, Tuples and Dictionaries.

4. Write a program covering various arguments for a function.

5. Write a program to implement various types of functions.

6. Write a program to implement recursion.

7. Write a program to implement command line arguments.

8. Write a program to create a class and its constructors.

9. Write a program to implement inheritance.

10. Write a program for exception handling.

11. Write a program to perform various linear algebra operations like finding eigen vales and vectors, determinant for a matrix.

12. Write a program to read a file.

13. Write a program to use System,math etc packages.

14. Write a program for visualizing the data using matplotlib package.

15. Write a program to access data from the web and validate it.

16. Write a program to demonstrate multi- threading.

TEXT BOOKS

1. Learning Python, Mark Lutz, Orielly

2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

3. John V Guttag, ―Introduction to Computation and Programming Using Python, Revised and expanded Edition, MIT Press , 2013.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press

2. Core Python Programming, W.Chun, Pearson.

3. Introduction to Python, Kenneth A. Lambert, Cengage

4. “Python in easy steps In Easy Steps”, Mike MC Grath, illustrated edition, In easy steps 2013 publishers.

B.TECH IV SEMESTER

	L	T	P	C
MC	2	0	0	-

20EC4M10 CONSTITUTION OF INDIA

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative

Course Outcomes:

At the end of the course, the student will be able to have a clear knowledge on the following:

CO1: Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.

CO2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

CO3: Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.

CO4: Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.

CO5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.

SYLLABUS

UNIT I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration Structure of the Indian Union: Federalism, CentreState relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, Rajya Sabha, The Supreme Court and High Court: Powers
and Functions;

UNIT III

State Government and its Administration Governor, Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT IV

A.Local Administration, District's Administration Head, Role and Importance, Municipalities, Mayor and role of Elected Representative, CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy(Different departments), Village level, Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission, Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1) Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.

2) Subash Kashyap, Indian Constitution, National Book Trust

3) J.A. Siwach, Dynamics of Indian Government & Politics

4) D.C. Gupta, Indian Government and Politics

5) H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

6) J.C. Johari, Indian Government and Politics Hans

7) J. Raj Indian Government and Politics

8) M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

9) Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-sources:

1) nptel.ac.in/courses/109104074/8

2) nptel.ac.in/courses/109104045/

3) nptel.ac.in/courses/101104065/

4) www.hss.iitb.ac.in/en/lecture-details

5)www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

B. TECH V SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC5T01 MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

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

1. To understand the basics of 8086 microprocessors architectures and its functionalities.
2. To develop machine language programming in microprocessors.
3. To design and develop Microprocessor based interfacing for real time applications using low level language like ALP.
4. To understand the basics of microcontrollers architectures and its functionalities.
5. To design and develop microcontroller based interfacing for real time applications using low level language like ALP.

Course Outcomes:

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

CO1: Understand the overview of 8086 microprocessor in general.

CO2: Understand the Assembly Language Programming in microprocessors.

CO3: Understand Interfacing I/O devices through PPI with microprocessor.

CO4: Understand the overview of microcontroller in general & ALP in microcontrollers.

CO5: Understand the microcontroller interfacing with I/O devices using ALP.

SYLLABUS

UNIT-I: MICROPROCESSOR ARCHITECTURE

Introduction to 8085,Main features, pin diagram/description, 8086 microprocessor family, 8086 internal architectures, bus interfacing unit, execution unit, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II: PROGRAMMING

Addressing modes, instruction set, assembler & directives, writing simple programs with an assembler, assembly language programs

UNIT-III: INTERFACING

I/O INTERFACE: 8255 PPI, Various Modes of Operation and Interfacing to 8086, D/A and A/D Converter, Stepper motor, keyboard interfacing, 7-segment display, Interfacing of DMA controller 8257, Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine, 8251 USART Architecture and Interfacing.

UNIT-IV: INTRODUCTION TO MICROCONTROLLERS

Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs

UNIT-V: REAL TIME CONTROL

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters, Interfacing: keyboard, displays (LED, 7-segment display unit), A/D and D/A converters.

TEXT BOOKS:

1. Microprocessors and Interfacing – Programming and Hard ware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition.
2. The 8051 Microcontroller & Embedded Systems Using Assembly and C by Kenneth J. Ayala, Dhananjay V. Gadre, Cengage Learninbg , India Edition.
3. Advanced Microprocessors and Peripherals KM Bhurchandi, AK Ray (3rd Edition)

REFERENCE BOOKS:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B. Brey, Pearson, Eighth Edition
2. Microprocessors and Microcontrollers by N. Senthil Kumar, M. Saravanan and S. Jeevananthan, Oxford University Press, Seventh Impression.

B. TECH V SEMESTER	PCC	L	T	P	C
		3	0	0	3

20EC5T02 ANTENNAS AND WAVE PROPAGATION

Course Overview:

It gives comprehensive study of basic antenna fundamentals, types of antennas, radiation pattern, main lobes and side lobes. Student will come to know how the different antennas work, student also gain knowledge in microwave antennas, antenna arrays. Wave propagation concepts, frequency range, transmission losses, calculations, space wave propagation, and troposphere wave propagation.

Prerequisite(s): Electromagnetic waves and Transmission Lines.

Course Objectives:
The main objectives of this course are given below:

1. To understand the basic terminology and concepts of Antennas.
2. To attain knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that.
3. Analyze the electric and magnetic field emission from various basic antennas and mathematical formulation of the analysis.
4. To have knowledge on antenna operation and types as well their usage in real time field.
5. Aware of the wave spectrum and respective band-based antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.

Course Outcomes:

At the end of this course the student will able to:

CO1: Identify basic antenna parameters.
CO2: Design and analyze wire antennas, loop antennas
CO3: Design and analyze antenna arrays
CO4: Analyze antenna measurements to assess antenna's performance
CO5: Identify the characteristics of radio wave propagation

SYLLABUS

UNIT-I: ANTENNA BASICS

Introduction, Functions of Antenna, Basic Antenna Elements, Sources of Radiation and Radiation Mechanism, Single Wire and Two Wire Antenna, Dipole Antenna, Basic antenna parameters- Radiation pattern, Beam Area, Radiation Intensity, Directivity Gain, Directivity, Resolution, Power Gain, Radiation Efficiency, Front to Back Ratio, Antenna Beam Width, Beam Efficiency, Antenna Bandwidth, Effective height, Antenna Apertures, Friis transmission formula, Fields from oscillating dipole, Field Zones of Antenna, Antenna Polarization, Antenna temperature, basic Maxwell's equations, retarded Potential- Helmholtz Theorem, Illustrative problems.

UNIT-II: THIN LINEAR WIRE ANTENNAS

Small Electric Dipole, Quarter wave Monopole and Half Wave Dipole, Long wire antennas, V-antennas, Inverted V-Antenna, Rhombic Antennas, Small Loop antennas, Helical Antennas, Design Relations. Illustrative problems.

UNIT-III: ANTENNA ARRAYS

Introduction, Types of Antenna Arrays, Two element array- Two Point Sources with equal magnitude and phase, Two Point Sources with equal magnitude and opposite phase, Two Point Sources with unequal magnitude and opposite phase, N element Uniform Linear Arrays - Broadside, End fire Arrays, End Fire Array (EFA) with Increased directivity, Principle of Pattern Multiplication, Binomial Arrays, Concept of Phased arrays.

UNIT-IV: VHF & UHF MICROWAVE ANTENNAS

Frequency range of Microwave Antennas, Yagi Uda Antenna, Flat Sheet Reflectors, Corner Reflectors, Parabolic Reflectors – Working principle, F/D ratio, Spill over, Cassegrain Feed Systems, Horn Antenna-Types of Horn Antenna, Design Equations, Lens Antenna-Types, Feed Systems, Zoning of Lens, E-Plane and H-Plane Metal Plate Lens Antenna.

UNIT-V: WAVE PROPAGATION

Overview of propagation effects, Flat and Spherical Earth Considerations, Ground Wave propagation, Sky Wave Propagation Formation of Ionospheric Layers and their characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF & Skip Distance, Virtual Height, Space Wave Propagation, Duct Propagation, Tropospheric Scattering, Fading and Multipath.

TEXT BOOKS:

1. E. C. Jordan and K. G. Balmain, ―Electromagnetic Waves and Radiating Systems‖, PHI, 2nd edition, 2000.
2. John D. Kraus and Ronald J. Marhefka, ―Antennas and Wave propagation‖ TMH, 4th Edition, 2010

REFERENCES BOOKS:

1. G.S.N Raju, ―Antennas and Wave Propagation‖, 1st Edn Pearson Education, 2004.
2. C.A. Balanis, ―Antenna Theory Analysis and Design‖, 4th Edn., John Wiley & Sons, 2016.

B. TECH V SEMESTER	PCC	L	T	P	C
		3	0	0	3

20EC5T03 DIGITAL SYSTEM DESIGN USING VHDL & VERILOG

Course Overview:

It gives comprehensive study of basic antenna fundamentals, types of antennas, radiation pattern, main lobes and side lobes. Student will come to know how the different antennas work, student also gain knowledge in microwave antennas, antenna arrays. Wave propagation concepts, frequency range, transmission losses, calculations, space wave propagation, and troposphere wave propagation.

Prerequisite(s): Electromagnetic waves and Transmission Lines.

Course Objectives:

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

1. In this course, students can study Integrated circuits for all digital operational designs like adder, Subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.
2. Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.
3. Understand the concepts of Latches and Flip-Flops and Design of Counters using Digital ICs, modelling of sequential logic integrated circuits using VHDL.

Course Outcomes:

At the end of this course the student will able to:

CO1: Understand the concepts of Design Flow and Programming Statements

CO2: Understand the concepts of Combinational logic circuits & sequential logic circuits in digital system

CO3: Understand The Concepts of Verilog & Language Constructs And Conventions

CO4: Understand The Concepts of Gate Level Modelling & Data Flow modelling

CO5: understand the concepts of behavioral modelling

SYLLABUS

UNIT-I: Introduction to VHDL

Design flow, program structure, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Entity Declaration, Architecture Body, Structural Style of Modelling , Dataflow Style of Modelling , Behavioural Style of Modelling ,. Configuration Declaration , Comparison of VHDL and Verilog HDL

UNIT-II: Combinational Logic Design and Sequential Logic Design

Combinational Logic Design

Adders & Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Simple Floating-Point Encoder.

Sequential Logic Design

Flip-Flops, Asynchronous Counters-2 bit,3 bit,4 bit, Synchronous Counters-2 bit,3 bit,4 bit, Ring Counter, Johnson Counter, Modulus N Asynchronous Counters, Modulus N Synchronous Counters, Shift Registers, Bi-directional shift register, Universal Shift Register

UNIT-III: INTRODUCTION TO VERILOG & LANGUAGE CONSTRUCTS AND CONVENTIONS

INTRODUCTION TO VERILOG

Verilog as HDL, Levels of design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Module, Simulation and Synthesis Tools, Test Benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators

UNIT-IV: GATE LEVEL MODELING & MODELING AT DATA FLOW LEVEL

GATE LEVEL MODELING AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits.

MODELING AT DATA FLOW LEVEL Introduction, Continuous assignment structures, Delays and continuous, Assignments, Assignment to vectors, Operators

UNIT-V: BEHAVIORAL MODELING

BEHAVIORAL MODELING Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Examples, Assignments with Delays, Wait construct, Multiple Always Blocks, Blocking and Non-blocking Assignments, The case statement, i*f* and i*f* -else constructs, Assign-de-assign construct, repeat construct, for loop , The disable construct, while loop, forever loop, Parallel blocks, Force-release, construct, Event.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.

2. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.

REFERENCES:

1. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition, 2004

2. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.

B. TECH V SEMESTER	**PEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC5T07 COMPUTER ARCHITECTURE & ORGANIZATION (PROFESSIONAL ELECTIVE-I)

Course Objectives:

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

1 Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system

2 In addition to this the memory management system of computer.

Course Outcomes:

At the end of this course the student will able to:

CO1: Know the Basic Structure of computers

CO2: Know the Register Transfer Language And Micro operations

CO3: Understanding of how a computer performs arithmetic operation of positive and negative numbers

CO4: Understand how computer stores positive and negative numbers.

CO5: calculate the effective address of an operand by addressing modes

SYLLABUS

UNIT-I: BASIC STRUCTURE OF COMPUTERS

The history of Computer development, Computer Types, Functional units, Basic operational concepts, Bus structures, System Software, Performance, Data types, Complements, Data Representation. Fixed Point Representation. Decimal Arithmetic operations Floating – Point Representation.

UNIT-II: REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS:

Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions –Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt.

UNIT-III: CENTRAL PROCESSING UNIT &MICRO PROGRAMMED CONTROL

CENTRAL PROCESSING UNIT: Stack Organization. Instruction formats. Addressing modes. Data Transfer and manipulation. Program control.

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control

UNIT-IV: THE MEMORY SYSTEM:

Memory Hierarchy, Main Memory- RAM, ROM, PROM, EPROM, EEPROM , Flash Memory, Associative memory, Cache Memories: Mapping Functions, Virtual memory, Auxiliary memory, Secondary Storage: Magnetic Hard Discs, Optical Disks, Memory management hardware.

UNIT-V: INPUT-OUTPUT ORGANIZATION

Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

TEXT BOOKS

1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
2. 2. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International editions, 1998.

REFERENCE BOOKS

1. Computer Organization and Architecture – William Stallings 7th Edition, PHI/Pearson, 2006.
2. 2. Computer Organization – Car Hamacher, ZvonksVranesic, SafwatZaky, 5th Edition, McGraw Hill, 2002

B. TECH V SEMESTER

PEC	L	T	P	C
	3	0	0	3

TELEMATICS
20EC5T08 (PROFESSIONAL ELECTIVE-I)

Course Objectives:

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

1. To introduce the concepts of Frequency and Time division multiplexing.
2. to introduce digital multiplexing and digital hierarchy namely SONET / SDH
3. to introduce the concepts of space switching, time switching and combination switching,
4. To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
5. To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.

Course Outcomes:

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

CO1: To learn about the various switching systems

CO2: To learn in detail about time division switching.

CO3: To know about traffic management.

CO4: To understand about various signaling in tele communication systems

CO5: To analyze various telecommunication networks

SYLLABUS

UNIT-I: SWITCHING SYSTEMS

Introduction-Message switching-Circuit switching-Manual switching-Functions of switching system- Strowger step by step system-Register translator-Senders-Distribution frames-Cross bar systems-General trunking-Electronic switching-Reed electronic systems-Digital switching systems.

UNIT-II: TIME DIVISION SWITCHING

Introduction-Space and time switching-Time division switching networks-grades of services Time division switching networks-non blocking networks-synchronization

UNIT-III: TELECOMMUNICATION TRAFFIC

Introduction-Unit of traffic-Congestion-Traffic measurement-A mathematical model-Local call systems-Queuing systems.

UNIT-IV: TELECOMMUNICATION SIGNALLING

Introduction-Customer line signaling- Audio frequency junction and trunk circuits-FDM carrier systems-PCM signaling- Inter register signaling- Common channel signaling principles-CCITT signaling, CCITT signaling, Digital customer line signaling.

UNIT-V: TELECOMMUNICATION NETWORKS

Introduction-Analog networks-Integrated digital networks-Integrated service digital networks Cellular radio networks-Intelligent networks-Private networks-numbering-charging-Routing Network management.

TEXTBOOKS:

1. Bellamy John, “Digital Telephony”, John Wily & Sons, Inc. 3rd edn. 2000.
2. J. E. Flood, “Telecommunications Switching, Traffic and Networks”, Pearson Education

REFERENCES

1. Viswanathan. T., “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 1994.

2. Joseph Y. Hui/Switching and Traffic Theory for Integrated Broad Band Networks/Kleewer Academic publishers, 1990

B. TECH V SEMESTER

PEC	L	T	P	C
	3	0	0	3

20EC5T09 CELLULAR AND MOBILE COMMUNICATIONS
(PROFESSIONAL ELECTIVE-I)

Course Objectives:

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

1. Students should familiarize with different cellular systems
2. Channel allocations with bandwidth utilizations
3. Signal traffic in cellular systems
4. Frequency management.
5. Handoffs

Course Outcomes:

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

CO1: Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.

CO2: Understand the different types of interference s influencing cellular and mobile communications.

CO3: Understand the frequency management, channel assignment and various propagation effects in cellular environment.

CO4: Understand the different types antennas used at cell site and mobile.

CO5: Understand the concepts of handoff and types of handoffs.

SYLLABUS

UNIT-I: CELLULAR SYSTEMS

Limitations of Conventional System, Basic Cellular Mobile System, First, second, third and fourth Generation cellular wireless systems, operation of Cellular System, Fundamentals of cellular Radio System Design: concept of frequency reuse channels, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system

UNIT-II: CO-CHANNEL & NON CO-CHANNEL INTERFERENCE

Measurement of Real Time Co-Channel Interference, design of Antenna system, cell-splitting Non-co channel interference-adjacent channel interference, Near End far end interference

UNIT-III: CELL COVERAGE FOR SIGNAL AND TRAFFIC

Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, foliage loss, and general formula for mobile propagation over water and flat open area, near and long distance propagation.

UNIT-IV: CELL SITE AND MOBILE ANTENNAS

Space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, mobile Antennas. Frequency Management And Channel Assignment: Numbering and grouping, setup access and paging channels ,channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells

UNIT-V: HANDOFFS

Handoff Initiation, types of handoff, delaying handoff, advantages of Handoff, power difference handoff, forced handoff, mobile assisted and soft handoff. Intersystem handoff

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edn., 2006.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCES:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2ndEdition, 2001.
2. Modern Wireless Communication –Simon Haykin Michael Moher, PersonsEduction,2005

B. TECH V SEMESTER

L	T	P	C
0	0	3	1.5

20EC5L10 MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives:

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

1. To develop and execute variety of assembly language programs of Intel 8086 including arithmetic and logical, sorting, searching, and string manipulation operations.
2. To develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices.
3. To develop and execute simple programs on 8051 micro controller.

Course Outcomes:

At the end of this course the student will able to:

CO1: Design and implement programs on 8086 microprocessor.

CO2: Design interfacing circuits with 8086

CO3: Design and implement 8051 microcontroller based systems

CO4: Understand the concepts related to I/O and memory interfacing

SYLLABUS

PART- A (Minimum of 5 Experiments has to be performed)
8086 Assembly Language Programming using Assembler Directives

1. Sorting.
2. Multibyte addition/subtraction
3. Sum of squares/cubes of a given n-numbers
4. Addition of n-BCD numbers
5. Factorial of given n-numbers
6. Multiplication and Division operations
7. Stack operations
8. BCD to Seven segment display codes

PART- B (Minimum of 3 Experiments has to be performed) 8086 Interfacing

1. Hardware/Software Interrupt Application
2. A/D Interface through Intel 8255
3. D/A Interface through Intel 8255

4. Keyboard and Display Interface through Intel 8279
5. Generation of waveforms using Intel 8253/8254

PART- C: (Minimum of 3 Experiments has to be performed) 8051 Assembly Language Programs

1. Finding number of 1‘s and number of 0‘s in a given 8-bit number
2. Addition of even numbers from a given array
3. Ascending / Descending order
4. Average of n-numbers

PART- D: (Minimum of 2 Experiments has to be performed) 8051 Interfacing

1. Switches and LEDs
2. 7-Segment display (multiplexed)
3. Stepper Motor Interface
4. Traffic Light Controller

B. TECH V SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

20EC5L11 DIGITAL SYSTEM DESIGN USING VHDL & VERILOG LAB

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL& Verilog source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. Further, it is required to verify the logic with necessary hardware.

Course Outcomes:
At the end of the course the student will be able to

CO1: Understand the concepts of Design Flow and Programming Statements

CO2: Understand the concepts of Combinational logic circuits in digital system

CO3: Understand the concepts of sequential logic circuits in digital system

CO4: Understand the concepts of Programmable logic devices & memories.

CO5: Understand the concepts of HDL modelling and logic families

LIST OF EXPERIMENTS:

1. Realization of Logic Gates
2. 3 to 8 Decoder
3. 8*1 Multiplexer and 2*1 De-multiplexer
4. 4-Bit Comparator.
5. D Flip-Flop
6. Decade Counter
7. 4 Bit Counter
8. Shift Register
9. Universal shift register
10. Ram (16*4) (read and write operations)
11. ALU

Equipment Required:

1. Xilinix ISE software-latest version
2. Personal computer with necessary pheripherals
3. Hardware kits- Various FPGA families.

B.TECH V SEMESTER	SC	L	T	P	C
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20EC5S12 JAVA PROGRAMMING

(Skill Oriented Course)

Course Objectives:

- Understand fundamentals of Object-Oriented Programming in java including defining classes, invoking methods using class libraries etc.,
- Demonstrate an understanding of graphical user interfaces, multi-threaded programming and event driven programming.

Course Outcomes: By the end of the course student will be able to

1. Implement java applications using OOP principles and proper program structuring.
2. Develop java programs using packages, inheritance and interfaces.
3. Implement error and exception handling techniques.
4. Design event driven GUI and real-time web related applications.

Exercise - 1 (Basics)

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program to sort for an element in a given list of elements using merge sort.

d) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3 (Class, Objects)

Implement java programs using the concept of

a) Class mechanism. Create a class, methods and invoke them inside main method.

b) Constructor.

c) Constructor overloading.

b) Method overloading.

Exercise -4 (Inheritance)

Implement java programs using the concept of

a) Single Inheritance

b) Multilevel Inheritance

c) Abstract class

Exercise - 5 (Inheritance - Continued)

Implement java programs using the concept of

a)“super” keyword.   b) Interfaces

Exercise – 6 (Runtime Polymorphism)

a) Write a JAVA program that implements Runtime polymorphism

Exercise – 7 (Exception)

Implement the programs by using the concepts of

a. Exception handling mechanism

b. Multiple catch clauses

c. Finally

d. Creating user defined exceptions

Exercise – 8 (Threads)

a) Write a JAVA program that creates threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third display “Welcome” every 3 seconds,(Repeat the same by implementing Runnable)

b) Write a program illustrating isAlive and join ()

c) Write a Program illustrating Daemon Threads.

Exercise – 9 (Packages)

a) Create a user defined package and demonstrate different ways of importing packages

Exercise - 10 (Applet)

a) Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program to create different shapes and fill colors using Applet.

B. TECH V SEMESTER

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20EC5M13 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Course Objectives:

- The course aims at imparting basic principles of thought process, reasoning and inferencing.
- Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
- Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
- The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1: Understand the significance of Indian Traditional Knowledge
CO2: Classify the Indian Traditional Knowledge
CO3: Compare Modern Science with Indian Traditional Knowledge system.
CO4: Analyze the role of Government in protecting the Traditional Knowledge
CO5: Understand the impact of Philosophical tradition on Indian Knowledge System.

SYLLABUS

Unit I
Introduction to Traditional Knowledge: Define Traditional Knowledge- Nature and Characteristics- Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in Global Economy.

Unit II
Basic structure of Indian Knowledge System: Astadash Vidya- 4 Ved - 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi),6vedanga (Shisha, Kalppa, Nirukha,Vykaran, Jyothisha & Chand),4upanga (Dharmashastra, Meemamsa, purana & Tharka Shastra).

Unit III

Modern Science and Indian Knowledge System: Indigenous Knowledge, Characteristics-Yoga and Holistic Health care-cases studies.

Unit IV

Protection of Traditional Knowledge: The need for protecting traditional knowledge - Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.

Unit V

Impact of Traditions: Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain &Boudh - Indian Artistic Tradition - Chitrakala, Moorthikala, Vasthukala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya.

Text Books

1. Traditional Knowledge System in India, by AmitJha, 2009.

2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

References

1. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, BharatiyaVidya

2. Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan

3. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.

4. Pramod Chandra, India Arts, Howard Univ. Press, 1983.

5. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

Web Resources:

1. https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html

2. http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf

3.https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_tex t.pdf

B. TECH VI SEMESTER	PCC	L	T	P	C
		3	0	0	3

20EC6T01 VLSI DESIGN

Course Objectives:

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

1. To learn basic MOS and CMOS Fabrication principles and Basic Electrical Properties of MOS and CMOS circuits
2. To Implement CMOS logic circuits.
3. To learn Scaling and Circuit Concepts of CMOS logic circuits.
4. To Design Combinational and Sequential logic circuits
5. To learn the concepts implementation techniques

Course Outcomes:
At the end of this course the student will able to:

CO1: Understand the insights of the MOS devices and its characteristics.

CO2: Implement the CMOS logic circuits

CO3: Analyze Scaling and Circuit Concepts of CMOS logic circuits.

CO4: Implement the CMOS combinational logic and sequential circuits.

CO5: Perform implementation techniques

SYLLABUS

UNIT-I: Introduction to MOS Devices

Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS,MOS transistor action, BICMOS technology. Comparison between CMOS and bipolar technologies.

Basic Electrical Properties of MOS Circuits: Ids versus Vds Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit.

UNIT-II: CMOS Logic Circuits

CMOS Logic Circuits: Implementation of logic circuits using nMOS and CMOS, Pass transistor and transmission gates,various pullups

UNIT-III: MOS CIRCUITS

Scaling of MOS Circuits: Scaling models, Scaling factors for device parameters, Limitations of scaling.

Basic Circuit Concepts: Sheet Resistance Rs and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out.

UNIT-IV: COMBINATIONAL LOGIC CIRCUITS & SEQUENTIAL LOGIC CIRCUITS

Combinational Logic Circuits: Pass transistor Logic, Transmission gates, combinational circuits design using pass transistors, combinational circuits design using transmission gates.

Sequential Logic circuits: latches and Registers, Static latches and Registers, Bistability principle, Multiplexer based latches, Static latches –D,SR,JK,T latches, Master-slave edge triggered register, Dynamic latches- D,SR,JK,T latche

UNIT-V: IMPLEMENTATION STRATEGIES

Full custom and Semi-custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems – Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. CMOS Digital Integrated Circuits Analysis and Design- Sung-Mo Kang, Yusuf Leblebici, Tata McGrawHill Education, 2003.

REFERENCE BOOKS

1. M. J. S. Smith, ‘Application Specific Integrated Circuits’, Addison Wesley, 1997.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

B. TECH VI SEMESTER

	L	T	P	C
PCC	**3**	**0**	**0**	**3**

20EC6T02 DIGITAL SIGNAL PROCESSING

Pre-requisite: Basic knowledge about transformations, differentiation and integration

COURSE OBJECTIVES:

The main objectives of this course are given below:

1. Analyze the Discrete Time Signals and Systems
2. Know the importance of FFT algorithm for computation of Discrete Fourier Transform
3. Understand the various implementations of digital filter structures
4. Learn the FIR and IIR Filter design procedures
5. Know the need of Multirate Processing

COURSE OUTCOMES:

At the end of this course the student will able to:

CO1: Apply the difference equations concept in the analyzation of Discrete time systems

CO2: Use the FFT algorithm for solving the DFT of a given signal

CO3: Design a Digital filter (FIR&IIR) from the given specifications

CO4: Realize the FIR and IIR structures from the designed digital filter

CO5: Use the Multirate processing concepts in various applications

SYLLABUS

UNIT-I: INTRODUCTION

Introduction to Digital Signal Processing: Discrete time sequences, Classification of Discrete time signals and systems, Review of Z-transforms, solution of difference equations using Z-transforms

UNIT-II: DISCRETE FOURIER SERIES & FOURIER TRANSFORMS

Introduction of discrete Fourier series and representation of periodic sequences. Discrete Fourier transforms &it‘s Properties.

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms for DFT calculation.

UNIT-III: DESIGN OF IIR DIGITAL FILTERS& REALIZATIONS

Basic structures of IIR systems-Direct form 1,Direct form 2 and cascade structures, Analog to Digital frequency transformation techniques, Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters.

UNIT-IV: DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS

Basic structures of FIR systems- Direct form, cascade structures, Characteristics of FIR Digital Filters, Design of FIR Digital Filters using Window Techniques- Rectangular and Hamming windows, Frequency Sampling technique, and Comparison of IIR & FIR filters.

UNIT-V: MULTIRATE DIGITAL SIGNAL PROCESSING

Introduction, Decimation, Interpolation, Applications – Sub-band Coding of Speech Signals, Implementation of Digital Filter Banks, Trans-multiplexers.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, DimitrisG.Manolakis,Pearson Education / PHI, 2007.

2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI,2008

REFERENCE BOOKS:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill, 2006
2. Digital Signal Processing: MH Hayes, Schaum‘s Outlines, TATA Mc-Graw Hill, 2007.

B. TECH VI SEMESTER

PCC	L	T	P	C
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20EC6T03 MICROWAVE ENGINEERING

Pre-requisite: Basic knowledge about transformations, differentiation and integration

Course Overview:

To adopt microwave technology in diverse applications as radio astronomy, long distance communication, space navigation, radar systems, medical equipment and missile electronic systems. Because microwave communication system handles a large fraction of the world's international and other long-haul telephone, data and television transmissions. To use microwave technology in wireless communication system such as Direct Broadcast Satellites (DBS) television, personal communication system (PCS), Wireless Local Area Networks (WLAN's), Cellular Video (CV) Systems, and global positioning Satellite (GPS) Systems operate in the frequency of range (1.5 GHZ to 94 GHZ). Thus, really heavily on microwave technology.

Prerequisite(s): Electromagnetic waves and Transmission Lines, Antenna and wave Propagation.

Course Objectives:
The main objectives of this course are given below:

1. Understand Fundamental Characteristics of rectangular Waveguides through Electromagnetic Field Analysis.
2. Understand Fundamental Characteristics of Circular Waveguides through Electromagnetic Field Analysis, microstrip and cavity resonators
3. Understand the various components of microwaves and the Basic Properties of Polarization and Ferrite Materials Composition in the Case of Waveguide Components.
4. Understand the concept of generating high microwave powers using microwave tubes
5. Understand the basics of microwave power generation using Gunn diodes, etc and Familiarize in Building a Microwave Test Bench Setup for Measurements.

Course Outcomes:
At the end of this course the student will able to:

CO1: Gain Knowledge of Transmission Lines and Waveguide Structures and How They Are Used as Elements in Impedance Matching and Filter Circuits.

CO2: Gain Knowledge of microstrip lines and cavity resonators

CO3: Apply Analysis Methods to Determine Circuit Properties of Passive or Active Microwave Devices.

CO4: Gain Knowledge and Understanding of Microwave Analysis Methods. Distinguish Between M-Type and O-Type Tubes

CO5: Gain knowledge in Gunn diodes with avalanche effects and Analyse and Measure Various Microwave Parameters Using a Microwave Test Bench

SYLLABUS

UNIT-I: RECTANGULAR WAVEGUIDES

Introduction to microwave communication, microwave spectrum and bands, Applications of Microwaves, **Rectangular wave guide**: Field Components, Transverse Electric (TE mode), Transverse Magnetic (TM mode), Transverse Electro Magnetic (TEM mode), Cut-off Frequency, Dominant mode, Filter characteristics, Phase Velocity, Group Velocity, Guide Wavelength, Relationship Between Phase and Group Velocities, Wave Impedances, Power Losses in a rectangular Waveguide.

UNIT-II: CIRCULAR WAVEGUIDES & MICROSTRIP LINES

Circular waveguides: Field Components, Transverse Electric (TE mode), Transverse Magnetic (TM mode), Transverse Electro Magnetic (TEM mode), Cut-off Frequency, Dominant mode. Micro strip transmission line (TL), Zo Relations of Micro stirp Line, Effective Dielectric Constants, Cavity Resonators-Rectangular and Circular cavity Resonator Quality Factor for Cavity Resonators. Re-entrant Cavities

UNIT-III: MICROWAVE COMPONENTS

Scattering Parameters of Microwave Tee-Junctions-E-plane, H-Plane, EH-Plane, Magic Tee Junctions, Directional Couplers: Two-hole Directional Coupler, S-matrix of Two-hole Directional Coupler, Waveguide Joints, Waveguide Bends, Corners, Transitions & Twists, Waveguide Irisis, Coupling Probe & Loops, Microwave propagation in Ferrite Devices- Faraday Rotation in Gyrator, Isolator, Circulator, Attenuators, Phase Shifters.

UNIT-IV: MICROWAVE TUBES

Limitations of conventional devices at microwave frequency, Operation and constructional details of two cavity Klystron Amplifier and Applegate diagram, Reflex Klystron, Magnetron, Helix Traveling wave tube.

UNIT-V: MICROWAVE SOLID STATE DEVICES

Transferred electron devices: Gunn-effect diodes & modes of operation. Avalanche transit – time devices: IMPATT diode, TRAPATT diode.

MICROWAVE MEASUREMENTS:

Microwave Bench Setup-Microwave power measurement using Bolometer method, Microwave attenuation measurement, VSWR measurement, Frequency measurement.

TEXT BOOKS:

1. Dr. M. Kulkarni- Microwave and Radar Engineering, 5th edition, Umesh Publications
2. Samuel Y. Liao, ―Microwave Devices and Circuits‖, 3rd Edition, Pearson Education, 2011.

REFERENCES:

1. Microwave and Radar Engineering – G Sasibhushana Rao Pearson
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.

B. TECH VI SEMESTER

PEC	L	T	P	C
	3	0	0	3

20EC6T04 **EMBEDDED SYSTEMS**
(PROFESSIONAL ELECTIVE-II)

Pre-requisite: Basic knowledge about transformations, differentiation and integration

Course Objectives:
The main objectives of this course are given below:

1. The basic concepts of an embedded system are introduced.
2. The various elements of embedded hardware and their design principles are explained.
3. Different steps involved in the design and development of firmware for embedded systems is elaborated.
4. Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed.
5. Fundamental issues in hardware software co-design were presented and explained.

Course Outcomes:
At the end of this course the student will able to:

CO1: Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
CO2: Understand how to integrate hardware and firmware of an embedded system using real time operating system.
CO3: Understand the Task communication of RTOS
CO4: The various embedded firmware design approaches on embedded environment.
CO5: Define the unique design problems and challenges of real-time systems

SYLLABUS

UNIT-I: INTRODUCTION TO EMBEDDED SYSTEMS

What is an embedded system Vs. General Computing system, history, classification, major application areas, and purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded systems, Application specific and Domain specific embedded systems-Examples

UNIT-II:

Factors to be considered in selecting a controller, 8051 Architecture, RTOS and Scheduling Operating basics, types, RTOS, Tasks, Process and Threads, Multiprocessing and Multitasking, Types of multitasking, Non preemptive Scheduling, Preemptive Scheduling

UNIT-III:

Task communication of RTOS, Shared memory, Pipes, Memory mapped objects, Message passing, Message queue, Mailbox, Signaling, RPC and sockets, Task communication/Synchronization issues, Racing, deadlock, live lock, The dining philosopher‛s problem.

UNIT-IV:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques-Busy waiting, Sleep and wakery, Semaphore, mutex, Critical section objects, Device drivers, How to clause an RTOS, Integration and Testing of embedded hardware and firmware

UNIT-V:

Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOKS:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

2. Embedded Systems: A Contemporary Design Tool Paperback by James K. Peckol

REFERENCES:

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE

2. Embedded Systems, Rajkamal, TMH, 2009.

B. TECH VI SEMESTER	PCC	L	T	P	C
		3	0	0	3

20EC6T05 **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**
(PROFESSIONAL ELECTIVE-II)

Course Objectives:
The main objectives of this course are given below:

1. Explain basic concepts and definitions in measurement.
2. Describe the bridge configurations and their applications.
3. Elaborate discussion about the importance of signal generators and analyzers in Measurement.
4. To introduce monitor, analyze and control any physical system.
5. To understand how different types of meters ‘work and their construction

Course Outcomes:
At the end of this course the student will able to:

CO1: Select the instrument to be used based on the requirements.

CO2: Understand and analyze different signal generators and analyzers.

CO3: Understand the design of oscilloscopes for different applications.

CO4: Design different Bridges for measurement of different parameters.

CO5: Design different transducers for measurement of different parameters.

SYLLABUS

UNIT-I:

Performance characteristics of instruments, Static characteristics- Accuracy, Resolution, Precision, Expected value, Error, Sensitivity, Dynamic Characteristics- speed of response, Fidelity, Lag and Dynamic error. Errors in Measurement. DC Voltmeters- Multi range, Range extension, AC voltmeters- multi range, range extension, Thermocouple type RF ammeter, Ohmmeters series type, Multimeter for Voltage, Current and resistance measurements.

UNIT-II:

Signal Generator- fixed and variable, AF oscillators, AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform Generators. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT-III:

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, standard specifications of CRO, CRO probes- Active & Passive, Lissajous method of frequency measurement, Dual trace oscilloscope, Sampling oscilloscope, Storage oscilloscope, Digital Storage oscilloscope.

UNIT-IV:

Measurement of Resistance-Wheat stone bridge. Kelvin's bridge, Kelvin's Double bridge**,** AC Bridges Measurement of Inductance- Maxwell's bridge, Anderson bridge, Hay's bridge. Measurement of Capacitance -Schering Bridge. Wien Bridge, Errors and precautions in using AC bridges. Q-meter.

UNIT-V:

Data Acquisition Systems, Transducers- Types of transducers, Resistance, Capacitance, inductance, LVDT, Strain gauges, Piezo Electric transducers, Thermocouples, Thermistor, Sensistors. Measurement of physical parameters - force, pressure, velocity, humidity and displacement.

TEXTBOOKS:

1. Electronic Instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

REFERENCES:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education

B. TECH VI SEMESTER	PEC	L	T	P	C
		3	0	0	3

20EC6T06 DIGITAL MODULATION TECHNIQUES
(PROFESSIONAL ELECTIVE-II)

Course Objectives:
The main objectives of this course are given below:

1. Analyze the properties of basic Modulation techniques and apply them to Digital Communication.
2. Apply different types of coding techniques to design the optimum receiver for channels with ISI and AWGN
3. Design and develop the different types of modulation techniques, equalizer to improve the performance under fading channels for various applications.
4. Understand and appreciate the need of various modulations and spread spectrum techniques.
5. Analyze the performance of spread spectrum systems in the presence of interference.

Course Outcomes:
At the end of this course the student will able to:

CO1: Explain merits and demerits of different modulation techniques & coding techniques, spread spectrum signals and channel behaviors.

CO2: Analyze various modulation, equalization, diversity and coding techniques for communication systems.

CO3: Compare performance of different types of modulation on different wireless application fading channels.

CO4: Design and demonstrate various modulation/coding equalization techniques and measure their performance.

CO5: Apply spread spectrum techniques to the baseband signal in the presence of interference to reduce the occurrence of error

SYLLABUS

UNIT-I:

Information and Entropy, Conditional Entropy and Redundancy, Mutual information, Source coding Huffman Code, Shannon-Fano Coding, Source coding to increase average information per bit, Bandwidth-S/N Trade off, Hartley Shannon Law, Error Control Codes, Linear Block Codes: Matrix Description of Linear Block Codes, Error Detection and Error Correction, Capabilities of Linear Block Codes. Cyclic Codes: Algebraic Structure, Encoding, Syndrome Calculation, Decoding. Convolution Codes: Encoding, Decoding,

UNIT-II:

Review of fundamental concepts and parameters in Digital Communication. Digital modulation schemes, Power spectra of digital modulation signals. Performance of carrier modulation schemes : Performance of BPSK and QPSK in AWGN Channel, M-ary PSK in AWGN Channel, Minimum Shift keying (MSK) Modulation, GMSK continuous phase modulation(CPM) schemes.

UNIT-III:

Channel characterization and modeling: Optimum receivers for AWGN Channels, Equalization techniques, Orthogonal Frequency Division Multiplexing (OFDM). Carrier Synchronization, Timing synchronization.

UNIT-IV:

Introduction to spread spectrum modulation, Direct Sequence modulation, spreading codes, Advantage of CDMA for wireless, Channel estimation, Frequency Hopping spread spectrum, , slow and fast frequency hopping, Processing gain.

UNIT-V:

Spread spectrum as a Multiple access technique: Multi channel and Multi carrier systems; Digital Communication through fading multipath channels; Multi user communications. ‘Space diversity on Receiver’ technique, MIMO antenna systems.

TEXT BOOKS:

1. John G. Proakis and Masoud Salehi, “Digital Communications,” McGraw Hill, 5/e, 2008.

2. Stephen G. Wilson, ”Digital Modulation and coding,” Pearson Education, 2010.

REFERENCE BOOKS:

1. Simon Haykin and Michael Moher, “Modern Wireless Communications,” Pearson Education, 2005.

2. Andrew J Viterbi, “CDMA principles spread spectrum communications,” Adison Wesley, 1995

B. TECH VI SEMESTER	PEC	L	T	P	C
		0	0	3	1.5

20EC6L10 MICROWAVE & OPTICAL COMMUNICATIONS LAB

Course Outcomes:
At the end of this course the student will able to:

CO1: The student will be able to understand the characteristics of Reflex Klystron, GUNN Diode.

CO2: The student will be able to measure the attenuation of variable attenuator.

CO3: The student will be able to measure the scattering parameters of Circulator, Directional coupler and Magic Tee.

CO4: The student will be able to understand the characteristics of LED, LASER Diode and calculate the losses in analog optical Link.

CO5: The student will be able to determine numerical aperture and calculate the data rate in digital optical link.

Introduction

This lab is offered to B.Tech. ECE students and concentrates on introducing the advances in communications. This lab is well equipped with all the microwave devices. The Laboratory conducts practical sessions to enable the students to implement their theoretical knowledge and observe the practical results, following outcome-based education. Lab deals with the measurements of the signals at microwave frequency range. It involves measurement of attenuation, reflex klystron and Gunn diode characteristics and scattering parameters of various microwave devices like Circulator, Direction Coupler, and Magic-Tee. Even the latest trend of communication technology i.e., fiber optics is also introduced and propagation conditions will be verified by evaluating the losses and digital data rate for transmission.

LIST OF MICROWAVE LAB EXPERIMENTS

1. Reflex klystron characteristics.
2. Measurement of Attenuation
3. Waveguide Parameters Measurement
4. Measurement of scattering parameters for Two Hole Directional Coupler
5. Measurement of scattering parameters for Three Port Circulator
6. Measurement of scattering parameters for Magic Tee

7. Measurement of GUNN Diode Characteristics.

LIST OF OPTICAL EXPERIMENTS

1. LED Characteristics.
2. LASER Diode Characteristics.
3. Measurement of Digital Data Rate using Digital Optical Link.
4. Measurement of Losses in Analog Optical Link.
5. Numerical Aperture determination for Fibers.

B. TECH VI SEMESTER	PCC	L	T	P	C
		0	0	3	1.5

20EC6L11 VLSI DESIGN LAB

Note: The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using 130nm technology with the Industry standard EDA Tools.

COURSE OBJECTIVES:

The main objectives of this course are given below:

1. To study understand the MOS device at device, circuit and layout level
2. To learn the implementation of designed circuit on FPGA Board

COURSE OUTCOMES:

At the end of this course the student will able to:

CO1: Design and analyse the MOS at device, circuit and layout level using back end CAD tool.

CO2: Design of combinational circuits using CAD tool

CO3: Design of Sequential combinational circuits using CAD tool

CO4: Design static RAM Cell using CAD tool

CO5: Design DAC using CAD tool

List of Experiments:

1. Design and Implementation of an Universal Gates
2. Design and Implementation of an Inverter
3. Design and Implementation of Full Adder
4. Design and Implementation of Full Subtractor
5. Design and Implementation of Decoder
6. Design and Implementation of Multiplexer
7. Design and Implementation of RS-Latch
8. Design and Implementation of D-Latch
9. Design and Implementation of Master Slave Flip-flop
10. Design and Implementation asynchronous counter
11. Design and Implementation of static RAM cell
12. Design and Implementation of 8 bit DAC using R-2R latter network

Software Required:

i. Mentor Graphics Software / Equivalent Industry Standard Software.ii. Personal computer system with necessary software to run the programs and to implement.

B. TECH VI SEMESTER	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

20EC6L12 DIGITAL SIGNAL PROCESSING LAB

LIST OF EXPERIMENTS

1. Generation of basic sequences impulse, unit step, ramp, Sinusoidal, exponentially growing and decaying sequences.

2. Verification of linear convolution.

3. Verification of circular convolution.

4. DFT of an N-point sequence

5. IDFT of an N-point sequence

6. a) Frequency response of IIR low pass Butterworth filter.

   b) Frequency response of IIR high pass Butterworth filter.

7. a) Frequency response of IIR low pass

   b) Frequency response of IIR high pass Chebyshev filters

8. a)Frequency response of FIR low pass filter using Rectangular Window.

   b) Frequency response of FIR low pass filter using Hamming Window.

9. Decimation.

10. Interpolation

Software needed: MATLAB

B. TECH VI SEMESTER

	L	T	P	C
SC	0	0	4	2

20EC6S13 SOFT SKILLS
(Skill Oriented Course)

Course Outcomes

The student will acquaint himself with various nuances of Soft Skills and Personality Development besides aspects related to Campus Recruitment Process.

SYLLABUS

1 Life Skills

2 JAM

3 Presentation Skills

4 Resume Writing

5 Group Discussion

6 Interview Skills

References:

1. ***Interact,*** Orient Blackswan

2. **Communication Skills,** Sanjay Kumar and Pushp Latha.OUP,2011

B.TECH VI SEMESTER

	L	T	P	C
MC	2	0	0	-

20EC6M14 DISASTER MANAGEMENT

Course Learning Objectives: The objective of this course is to

1. Understand Types of disasters like Earthquake, Landslide, Flood, Drought, Fire
2. Know Panchayati Raj Institutions/ Urban Local Bodies (PRIs/ ULBs), States,Centre, and other stakeholders
3. Understand Climate Change Adaptation - IPCC Scenario and Scenarios in the context of India
4. Understand Role of GIS and Information Technology Components in Preparedness, Risk Assessment
5. Know various case studies

Course Learning Outcomes: On successful completion of this course, the students will be able to

CO1: Differentiate the types of disasters, causes and their impact on environment and society

CO2: Assess vulnerability and various methods of risk reduction measures as well as mitigation.

CO3: Draw the hazard and vulnerability profile of India, Scenarios in the Indian context

CO4: Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

CO5: Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment

SYLLABUS

UNIT-I:

INTRODUCTION TO DISASTERS Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT-II:

APPROACHES TO DISASTER RISK REDUCTION (DRR) Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level State Disaster Management Authority (SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT-III:

INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources

UNIT-IV:

DISASTER RISK MANAGEMENT IN INDIA Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT-V:

DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

Text Books:

1. Singhal J.P.“Disaster Management”, Laxmi Publications, 2010. ISBN-10: ISBN-13: 978-9380386423

2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

Reference Books:

1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy, 2009

B. TECH VII SEMESTER **PEC**

L	T	P	C
3	0	0	3

20EC7T01 **CMOS ANALOG IC DESIGN**
(PROGRAM ELECTIVE-III)

Course Objectives:
The main objectives of this course are given below:

1. to study the fundamentals of analog circuits and MOS device models
2. to gain knowledge on various configurations of MOS transistors and feedback concepts
3. to study the characteristics of noise and frequency response of the amplifier
4. to learn the concepts of Op-Amp frequency compensation, capacitor switches and PLLs

Course Outcomes:
At the end of this course the student will able to:

CO1: Realize the concepts of Analog MOS devices and current mirror circuits.

CO2: Design different configuration of Amplifiers and feedback circuits.

CO3: Analyze the characteristics of frequency response of the amplifier and its noise.

CO4: Analyze the performance of the stability and frequency compensation techniques of Op- Amp Circuits.

CO5: Construct switched capacitor circuits and PLLs

SYLLABUS

UNIT-I: INTRODUCTION TO ANALOG IC DESIGN AND CURRENT MIRRORS

Concepts of Analog Design - General consideration of MOS devices – MOS I/V Characteristics – Second order effects – MOS device models. Basic current mirrors-Cascode current mirrors- Active current mirrors- Large and Small signal analysis-Common mode properties.

UNIT-II: AMPLIFIERS AND FEEDBACK

Basic Concepts – Common source stage- Source follower- Common gate stage-Cascode stage. Single ended and differential operation- Basic Differential pair-Common mode response- Differential pair with MOS loads- Gilbert Cell. Feedback-

General Consideration of feedback circuits- Feedback topologies- Effect of loading- Effect of feedback on Noise.

UNIT-III: FREQUENCY RESPONSE OF AMPLIFIERS AND NOISE

General considerations- Miller Effect and Association of Poles with Nodes, Common source stage- Source followers- Common gate stage- Cascode stage- Differential pair. Noise- Statistical characteristics of noise- Types of noise- Representation of noise in circuits- Noise in single stage amplifiers- Noise in differential pairs- Noise Bandwidth.

UNIT-IV: OPERATIONAL AMPLIFIER STABILITY AND FREQUENCY COMPENSATION

General Considerations- One and Two Stage Op Amps- Gain Boosting- Comparison- Common mode feedback- Input range limitations- Slew rate- Power Supply Rejection- Noise in Op Amps- General consideration of stability and frequency compensation- Multipole system- Phase margin- Frequency compensation- Compensation of two stage op Amps- Other compensation techniques.

UNIT-V: SWITCHED CAPACITOR CIRCUITS AND PLLS

General Considerations- Sampling switches- Switched Capacitor Amplifiers- Switched Capacitor Integrator- Switched Capacitor Common mode feedback. Phase Locked Loops-Simple PLL- Charge pump PLLs - Non ideal Effects in PLLs- Delay locked loops- its Applications.

TEXT BOOK:

1. Behzad Razavi, ―Design of Analog CMOS Integrated Circuits‖, Tata McGraw Hill, 2001, 33rd re-print, 2016.
2. Phillip Allen and Douglas Holmberg ―CMOS Analog Circuit Design‖ Second Edition, Oxford University Press, 2004.

REFERENCES:

1. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, Analysis and Design of Analog Integrated Circuits, 5th Edition, Wiley, 2009
2. Grebene, ―Bipolar and MOS Analog Integrated circuit design‖, John Wiley & sons, Inc., 2003

B. TECH VII SEMESTER **PEC**

L	T	P	C
3	0	0	3

20EC7T02 **DATA COMMUNICATIONS AND NETWORKS**
(PROGRAM ELECTIVE-III)

COURSE OBJECTIVES:
The main objectives of this course are given below:

1. To Focus on information sharing and networks.
2. To Introduce flow of data, categories of network, different topologies.
3. To Focus on different coding schemes.
4. Brief the students regarding protocols and standards.
5. To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices, etc.

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: On successful completion of the course, the student will be having the basic knowledge of data sharing, transmission media and their protocols.
CO2: Student will have the basic knowledge of computer networks.
CO3: To Focus on information sharing and networks.
CO4: To Introduce flow of data, categories of network, different topologies.
CO5: To Focus on different coding schemes

SYLLABUS

UNIT-I:

Introduction to data communication and networking: Why study data communication? Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works.

Study of OSI and TCP/IP protocol suit: The Model,Functions of the layers,TCP/IP Protocol Suites

UNIT-II

Study of Signals: Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals, Digital Signals.

Study of Digital transmission: Digital to Digital Conversion, Analog to Digital Conversion.

UNIT-III:

Study of Analog transmission: Digital to Analog Conversion, Analog to Analog Conversion.

Study of Multiplexing: Many to one/one to Many, Frequency division Multiplexing, Wage division Multiplexing, Time division Multiplexing, Multiplexing applications.

UNIT-IV:

Types of transmission media: Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching.

Error Detection and Correction: Types of Errors, Detection, Parity Check, Vertical Redundancy Check Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction.

UNIT-V:

Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems.

Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Gateways Routers, Routing Algorithms, Distance Vector Routing, Link State Routing.

TEXT BOOKS:

1. Data communication & Networking by Bahrouz Forouzan.
2. Computer Networks by Andrew S. Tanenbaum

REFERENCE BOOKS:

1. Data and Computer Communications by William Stallings
2. Kleinrock, Leonard. *Queueing Systems, Vol 1: Theory*. New York, NY: Wiley J., 1975. ISBN: 0471491101.

B. TECH VII SEMESTER

PEC	L	T	P	C
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20EC7T03 **INFORMATION THEORY AND CODING**
(PROGRAM ELECTIVE-III)

Course Objectives:
The main objectives of this course are given below:

1. To Understand the concept of Entropy, Rate of information and order of the source with reference to dependent and independent source.
2. To Study various source encoding algorithms.
3. To Model discrete & continuous communication channels.
4. To Study various error control coding algorithms.

Course Outcomes:
At the end of this course the student will able to:

CO1: Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source

CO2: Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms

CO3: Model the continuous and discrete communication channels using input, output and joint probabilities

CO4: Determine a code word comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes

CO5: Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.

SYLLABUS

UNIT-I: INFORMATION THEORY

Introduction, Measure of information, Information content of message, Average Information content of symbols in Long Independent sequences, Average Information content of symbols in Long dependent sequences, Statistical Model of Information Sources, Entropy and Information rate

UNIT-II: SOURCE CODING

Source coding theorem, Prefix Codes, Kraft McMillan Inequality Property Encoding of the Source Output, Shannon's Encoding Algorithm. Shannon Fano Encoding Algorithm, Huffman codes, Extended Huffman coding, Arithmetic Coding,

UNIT-III: INFORMATION CHANNELS

Communication Channels, Channel Models, Channel Matrix, Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of: Binary Symmetric Channel.

UNIT-IV: ERROR CONTROL CODING

Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Single Error Correcting Hamming Codes, Table lookup decoding using Standard Array. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

UNIT-V: SOME IMPORTANT CYCLIC CODES

Golay Codes, BCH Codes Convolution Codes: Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm)

TEXT BOOKS:

1. Information Theory, Inference and Learning Algorithms by David J.C. MacKay. Draft 2.2.4 August 31, 2001.

2. Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill

REFERENCE BOOKS:

1. Elements of Information Theory, by Thomas M. Cover and Joy A. Thomas, John Wiley, 1991, ISBN 0-471- 06259-6

2. Todd K. Moon, "Error Correction Coding – Mathematical Methods and Algorithms", 2006, Wiley India

B. TECH VII SEMESTER	PEC	L	T	P	C
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20EC7T04 DIGITAL IMAGE PROCESSING (PROGRAM ELECTIVE-IV)

Course Objectives:
The main objectives of this course are given below:

1	To comprehend the relation between human visual system and machine perception and processing of digital images.
2	To provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.

Course Outcomes:
At the end of this course the student will able to:

CO1:	Understand digital image fundamentals and various image transform techniques.
CO2:	Learn various image enhancement techniques.
CO3:	learn different causes for image degradation and overview of image restoration techniques
CO4:	Learn different techniques employed for image segmentation and understand different morphological image processing techniques.
CO5:	Understand the need for compression and evaluate the basic compression algorithms.

SYLLABUS

UNIT-I: DIGITAL IMAGE FUNDAMENTALS & IMAGE TRANSFORMS

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT-II: IMAGE ENHANCEMENT (SPATIAL DOMAIN)

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or

Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering. Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT-III: IMAGE RESTORATION

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT-IV: IMAGE SEGMENTATION

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

UNIT-V: IMAGE COMPRESSION

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- MC GRAW HILL 2010

REFERENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - ScotteUmbaugh, 2nd Ed, CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, MC GRAW HILL EDUCATION, 2010.

B. TECH VII SEMESTER	**PEC**	**L**	**T**	**P**	**C**
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20EC7T05 **LOW POWER VLSI DESIGN**
(PROFESSIONAL ELECTIVE-IV)

Course Objectives:
The main objectives of this course are given below:

1. This course addresses a profound analysis on the development of the CMOS & Bi-CMOS digital circuits for a low voltage low power environment
2. To study the concepts of device behaviour and modelling
3. To study the concepts of low voltage, low power logic Adder circuits.
4. To study the concepts of low voltage, low power logic Multiplier circuits.
5. To study the concepts of low voltage, low power memories.

Course Outcomes:
At the end of this course the student will able to:

CO1: Capability to recognize advanced issues in VLSI systems, specific to the deep-submicron silicon technologies.

CO2: Students able to understand deep submicron CMOS technology and digital CMOS design styles.

CO3: Understand the concept of Low voltage, Low power Adders

CO4: Understand the concept of Low voltage, Low power Multipliers

CO5: Understand the concept of Low voltage, Low power Memories

SYLLABUS

UNIT-I: FUNDAMENTALS

Fundamentals: Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II: LOW-POWER DESIGN APPROACHES

Low-Power Design Approaches: Low-Power Design through Voltage Scaling: VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel

Processing Approaches. Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III: LOW-VOLTAGE LOW-POWER ADDER

Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low Voltage Low-Power Logic Styles.

UNIT-IV: LOW-VOLTAGE LOW-POWER MULTIPLIERS

Low-Voltage Low-Power Multipliers: Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-V: LOW-VOLTAGE LOW-POWER MEMORIES

Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

TEXT BOOKS:

1. Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits – Analysis and Design", TMH, 2011.
2. Kiat-Seng Yeo, Kaushik Roy, "Low-Voltage, Low-Power VLSI Subsystems", TMH Professional Engineering.

REFERENCE BOOKS:

1. Ming-BO Lin, "Introduction to VLSI Systems: A Logic, Circuit and System Perspective", CRC Press
2. Anantha Chandrakasan, "Low Power CMOS Design", IEEE Press, /Wiley International, 1998.

B. TECH VII SEMESTER	PEC	L	T	P	C
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20EC7T06 OPTICAL COMMUNICATIONS
(PROFESSIONAL ELECTIVE-IV)

Course Objectives:
The main objectives of this course are given below:

The student will be introduced to the functionality of each of the components that comprise a fiber-optic communication system

1. The properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
2. To understand optical fiber measurements and various coupling techniques
3. Working of optical sources, detectors and transmission techniques.
4. To Understand the knowledge about optical communication systems and networks
5. To Analyze and design optical communication and fiber optic sensor systems.

Course Outcomes:
At the end of this course the student will able to:

CO1: Understand about the various optical fiber modes, configuration and transmission characteristics of optical fibers

CO2: Explore various idea about optical fiber measurements and various coupling techniques

CO3: Learn about the various optical sources, detectors and transmission techniques

CO4: Enrich the knowledge about optical communication systems and networks

CO5: To be able to design optical system based on requirements.

SYLLABUS

UNIT-I: INTRODUCTION TO OPTICAL FIBERS

Introduction to optical fiber communication system and advantages, Ray theory of transmission, total internal reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Optical Fiber waveguide- Modes, V number, Mode Coupling, Step Index Fibers, Graded Index Fibers. Single Mode Fibers- Cut off Wavelength, Mode Field Diameter, Effective Refractive Index

UNIT-II: TRANSMISSION CHARACTERISTIC AND DISTORTION

Fiber Materials, Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses, Types of Dispersion – Material Dispersion, Wave- Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening, Optical Fiber Connectors- Connector Types, Connector Return Loss. Fiber Splicing: Splicing Techniques, Fiber Alignment and Joint Loss

UNIT-III: OPTICAL SOURCES AND DETECTORS

Optical Sources- LEDs, Structures, Materials, surface emitting LED, Edge emitting LED, quantum efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Detectors: PIN photo detector and Avalanche photo diodes

UNIT-IV: POWER LAUNCHING AND RECEPTION

Source to Fiber Power Launching: – Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling, optical receiver operation, digital signal transmission error sources, digital receiver performance-probability of error-receiver sensitivity-quantum limit.

UNIT-V: OPTICAL SYSTEM DESIGN

Optical System design consideration-Point to Point link design, Link power budget, rise time budget, WDM principles and necessity, Measurement of Attenuation and Dispersion, Eye pattern

TEXT BOOKS

1. Optical Fiber Communications — Gerd Keiser, TMH, 4th Edition, 2008.
2. Optical Fiber Communications — John M. Senior, Pearson Education, 3rd Edition, 2009.

REFERENCE BOOKS

1. Fiber Optic Communications — D.K. Mynbaev, S.C. Gupta and Lowell L. Schemer, Pearson Education, 2005.
2. Text Book on Optical Fiber Communication and its Applications — S.C.Gupta, PHI, 2005

B. TECH VII SEMESTER	PEC	L	T	P	C
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20EC7T07 **RADAR ENGINEERING**
(PROFESSIONAL ELECTIVE-V)

Course Objectives:
The main objectives of this course are given below:

1. The Basic Principle of radar and radar range equation.
2. Different types of radars; CW, FM-CW
3. MTI and pulse Doppler radars.
4. Understand the different tracking techniques for radar.
5. Understand the characteristics of a matched filter receiver and its performance, different types of displays, duplexers and antennas used in radar systems.

Course Outcomes:
At the end of this course the student will able to:

CO1: Derive the radar range equation and to solve some analytical problems.
CO2: Understand the different types of radars and its applications.
CO3: Understand the different types of MTI Radars and Pulse Doppler Radar.
CO4: Understand the concept of tracking and different tracking techniques.
CO5: Understand the various components of radar receiver and its performance

SYLLABUS

UNIT-I: BASICS OF RADAR

Introduction, Principle of Radar, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Pulsed Radar, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, SNR, Modified Radar Range Equation, probability of detection, probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses, Illustrative Problems.

UNIT-II: CW AND FREQUENCY MODULATED RADAR

Doppler Effect, **Continuous Wave (CW) Radar** – Block Diagram and Operation, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Doppler Filter Bank, **Frequency Modulated-Continuous Wave (FM-CW) Radar:** Range and Doppler Measurement, Block Diagram and operation Characteristics, FM-CW Radar using Altimeter, Multi Frequency CW Radar, Illustrative Problems.

UNIT-III: MTI AND PULSE DOPPLER RADAR

Introduction, Principle, Simple CW Radar, MTI Radar Block Diagram with Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers, Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. Limitations to MTI Performance. Non-Coherent MTI Radar, Pulse Doppler Radar.

UNIT-IV: TRACKING RADAR

Tracking with Radar principle, Sequential Lobing, Conical Scan, Automatic Gain Controller Tracking Radar, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse of Single Coordinate and Two coordinate, Phase Comparison Mono pulse, tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT-V: RADAR RECEIVERS

Radar Receiver, Matched Filter Receiver, relation between matched filter characteristics and correlation functions, Efficiency of non-matched filters, Constant False Alarm Rate Receiver, Radar Displays types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations.

TEXT BOOKS

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007.
2. Radar Engineering – GSN Raju, IK International.

REFERENCE BOOKS

1. Radar: Principles, Technology, Applications – Byron Edde, Pearson Education, 2004.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.

B.TECH VII SEMESTER	PEC	L	T	P	C
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20EC7T08 EMBEDDED REAL TIME OPERATING SYSTEMS
(PROFESSIONAL ELECTIVE-V)

Course Objectives:
The main objectives of this course are given below:

1. Understand the concepts of embedded system design and analysis
2. Learn the architecture and programming of ARM processor
3. Be exposed to the basic concepts of embedded programming
4. Learn the real time operating systems

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Describe the architecture and programming of ARM processor

CO2: Outline the concepts of embedded systems

CO3: Explain the basic concepts of real time operating system design

CO4: Model real-time applications using embedded-system concept

CO5: Know about operating systems

SYLLABUS

UNIT-I: INTRODUCTION TO EMBEDDEDSYSTEM DESIGN

Complex systems and microprocessors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT-II: ARM PROCESSOR AND PERIPHERALS

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT-III: EMBEDDED PROGRAMMING

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

UNIT-IV: REAL TIME SYSTEMS

Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronization.

UNIT-V: PROCESSES AND OPERATING SYSTEMS

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real- time operating systems- Priority based scheduling- Inter process communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

TEXT BOOKS:

1. Marilyn Wolf, ―Computers as Components - Principles of Embedded Computing System Design‖, Third Edition ―Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)

2. Jane W.S.Liu,‖ Real Time Systems‖, Pearson Education, Third Indian Reprint, 2003.(UNIT IV)

REFERENCES:

1. Lyla B.Das, ―Embedded Systems : An Integrated Approach‖ Pearson Education, 2013.

2. Jonathan W.Valvano, ―Embedded Microcomputer Systems Real Tim Interfacing‖ Third Edition Cengage Learning, 2012.

B. TECH VII SEMESTER	PEC	L	T	P	C
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20EC7T09 SATELLITE COMMUNICATIONS

Course Objectives:
The main objectives of this course are given below:

1. Understand the concepts, applications and subsystems of Satellite communications.
2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design
3. Understand the concepts of satellite navigation, architecture and applications of GPS.

Course Outcomes:
At the end of this course the student will able to:

CO1: Understand the basic concepts, applications, frequencies used and types of satellite communications.

CO2: Understand the various satellite subsystems and its functionality.

CO3: Understand the concepts of satellite link design and calculation of C/N ratio.

CO4: Understand the concepts of multiple access and various types of multiple access techniques in satellite Systems.

CO5: Understand the concepts of satellite navigation, architecture and applications of GPS

SYLLABUS

UNIT-I:

INTRODUCTION: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications.

UNIT-II:

SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and Monitoring, Power systems, Communication subsystems, Satellite antenna, Equipment reliability and Space qualification.

UNIT-III:

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT-IV:

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N, Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA, Code Division multiple access (CDMA), Spread spectrum transmission and reception.

UNIT-V:

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.

2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.

2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.

B.TECH VII SEMESTER	HSMC	L	T	P	C
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20EC7T16 UNIVERSAL HUMAN VALUES 2
Understanding Harmony

Course Objectives

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcome

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

CO1: Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society

CO2: Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.

CO3: Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society

CO4: Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.

CO5: Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

SYLLABUS

UNIT- I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential
Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT- II

Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'

11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

12. Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT- III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

14. Understanding the meaning of Trust; Difference between intention and competence

15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT-IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature

19. Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature

20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

21. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT-V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

22. Natural acceptance of human values

22. Definitiveness of Ethical Human Conduct

23. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

24. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order

b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,

c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

25. Case studies of typical holistic technologies, management models and production systems

26. Strategy for transition from the present state to Universal Human Order:

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b. At the level of society: as mutually enriching institutions and organizations

27. Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Readings

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews

7. Economy of Permanence - J C Kumarappa

8. Bharat Mein Angreji Raj – Pandit Sunderlal

9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)

13. Gandhi - Romain Rolland (English)

B.TECH VII SEMESTER

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20EC7T17 INTERNET OF THINGS APPLICATIONS WITH LATEST BOARDS
(Skill Oriented Course)

LIST OF EXPERIMENTS

1. Familiarization with the concept of IOT, Arduino / Raspberry Pi and perform necessary software installation.
2. Design of digital dc voltmeter and ammeter Study of Raspberry-Pi, Beagle board, Arduino and other micro controller
3. Create a web server that displays a text that can be read by signing into the page.
4. Create a web server that displays two buttons that can be used to control two LEDs connected to the board,
5. Design a traffic control system using IOT
6. Design a railway gate control using stepper motor using IOT
7. Study of different operating systems for Node MCU / Raspberry Pi/ Beagle board. Understanding the process of Os installation on Node MCU / Beagle board
8. Study of Connectivity and Configuration of Raspberry-Pi/ Beagle Board circuit with basic peripherals, LEDs, Understanding GPIO and its use in program.
9. To study of IoT Data Logging using Beaglebone Black and Thingspeak.
10. Turn a smartphone into an IoT device using the IBM Watson IoT Platform cloud-hosted service.

B.TECH V SEMESTER	OEC	L	T	P	C
		3	0	0	3

20CE5T04 ARCHITECTURE AND TOWN PLANNING
(OPEN ELECTIVE-I)

Course Objectives: The objective of this course is to

- Initiating the students to different architectures of the world.
- Salient features of Egyptian, Greek, Roman, Indian Vedic, Indus valley civilization.
- Architectural Design concepts, Principles of Planning and Composition.
- To understand town planning from ancient times to modern times.
- To impart the concepts of town planning standards.

Course Outcomes: On successful completion of this course, the students will be able to

CO1: Student should be able to distinguish architectural styles of eastern and Western world.

CO2: Student should understand the importance of Orders of Architecture.

CO3: Should be able to compose spaces of buildings using design concepts, planning principles.

CO4: Student should understand the town planning standards, landscaping features.

SYLLABUS

UNIT-I:

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace – Fort - Tomb.

UNIT-II:

Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNIT-III:

Principles of Planning: Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements,

Post-classic Architecture: Introduction of post-classic architecture contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wright, Walter Groping.

UNIT-IV:

Histroical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT-V:

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- neighbor hood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation planning regulations and limitations.

Text books:

1. 'The great ages of World Architecture' by G.K. Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S.Sane.
3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHI Learning, NewDelhi.
4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning'by G.K. Haraskar.

Reference Books:

1. 'Drafting and Design for Architecture' by Hepler, Cengage
2. Learning 'Architect's Portable Handbook' by John Patten Guthrie – Mc Graw Hill International Publications.
3. 'Mordern Ideal Homes for India' by R. S. Deshpande.
4. 'Town and County Planning' by A.J. Brown and H.M. Sherrard.
5. 'Town Design' by Federik Glbbard, Architectural press, London.

		L	T	P	C
B.TECH V SEMESTER	**OEC**	**3**	**0**	**0**	**3**

20CE5T05 ELEMENTS OF CIVIL ENGINEERING

(OPEN ELECTIVE-I)

Course Objectives: The objective of this course is to

To introduce basics of Civil Engineering concepts in the fields of surveying, building materials, water resources, Water Supply, Sanitary, Electrical Works in Building and Highway engineering.

Course Outcomes: On successful completion of this course, the students will be able to

CO1: The student should be able to know the basics of civil engineering and concepts of surveying.

CO2: The student should be able to know various properties of building materials and various types of building.

CO3: The student should be able to know the fundamentals of Water Resources, Water Supply, Sanitary and Electrical Works in Building.

CO4: The student should be able to know the fundamental concepts highway engineering.

SYLLABUS

UNIT-I:

Introduction. Introduction of Civil Engineering, Scope of Civil Engineering, Role of Civil Engineer in Society. Impact of infrastructural development on economy of country.

UNIT-II:

Surveying Introduction: Definition of Surveying, Fundamental principles of surveying, Classification of surveying.

Linear Measurement: Methods, Instruments used in chain surveying, Selection of stations, Chaining and Ranging.

Angular Measurement: Instruments used, Types of compass, Types of meridians and bearings, Measurement of bearings, computation of angles. Compass traversing local attraction.

Levelling: Objectives and applications-terminology-Instruments, component parts of dumpy level, Types of levelling, levelling staff

UNIT-III:

Building Materials and Construction Materials: Introduction to construction materials - Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Classification of buildings, Building components and their functions.

UNIT-IV:

Water Resources Hydrologic cycle, water use and its conservation, Introduction to dams, barrages and check dams. Water Supply, Sanitary and Electrical Works in Building Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

UNIT–V:

Transportation Engineering, classification of roads, Introduction of flexible and rigid pavements, Introduction to road traffic and traffic control mechanism.

Text Books:

1. Elements of Civil Engineering, Mimi Das Saikia, Bhargab Mohan Dasand Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering, Dr. R.K. Jain and Dr. P.P. Lodha, Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I, Dr. B. C. Punmia, Ashokkumar Jain, Arun kumar Jain, 16th Edition Publisher: Laxmi Publication Delhi.

Reference Books:

1. Surveying Theory and Practice, James M Anderson and Edward, 7th Edition, M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling, R. Subramanian Publisher, Oxford University.
3. Building drawing, M.G. Shah, C.M.Kale and S.Y. Patki Publisher: TataMcGraw Hill.

B.TECH V SEMESTER	OEC	L	T	P	C
		3	0	0	3

20EE5T04 BASICS OF CONTROL SYSTEMS
(OPEN ELECTIVE-I)

Course Objectives:

- To Enable the student to understand the importance of Modelling of Control systems
- To understand the First order & second order systems
- To understand the transfer function analysis
- To understand the Stability of the systems
- To understand the States Space Analysis

Course Outcomes:

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

CO1: Understand the different Classification of control systems and modelling

CO2: Understand the functioning of Signals & time response analysis

CO3: Understand the concept of Root Locus & Construction of Root Loci

CO4: Understand the concept of Bode plot & Nyquist Plot

CO5: Understand the concept of States Space Analysis of LTI System

SYLLABUS

UNIT – I

Mathematical Modeling of Control Systems: Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems

UNIT-II

Time Response Analysis: Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT – III

Stability and Root locus Technique: The concept of stability – Routh's stability criterion –limitations of Routh's stability –Root locus concept - construction of root loci

UNIT–IV

Frequency Response Analysis: Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots.

UNIT–V

State Space Analysis of LTI Systems: Concepts of state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations.

Text Books:

1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India,2nd Edition.

Reference Books:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Control Systems, Manik Dhanesh N, Cengage publications.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International
   Publications, 5th Edition.
4. Control Systems Engineering, S.Palani,TataMcGraw Hill Publications.

		L	T	P	C
B.TECH V SEMESTER	**OE**	**3**	**0**	**0**	**3**

20EE5T05 SPECIAL ELECTRICAL MACHINES

(OPEN ELECTIVE-I)

Course Objective:

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor**.**
- To explain the theory of travelling magnetic field and applications of linear motors.

Course Outcomes:

The student should be able to

CO1: Distinguish between brush dc motor and brush less dc motor**.**

CO2: Explain the performance and control of stepper motors, and their applications.

CO3: Explain theory of operation and control of switched reluctance motor.

CO4: Explain the theory of travelling magnetic field and applications of linear motors.

CO5: Understand the significance of electrical motors for traction drives.

SYLLABUS

Unit I: Stepper Motors: Classification and construction details of stepper motors – Hybrid and Variable Reluctance Motor (VRM) - Construction and principle of hybrid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of stepper motors – Applications of stepping motors.

Unit II: Switched Reluctance Motors: Construction – Comparison of conventional and switched reluctance motors –Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

Unit III : Brushless DC Motor: Construction – Principle of operation of BLDM – sensing and logic scheme, basic drive circuit, power converter circuit, transient analysis Theory of brushless DC motor as variable speed synchronous motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency.

UNIT-IV: **Linear motors:** Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

Unit V: Electric Motors for traction drives: AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Text Books:

1. Special electrical Machines, K. Venkata Ratnam, University press, 2009, New
2. "Linear Electric Motors: Theory, Design and Practical application" , Naser A and Boldea I, Prentice Hall Inc, New Jersey, 1987.

Reference Books:

1. Generalized Theory of Electrical Machines – PS Bhimbra, Khanna Publishers.
2. "Brushless Permanent Magnet and Reluctance Motor Drives" , Miller T.J.E. Clarendon Press, Oxford, 1989.
3. Electric Machines – Theory, operation, Applications and Control - Charles I. Hubert – Pearson Publications.

B.TECH V SEMESTER		**OEC**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**
20ME5T04	**DESIGN THINKING & PRODUCT INNOVATION (OPEN ELECTIVE-I)**					

Pre-requisite: Managerial Economics and Financial Analysis,

Management Science.

Course Objective: At the end of the course, The student will able to

1. Design and develop the new product
2. Explain the basics of design thinking.
3. Describe the role of reverse engineering in product development.
4. Identify the needs of society and convert into demand.
5. Explain the product planning and product development process

Course Outcomes: At the end of the course, student will be able to

CO1: To bring awareness on innovative design and new product development.

CO2: To explain the basics of design thinking.

CO3: To familiarize the role of reverse engineering in product development.

CO4: To train how to identify the needs of society and convert into demand.

CO5: To introduce product planning and product development process.

SYLLABUS

UNIT-I: SCIENCE TO ENGINEERING:

Job of engineers, engineering units and measurement, elements of engineering analysis, forces and motion, energy, kinematics and motion, conversion of linear motion to rotary and vice versa, motion transmission. Physics to Engineering: Application of Newton laws, Pascal's law, Bouncy, Bernoulli's theorem, Ohm's law, electrical induction in
engineering products.

UNIT-II: HISTORICAL DEVELOPMENT:

Invention wheel, early mechanics in design, mechanical advantages,
industrial revolution, steam and petrol for mobility. Innovations in Electrical and Electronics: Electrical energy generation, electrical bulb, electrical equipment, electronics and automation, computing for early days to present, innovations in communications.

UNIT-III: SYSTEMATIC APPROACH TO PRODUCT DEVELOPMENT:

Design Thinking, Innovation, Empathize Design Thinking as a systematic approach to Innovation, brainstorming, visual thinking, design challenges, innovation, art of Innovation, strategies for idea generation, creativity, teams for innovation. Solution finding methods: Conventional, intuitive, discursive, methods for combining solution, decision making for new design.

UNIT-IV: REVERSE ENGINEERING IN PRODUCT DEVELOPMENT:

Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, 3D printing, study of introducing electrical and electronic controls to the old products, importance of ergonomics in product development, environmental considerations in design, safety considerations in design.

UNIT-V:

Study of Product Development- Agriculture, development of machines for separation of corn seeds, peeling of groundnut shells, husk removing from paddy. Electrical: Design of burglar alarm, speedometer, water level indicator, smart gates, smart lights. Design of electrical vehicles, unmanned vehicles, design principles in drones.

Text Books:

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, “Exploring Engineering: An Introduction to Engineering and Design”, 4th edition, Elsevier, 2016.
2. David Ralzman, “History of Modern Design”, 2nd edition, Laurence King Publishing Ltd., 2010
3. An AVA Book, “Design Thinking”, AVA Publishing, 2010.

Reference Books:

1. G. Pahl, W.Beitz, J. Feldhusen, KH Grote, “Engineering Design: A Systematic Approach”, 3rd edition, Springer, 2007.
2. Tom Kelley, Jonathan Littman, “Ten Faces in Innovation”, Currency Books, 2006.

B.TECH V SEMESTER	**OEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20ME5T05 **NANOTECHNOLOGY (OPEN ELECTIVE-I)**

Pre-requisite: Materials Science

Course Objective:

- To familiarize with principles of quantum mechanics on which nano materials behave
- To elucidate applications of nanotechnology

Course Outcomes:

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

CO1: Analyze the concepts and preparation methods of Nano materials

CO2: Understand the nano material properties and their behavior

CO3: Use various techniques for investigating nano material

CO4: Know the importance of Nano Technology for advanced materials processing

CO5: Know the importance of Nano structured Materials for Various Energies.

SYLLABUS

UNIT-I: Introduction to Nano technology:

Introduction: History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects

UNIT-II: Unique Properties of Nanomaterials:

Microstructure and Defects in nanocrystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple, and disclinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility, Magnetic Properties: Soft magnetic Nanocrystalline alloy, Permanent magnetic Nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT-III: Synthesis Routes :

Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method ,Self assembly, Top down approaches: Mechanical alloying, Nano-lithography, Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

UNIT-IV: Nanomaterials for Energy Conversion Systems:

Issues and Challenges of functional Nanostructured Materials for electrochemical Energy, Conversion Systems, Fuel Cells, Principles and nanomaterials design for Proton exchange membrane fuel cells (PEMFC); Direct methanol fuel cells (DMFC).

UNIT-V:

Issues and Challenges of functional Nanostructured Materials for electrochemical Energy Storage Systems, Primary and Secondary Batteries (Lithium ion Batteries), Cathode and anode materials, Nanostructured Carbon based materials, Nano-Oxides, Novel hybrid electrode materials, Current status and future trends.

Text books:

1. Electrochemical methods: Fundamentals and Applications, Allen J.Bard and Larry R. Faulkner, 2ndEdition John Wiley & Sons. Inc (2004)
2. D. Linden Ed., Handbook of Batteries, 2nd edition, McGraw-Hill, New York (1995)
3. G.A. Nazri and G. Pistoia, Lithium Batteries: Science and Technology, KulwerAcdemic Publishers, Dordrecht, Netherlands (2004).
4. J. Larmine and A. Dicks, Fuel Cell System Explained, John Wiley, New York (2000).

Reference Books:

1. Science and Technology of Lithium Batteries-Materials Aspects: An Overview, A. Manthiram, Kulwer Academic Publisher (2000).
2. M. S. Whittingham, A. J. Jacobson, Intercalation Chemistry, Academic Press, New York (1982).
3. M. Wakihara, O. Yamamoto, (Eds.) Lithium Ion Batteries: Fundamentals and Performance, Wiley –VCH ,Weinheim (1998).

B. Tech V SEMESTER	OEC	L	T	P	C
		3	0	0	3

20EC5T04 LINEAR SYSTEM ANALYSIS (OPEN ELECTIVE –I)

Pre-requisite: Basic knowledge about vectors, differentiation and integration

COURSE OBJECTIVES:
The main objectives of this course are given below:

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

1. To understand basics of Signals and Systems required for all Engineering related courses.
2. To understand the behaviour of signal in time and frequency domain.
3. To understand the characteristics of LTI systems.
4. To understand concepts of Signals and Systems and its analysis using different transform techniques.
5. To understand sampling, convolution and correlation.

COURSE OUTCOMES:
At the end of this course the student will able to:

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

CO1: Differentiate various signal functions.
CO2: Represent any arbitrary signal in time and frequency domain.
CO3: Understand the characteristics of linear time invariant systems.
CO4: Analyse the signals with different transform technique.
CO5: Understand the concept of sampling.

SYLLABUS

UNIT-I: Signal Analysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function

UNIT-II: Fourier series & Fourier transforms

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series.Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform.

UNIT-III: Signal Transmission through Linear Systems

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Pauley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time.

UNIT-IV: Laplace Transforms & Z–Transforms

Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal.

Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms

UNIT-V: Sampling theorem & Correlation

Graphical and analytical proof for Band Limited Signals, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.

Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parseval's Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2nd Ed.

Reference Books:

1. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH

B. TECH V SEMESTER

	L	T	P	C
OEC	3	0	0	3

20EC5T05 DIGITAL LOGIC DESIGN (OPEN ELECTIVE –I)

Course Objectives:

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

1. To represent numbers and conversion between different representations.
2. To analyze logic processes and implement logical operations.
3. To develop the combinational logic circuits.
4. To understand concept of programmable logic devices like PROM, PLA, PAL.
5. To design and analyze the concepts of sequential circuits.

Course Outcomes:

At the end of this course the student will able to:

CO1: Understand different number systems and their conversions.

CO2: Analyze the logical operations and Boolean algebra

CO3: Develop combinational circuits and perform logical operations.

CO4: Understand different programmable logic devices.

CO5: Design the sequential logic functions.\

SYLLABUS

UNIT-I:

Number Systems: Binary- Octal- Decimal- Hexadecimal Number Systems- Conversion of Numbers from One Radix to Another Radix- r‘s Complement- (r-1)‘s Complement- Subtraction of Unsigned Numbers- Signed Binary Numbers- Problems.

UNIT-II:

Logic Gates and Boolean Algebra: Basic Gates- Universal Gates- Ex-Or and Ex-Nor Gates- SOP- POS- Boolean Theorems- Dual of Logical Expressions- Minimizations of Logic Functions Using Boolean Theorems- K Map Method- Minimization of Boolean Functions.

UNIT-III: Signal Transmission through Linear Systems

Combinational Logic Circuits: Design of Half Adder- Full Adder- Half Subtractor- Full Subtractor- Ripple Adder and Subtractor- Design of Decoders- Encoders- Multiplexers- Demultiplexers- Magnitude Comparator.

UNIT-IV: Laplace Transforms & Z–Transforms

Introduction to Programmable Logic Devices (PLDs): PLA- PAL- PROM- Realization of Switching Functions Using PROM- Comparison of PLA, PAL and PROM.

UNIT-V: Sampling theorem & Correlation

Introduction to Sequential Logic Circuits: Basic Sequential Logic Circuits- Latch and Flip-Flop- RS- Latch Using NAND and NOR Gates- RS, JK, T and D Flip Flops- Conversion of Flip Flops- Flip Flops With Asynchronous Inputs (Preset and Clear)- Design of Registers- Universal Shift Register- Ring Counter- Johnson Counter.

TEXT BOOKS

1. Digital Design, M.Morris Mano, Michael D Ciletti, 4thEdition, PEA, 2003.

2. Fundamentals of Logic Design, Roth, 5thEdition, Cengage, 2004

REFERENCE BOOKS

1. Switching and Finite Automata Theory, Kohavi, 3rd Edition, Jha, Cambridge, 2005

2. Digital Logic Design, Leach, Malvino, Saha, TMH, 2000.

B. TECH V SEMESTER	OEC	L	T	P	C
		3	0	0	3

SOLID STATE DEVICES
20EC5T06 (OPEN ELECTIVE –I)

Course Objectives: Students undergoing this course, are expected to

1. Familiarize with the fundamentals of Semiconductor physics
2. Familiarize with various diodes and characteristics.
3. Familiarize with the transistors and their configurations.
4. Disseminate Amplifications with transistors
5. Understand the operation and working of Oscillators

Course Outcomes:

After undergoing the course, students will be able to

CO1: Understand importance of semiconductors.

CO2: Analyze Diode characteristics.

CO3: Differentiate various Transistor BJT configurations.

CO4: Design amplifiers at different applications using transistor.

CO5: Analyze different Feedback amplifiers & oscillators design

SYLLABUS.

Unit I: Basics Concepts of Semiconductor Physics, Charged Particles, Field Intensity, Potential, Energy, the eV unit of energy, Energy Band theory of Crystals, Insulators, Semiconductors and metals, Mobility and Conductivity, Electrons and Holes, Donor and Acceptor impurities, Charge Densities in a Semiconductor, Electrical properties of Ge and Si, Hall Effect, Diffusion and Drift Currents, Mass action Law, Fermi-Dirac distribution.

Unit II: Diodes: PN junction diode- Energy band diagram of PN junction Diode- V-I Characteristics –Current components in PN junction Diode- Diode equation- Diode resistance and capacitance, Characteristics of Zener Diode, Varactor Diode- SCR and UJT.

Unit III: Transistors Bipolar Junction Transistor: Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB, CC&CE configurations- Transistor as a Switch,Transistor as an amplifier. Field Effect Transistors (FET): Junction Field Effect Transistor construction & operation, characteristics of CS, CD & CG

Unit IV: Small Signal Transistor Amplifier models: Low Frequency Transistor Amplifier Models: Two port network, Transistor hybrid model, determination of h- parameters, generalized analysis of transistor amplifier model using h-parameters

Unit V: Feedback Amplifiers and Oscillators: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and their analysis. Generalized analysis of LC Oscillators, Hartley and Colpitt‘s oscillators with BJT and their analysis.

Text Books:

1) Millman, Halkias, ―Integrated Electronics- Analog and Digital Circuits and Systems, TMH.

2).Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGrawHill,Second Edition.

Reference Books:

1) Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.

2) . Basic Electronic Circuits -V.K.Mehta, S-chand Publications,2008

B. TECH V SEMESTER	**OEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

INTRODUCTION TO ARTIFICIAL INTELLIGENCE
20CS5T07 (OPEN ELECTIVE –I)

Course Objectives:

- To gain a historical perspective of Artificial Intelligence and its foundations.
- To familiarize the basic principles of Artificial Intelligence towards problem solving Inference, Perception, Knowledge representation and Learning.
- To understand advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems.

Course Outcomes: At the end of the course, the students will be able to:

CO1: To Understand the history of Artificial Intelligence and its foundations.

CO2: Apply various Artificial Intelligence Techniques for problem solving.

CO3: Formalization of knowledge using the framework of predicate logic.

CO4: Ability to apply knowledge representation and reasoning to real world problems.

CO5: Derive conclusions from uncertain knowledge and quantify the uncertainty in the Conclusions obtained.

SYLLABUS

UNIT-1:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT-2: Problem Solving:

State-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem Reduction and Game Playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT-3: Logic Concepts:

Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT-4: Knowledge representation:

Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNIT-5: Expert system and applications:

Introduction phases in building expert systems, expert system versus traditional systems.

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-Shaffer theory, Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning (Units 1,2,3,4,5)

REFERENCES:

1. Artificial Intelligence- Deepak Khemani, TMH, 2013
2. Introduction to Artificial Intelligence, Patterson, PHI
3. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5thed, PEA
4. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

B. TECH V SEMESTER

	L	T	P	C
OEC	3	0	0	3

OPERATING SYSTEMS
20CS5T08 (OPEN ELECTIVE –I)

Course Objectives:

- Understand the importance of Operating System and its services.
- To impart the concepts of process, memory and file management techniques.
- To familiarize with the deadlock handling techniques.

Course Outcomes:

CO1: Understand the importance, functions and structures of operating systems.

CO2: Analyze and compare the performance of various CPU scheduling algorithms.

CO3: Develop software or hardware-based solutions for process synchronization.

CO4: Apply deadlock handling techniques to avoid deadlocks.

CO5: Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.

SYLLABUS

UNIT - I: Introduction: Defining operating system, operating system structures, operating systems operations, User and Operating-System Interface, Operating-system services, System calls: Types of system calls, operating system debugging, System Boot.

Study of Linux System: Components of LINUX, Inter process Communication

UNIT - II: Process Management: Process Concept, Process state, Process control block (PCB), Process scheduling, Scheduling queues, Schedulers, Operations on Processes, Process creation, Process Termination, Process, Inter process communication.

Multithreaded Programming: Multithreading models, Scheduling: Basic Concepts, Scheduling algorithms

UNIT – III: Synchronization: The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

File System Interface: File attributes, File operations, Access methods, Directory and Disk structures

UNIT - IV: Deadlocks: Deadlock characterization, Methods for handling deadlocks: deadlock- Prevention - Mutual Exclusion, Hold and wait, No preemption, Circular wait, Avoidance-Safe state, Resource allocation, Bankers's Algorithm, Safety Algorithm, Detection-Single instance of each resource type, several instances of a resource type, Detection algorithm usage, recovery from Dead lock.

UNIT - V:

Memory Management Strategies: Swapping, Contiguous memory allocation, Paging, Segmentation

Virtual-Memory Management: Demand paging, Page replacement Algorithms, Thrashing.

Mass-storage structure: Magnetic disk, Disk Scheduling

TEXT BOOKS:

1. Abraham Silberschatz, Peter B, Galvin, Greg Gagne, Operating System, John Wiley, 9thedition.(Unit-1,2,3,4,5)
2. Stallings, Operating Systems - Internal and Design Principles, Pearson education, 6th edition–2005.(Unit-5)

REFERENCES:

1. D. M. Dhamdhere, Operating systems- A Concept based Approach, TMH, 2nd edition.
2. Andrew S Tanenbaum, Modern Operating Systems, PHI, 4th edition.
3. Charles Crowley ,Operating Systems: A Design-Oriented Approach, Tata Mc Graw Hill Education,1996.

B. TECH V SEMESTER

OEC	L	T	P	C
	3	0	0	3

SOFTWARE ENGINEERING
20CS5T09 (OPEN ELECTIVE –I)

Course Objective:

- Gain knowledge about software process models.
- Familiarize the basic software engineering methods, practices and its applications.
- Facilitate students in software design.

Course Outcomes:

CO1: Understand the software life cycle models

CO2: Understand the scrum approach to agile project management**.**

CO3: Analyze the software requirements and generate SRS document

CO4: Understand some of the different models that may be used to design

CO5: Understand various software testing approaches and quality control to ensure good quality software

SYLLABUS

Unit-I:

Introduction to Software Engineering: Nature of software, Software engineering, The Software Processes, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialised Process models, The Unified Process, Personal and Team Process Models.

Unit-II:

Requirements Engineering: Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management.

Requirements Modelling: Requirement Analysis, Scenario-Based Modelling, Data Modelling Concepts, Class-Based Modelling

Unit-III:

Design Concepts: The Design Process, Design Concepts, The Design Models, Architectural Design: Software Architecture, Architectural Genres, Architectural Styles. User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

Unit-IV:

Understanding of UML diagrams: Structural diagrams - class diagram, object diagram, component diagram, deployment diagram, Behavioural diagrams - Use-case diagram, activity diagram, sequence diagram, collaboration diagram, state chart diagram.

Unit-V:

Implementation: Structured coding Techniques, Coding Styles-Standards and Guidelines, Implementation Issues.

Software Testing Strategies: A Strategic approach to Software Testing, Strategic Issues and Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing, Software Quality concepts.

TEXT BOOKS:

1. Roger S. Pressman (2010), Software Engineering, A Practitioner's Approach, 7th Edition, McGraw-Hill International Edition, India.
2. Ian Sommerville (2011), Software Engineering, 9th Edition, Pearson education, India.
3. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Ph.D.Jim ConallenKelli A. Houston," Object-Oriented Analysis and Design with Applications", 3rd edition.

REFERENCES:

1. Pankaj Jalote (2010), Software Engineering, A Precise Approach, Wiley India.
2. Waman S. Jawadekar (2008), Software Engineering: A Primer, McGraw-Hill, India.
3. Hans Van Vilet (2008), Software Engineering Principles and Practice, 3rd Edition, John Wiley & Sons Ltd.
4. Rajib Mall (2005), Fundamental of Software Engineering, PHI.
5. Deepak Jain, Software Engineering, Principles and Practices, Oxford, University Press, India.

B. TECH V SEMESTER

	L	T	P	C
OEC	3	0	0	3

COMPUTER NETWORKS
20IT5T07 (OPEN ELECTIVE –I)

Course Objectives:

- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the students to basic principles of networking using the goals like protocol layering and top down approach.
- Build an understanding of the basics of the internetworking and routing used in the computer networks.
- To provide guidelines in developing network applications

Course Outcomes:

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

CO1- Independently enumerate the layers of the OSI model and TCP/IP.

CO2- Identify the different types of network topologies and protocols.

CO3- Compare and contrast methods to identify Errors and correct them

CO4- Differentiate between various network routing algorithms.

CO5- Understand WWW and HTTP Architectures.

SYLLABUS

UNIT - I: Introduction:

OSI overview, TCP/IP and other networks models, Examples of Networks: Arpanet, Internet, Network Topologies Wide Area Networks(WAN), Local Area Networks(LAN), Metropolitan Area Networks(MAN).

UNIT - II: Physical Layer and overview of PL Switching:

Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks

UNIT – III: Data link layer:

Design issues, Framing: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network.

Elementary Data Link Layer protocols: Simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

Sliding window protocol: One bit, Go-back N, Selective Repetitive protocol, Stop and wait protocol.

UNIT - IV: Random Access:

ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: Frequency Division Multiple Access(FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access(CDMA).

Network layer: Shortest Path, Distance Vector Routing Algorithm, Hierarchal routing algorithm.

UNIT - V: Application layer (WWW and HTTP):

WWWARCHITECTURE: Client (Browser), Server, Uniform Resource Locator, Resource Record, HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Request Message Format, HTTP Response Message Format

TEXT BOOKS:

1. Data Communications and Networks – Behrouz A. Forouzan. Third Edition TMH. (Units 1,2,4,5)
2. Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education(Units 1, 3, 4)

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

B. TECH V SEMESTER

	L	T	P	C
OEC	3	0	0	3

COMPUTER GRAPHICS
20IT5T08 (OPEN ELECTIVE –I)

Course Objectives:

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

Course Outcomes:

After learning the course, the student will be able:

CO1: Illustrate the basics of computer graphics, different graphics systems and applications of computer graphics with various algorithms for line, circle and ellipse drawing objects for 2D transformations.

CO2: Apply projections and visible surface detection techniques for display of 3D scene on 2D screen.

CO3: Illustrate able to create the general software architecture of programs that use 3D object sets with computer graphics.

CO4: Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

CO5: Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.

SYLLABUS

UNIT - I: Introduction to Graphics:

Application area of Computer Graphics, overview of graphics systems, video-display devices, graphics monitors and work stations and input devices. 2D Primitives: Output primitives-Line, Circle and Ellipse drawing algorithms, Attributes of output primitives, Two dimensional Geometric transformations, Two dimensional viewing Line, Polygon, Curve and Text clipping algorithms.

UNIT - II: 3D Concepts:

Parallel and Perspective projections, Three dimensional object representation-Polygons, Curved lines, Splines, Quadric Surfaces, Visualization of data sets, 3D transformations, Viewing, Visible surface identification.

UNIT – III: Graphics Programming:

Color Models- RGB, YIQ, CMY, HSV, Animations -General Computer Animation, Raster, Key frame. Graphics programming using OPENGL-Basic graphics primitives, Drawing three dimensional objects, Drawing three dimensional scenes

UNIT – IV: Rendering:

Introduction to shading models, Flat and Smooth shading, Adding texture to faces, Adding shadow of objects, Building a camera in a program, Creating shaded objects

UNIT - V: Overview of Ray Tracing:

Intersecting rays with other primitives, Adding Surface texture, Reflections and Transparency, Boolean operations on Objects.

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics– C Version, second edition, Pearson Education, 2004

REFERENCES:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007

B. TECH V SEMESTER	OEC	L	T	P	C
		3	0	0	3

20HS5T01 QUANTITATIVE APTITUDE AND REASONING (OPEN ELECTIVE –I)

SYLLABUS

Unit-I: Divisibility and remainder rules of numbers, Unit digit , square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages, Alphabetical and miscellaneous series, Coding and decoding and Blood Relations

Unit-II: Profit & loss, Simple interest and Compound interest, Direction, Order and Ranking, Sitting arrangement and Puzzle

Unit-III: Ratio & proportions, Partnership, Alligation and mixtures and Ages.
Data sufficiency, Inequalities and Decision making.

Unit-IV: Time and work, Pipes & cisterns and Time and distance.
Syllogism, Statement and course of action and Statement and Assumption.

Unit-V: Boats and streams, Areas, Volume and surface areas.
Statement and argument, Cause and effect and Drawing inference.

Text Books:

1. "Objective Arithmetic" by R.S. Agarwal, S. Chand Publications.
2. Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

Reference Books:

1. Quantitative Aptitude by Dinesh Khattar, Pearson Education.
2. Quantitative Aptitude by Abhjit Guha.
3. Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.

B. TECH V SEMESTER	OEC	L	T	P	C
		3	0	0	3

PRINCIPLES OF MANAGEMENT
20MB5T01 (OPEN ELECTIVE –I)

COURSE OBJECTIVE

This course ensures that the students understand

1. Management Concepts
2. Applications of Concepts in Practical aspects of business and Development of Managerial Skills.
3. Managers manage business organizations in the dynamic global environment and maintain competitive advantage.
4. Business decisions are made using various tools and techniques to remain competitive
5. Managers use problem-solving strategies, critical thinking skills in real-life situations and implement successful planning.

COURSE OUTCOME

After learning the contents of this course, the student would be able to know

CO1: What are the circumstances that lead to management evolution and how it will affect future managers.

CO2: Analyze and evaluate the influence of historical forces on the current practice of management

CO3: Develop the process of management's functions: Planning and Organizing.

CO4: Evaluate leadership styles to anticipate the consequences of each leadership style and directing.

CO5: Identify the areas to control and selecting the appropriate controlling methods/techniques.

SYLLABUS

UNIT I

Introduction to Management: Definition, Functions, Process, Scope and Significance of Management.

Nature of Management, Functions of Management, Managerial Roles, Levels Managerial Skills and Activities, Difference between Management and Administration, Significance of Values and Ethics in Management.

Challenges of Management

UNIT II

Evolution of Management Thought: Approaches to Management - Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approach.

UNIT III

Planning and Organizing: Nature, Scope, Objective and Significance of Planning, Elements and Steps of Planning, Decision Making Organizing Principles, Span of Control, Line and Staff Relationship, Authority, Delegation and Decentralization. Effective Organizing, Organizational Structures, Formal and Informal Organizations, Staffing.

UNIT IV

Directing: Effective Directing, Supervision, Motivation, Different Theories of Motivation-Maslow, Herzberg, McClelland, Vroom, Porter and Lawler, Job Satisfaction. Concept of Leadership- Theories and Styles. Communication Process, Channels and Barriers, Effective Communication.

UNIT V

Controlling and Coordinating: Elements of Managerial Control, Control Systems, Management Control Techniques, Effective Control Systems. Coordination Concept, Importance, Principles and Techniques of Coordination, Concept of Managerial Effectiveness.

TEXT BOOKS

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.
3. Management-Tasks, Responsibilities & Practices, Drucker, F. Peter
4. Principles of Management, Terry and Franklin

REFERENCES

1. Essentials of Management, Koontz Weihrich, Tata McGraw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012

NPTEL WEB COURSE:

nptel.ac.in/courses/122108038/

NPTEL VIDEO COURSE:

nptel.ac.in/courses/122108038/#

B. TECH V SEMESTER	**OEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

TECHNOLOGY MANAGEMENT
20MB5T02 (OPEN ELECTIVE –I)

Course Objective

- The course aims at providing an overview of various issues connected with Management of Technology in organizations.

Course Outcomes

CO1: To understand the importance of technology and innovation management

CO2: To understand the technology absorption, incremental innovation, research and development, technovation and technology fusion that dominate the contemporary world industry.

CO3: To understand the nature, significance, dimensions requirements, concepts, issues, themes, policies and structure of the management of technology and technovation.

SYLLABUS

UNIT-I

Evolution of Technology-Effects of New Technology- Technology Innovation.- Invention-Innovation- Diffusion- Revolutionary and Evolutionary Innovation- Product and Process Innovation- Strategic Implications of Technology- Technology – Strategy Alliance -Convergent and Divergent Cycle- The Balanced Approach.

UNIT-II

Technology Assessment- Technology Choice- Technological Leadership and Followership- Technology Acquisition- Technological Forecasting- Exploratory, Intuitive, Extrapolation, Growth Curves, Technology Monitoring- Normative: Relevance Tree, Morphological Analysis, Mission Flow Diagram.

UNIT-III

Diffusion of Technology- Rate of Diffusion; Innovation Time and Innovation CostSpeed of Diffusion- Technology Indicators- Various Indicators- Organizational Implications of Technology- Relationship between Technical Structure and Organizational Infrastructure- Flexible Manufacturing Management System (FMMS).

UNIT-IV

Financial Aspects in Technology Management- Improving Traditional Cost - Management System- Barriers to the Evaluation of New Technology- Social Issues in Technology Management- Technological Change and Industrial Relations- Technology Assessment and Environmental Impact Analysis.

UNIT-V

Human Aspects in Technology Management- Integration of People and Technology Organizational and Psychological Factors- Organizational Outcome- Technology Transfer-Technology Management Scenario in India.

Text Books

1. Sharif Nawaz: Management of Technology Transfer & Development, APCFT, Bangalore, 1983.

2. Rohtagi P K, Rohtagi K and Bowonder B: Technological Forecasting, Tata McGraw Hill,New Delhi.

References

1. Betz Fredrick: Managing Technology, Prentice Hall, New Jersey.
2. Gaynor: Handbook of Technology Management, McGraw Hill.
3. Tarek Khalil: Management of Technology, McGraw Hill International, 2000.
4. “Managing Technology and Innovation”, Robert & Roland, 1st Edition, Routledge.

B. TECH V SEMESTER

	L	T	P	C
OEC	3	0	0	3

FOUNDATIONS OF DATA SCIENCE
20AD5T07 (OPEN ELECTIVE –I)

Course Objective: *This* ***course*** explains vital data science concepts and teaches you how to accomplish the fundamental tasks that occupy data scientists. You'll explore data visualization, graph databases, the use of NoSQL, and the data science process. You'll use the Python language and common Python libraries as you experience firsthand the challenges of dealing with data at scale.

Course Outcomes: At the end of the course, student will be able to

CO1: Describes benefits of data science, facets of data

CO2: Illustrates data science process and describes the need of machine learning

CO3: Describes the problems of handling large data

CO4: Introduces distributed data storage and processing frame works

CO5: Describes about graph databases and text analytics

SYLLABUS

UNIT-1: Data science in a big data world: Benefits and uses of data science and big data, Facets of data, The data science process, The big data eco system and data science, An introductory working example of Hadoop.

UNIT-2:

The data science process: Overview of the data science process, Step 1: Defining research goals and creating a project charter, Step 2: Retrieving data, Step 3: Cleansing, integrating, and transforming data, Step 4: Exploratory data analysis, Step 5: Build the models, Step 6: Presenting findings and building applications on top of them. Machine learning: What is machine learning and why should you care about it?, The modeling process, Types of machine learning, Semi-supervised learning.

UNIT-3:

Handling large data on a single computer: The problems you face when handling large data, General techniques for handling large volumes of data, General programming tips for dealing with large data sets, Case study 1: Predicting malicious URLs, Case study 2: Building a recommender system inside a database.

UNIT-4: First steps in big data: Distributing data storage and processing with frameworks, Case study: Assessing risk when loaning money, Join the NoSQL movement: Introduction to NoSQL, ACID: the core principle of relational databases, CAP Theorem: the problem with DBs on many nodes, The BASE principles of NoSQL databases, NoSQL database types, Case study: What disease is that?

UNIT-5: The rise of graph databases: Introducing connected data and graph databases , Introducing Neo4j: a graph database, Connected data example: a recipe recommendation engine, Text mining and text analytics: Text mining in the real world, Text mining techniques, Case study: Classifying Reddit posts.

Text Book:

Introducing Data Science by Davy Cielen, Arno D. B. Meysman, and Mohamed Ali

B. TECH V SEMESTER

	L	T	P	C
OEC	3	0	0	3

20AM5T07 INTRODUCTION TO MACHINE LEARNING (OPEN ELECTIVE –I)

Pre-requisite: Probability and Statistics, Linear Algebra

Course Objective: *This **course*** explains basic concepts of Machine Learning and teaches you to use recent machine learning software for solving problems and understanding supervised and unsupervised learning methods

Course Outcomes: At the end of the course, student will be able to

CO1: Identify the characteristics of machine learning.

CO2: Summarize the Model building and evaluation approaches.

CO3: Apply Bayesian learning and regression algorithms for real-world Problems.

CO4: Apply supervised learning algorithms to solve the real-world Problems.

CO5: Apply unsupervised learning algorithms for the real world data.

SYLLABUS

Unit-1: Introduction to Machine Learning and Preparing to Model:

Introduction to Machine Learning- Introduction, What is Human Learning? Types of Human Learning, What is Machine Learning? Types of Machine Learning, Problems Not To Be Solved Using Machine Learning, Applications of Machine Learning.

Preparing to Model- Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing

Modeling & Evaluation, Basics of Feature Engineering:

Modeling & Evaluation - Introduction, Selecting a Model, Training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model.

Basics of Feature Engineering - Introduction, Feature Transformation, Feature Subset Selection.

Unit-2: Bayesian Concept Learning and Regression:

Bayesian Concept Learning - Introduction, Why Bayesian Methods are Important? Bayes' Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network.

Regression: Introduction, Regression Algorithms - Simple linear regression, Multiple linear regression, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

Unit-3: Supervised Learning: Classification, Ensemble Learning: Classification- Introduction, Example of Supervised Learning, Classification Model, Classification

Learning Steps, Common Classification Algorithms - k-Nearest Neighbour (KNN), Decision tree, Random forest model, Support vector machines.

Ensemble Learning- Boosting, Bagging

Unit-4: Basics of Neural Network

Introduction, Understanding the Biological Neuron, Exploring the Artificial Neuron Types of Activation Functions, Early Implementations of ANN, Architectures of Neural Network, Learning Process in ANN, Backpropagation, Deep Learning

Unit-5: Unsupervised Learning:

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning.

Principle Component Analysis: Introduction, Probabilistic PCA- Maximum Likelihood PCA, EM Algorithm for PCA, Bayesian PCA, Factor Analysis; Kernel PCA

Clustering: Clustering as a Machine Learning task, Different types of clustering techniques, Partitioning methods, Hierarchical clustering, Density-based methods: DBSCAN.

Finding Pattern using Association Rule - Definition of common terms, Association rule, Apriori algorithm.

Text Books:

1. Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das, “Machine Learning”, Pearson Education India ,1st edition.
2. Christopher M. Bishop, “Pattern Recognition and Machine Learning”. New York :Springer, 2006.

Reference Books:

1. Tom M. Mitchell, “Machine Learning’, MGH, 1997.
2. Shai Shalev-Shwartz, ShaiBen David, “Understanding Machine Learning: From Theory to Algorithms”, Cambridge.
3. Peter Harington, “Machine Learning in Action” , Cengage, 1st edition, 2012.

B.TECH VI SEMESTER	OEC	L	T	P	C
		3	0	0	3

20CE6T08 REMOTE SENSING AND GIS (OPEN ELECTIVE-II)

Course Objectives: The objective of this course is to

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Learn various types of sensors and platforms
- learn concepts of visual and digital image analyses
- Understand the principles of spatial analysis
- Appreciate application of RS and GIS to Civil engineering

Course Outcomes:

On successful completion of this course, the students will be able to

CO1: Be familiar with ground, air and satellite based sensor platforms.

CO2: Interpret the aerial photographs and satellite imageries

CO3: Create and input spatial data for GIS application

CO4: Apply RS and GIS concepts in water resources engineering

SYLLABUS

UNIT–I:

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems. Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT–II:

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT–III:

Geographic Information System: Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data Models.

UNIT – IV:

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT–V:

RS and GIS applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications. Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

Text Books:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
4. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
5. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt. Ltd, 2013.

Reference Books:

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A KW Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. 'Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.
5. 'Principals of Geographical Information Systems' by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

		L	T	P	C
B.TECH VI SEMESTER	**OEC**	**3**	**0**	**0**	**3**

20CE6T09 ENVIRONMENTAL IMPACT ASSESSMENT
(OPEN ELECTIVE-II)

Course Objectives: The objective of this course is to

- impart knowledge on different concepts of Environmental Impact Assessment
- know procedures of risk assessment
- learn the EIA methodologies and the criterion for selection of EIA methods
- pre-requisites for ISO 14001 certification
- know the procedures for environmental clearances and audit
- appreciate the importance of stakeholder participation in EIA

Course Outcomes:

On successful completion of this course, the students will be able to

CO1: Prepare EMP, EIS, and EIA report
CO2: Identify the risks and impacts of a project
CO3: Selection of an appropriate EIA methodology
CO4: Evaluation the EIA report
CO5: Estimate the cost benefit ratio of a project
CO6: Know the role of stakeholder and public hearing in the preparation of EIA

SYLLABUS

UNIT–I:

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA.

UNIT–II:

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP.

UNIT-III:

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV:

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT–V:

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.

Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

Reference Books:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

B.TECH VI SEMESTER **OEC**

L	T	P	C
3	0	0	3

20EE6T08 RENEWABLE ENERGY SOURCES (OPEN ELECTIVE-II)

Course Objective:

- To give sufficient knowledge about the promising new and renewable sources of energy
- Explain the concept of various forms of renewable energy
- Learn the present energy scenario
- Analyse the environmental aspects of renewable energy resources.

Course Outcomes:

CO1: Know the need of various renewable energy systems

CO2: understand the concepts of bio-energy,

CO3: Acquire the knowledge of OTEC, tidal,

CO4: Acquire the knowledge of geothermal and Alternative energy sources

SYLLABUS

UNIT-I

Introduction: Introduction to energy sources, reserves and estimates, global energy scenario, renewable energy -environment implications, global warming and climate change, limitations of conventional energy sources, classification of non-conventional energy sources - solar energy, wind energy, bio-energy, Ocean Thermal Energy Conversion (OTEC), tidal, geothermal and hydro.

UNIT-II

Bio-energy: Biomass and its sources, energy plantation, production of fuel wood, bio-conversion processes, bio-gas, bio-diesel and ethanol production and utilization, thermo-chemical processes, biomass gasification, process, types of reactors, utilization of producer gas for thermal and electricity generation.

UNIT-III

Ocean thermal energy conversion, tidal, geothermal: Tidal energy, wave energy, data, technology options; open and closed *Ocean thermal energy conversion* cycles, geothermal energy sources, power plant and environmental issues.

UNIT-IV

Fuel Cells: Hydrogen generation-storage, transport and utilization, applications, power generation. Fuel cells-Technologies, types, economics and power generation.

UNIT-V

Solar Energy Storage and Applications:

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Text Books:

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2006
2. Renewable Energy Resources – Twidell&Wier, CRC Press(Taylor & Francis), 2012
3. *Y. W. B. Charles*, *B.H. Essel*, *―Biomass Conversion and Technology‖*, John Wiley, Latest Edition

Reference Books:

1. Renewable energy resources by G. N. Tiwari, M. K. Ghosal, Alpha Science International, 2005.
2. Renewable Energy Technologies by R. Ramesh, K. Uday Kumar, M. Anandakrishnan, Narosa Publishing House, 1997
3. Non-Conventional Energy Systems by K Mittal, A. H. Wheeler Publishing Company Limited, 01-Jan-1999.
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, P.H.I.
5. Godfrey Boyle, ―Renewable Energy- Power for a Sustainable Future‖, Oxford University Press, U.K.,
6. Twidell, J.W. & Weir, A., ―Renewable Energy Sources‖, E.F.N Spon Ltd., UK.

B.TECH VI SEMESTER	**OEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EE6T09 ENERGY AUDIT, CONSERVATION AND MANAGEMENT (OPEN ELECTIVE-II)

Course Objective:

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:
At the end of the course student will be able to

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

SYLLABUS

UNIT-I

Basic Principles of Energy Audit and management: Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Piecharts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions –Language – Questionnaire – Check list for top management.

UNIT-II

Lighting: Modification of existing systems – Replacement of existing systems – Priorities**:** Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level –Illumination of inclined surface to beam – Luminance or brightness – Types of lamps –Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

UNIT-III

Power Factor and energy instruments: Power factor – Methods of improvement – Location of capacitors – Power factor with nonlinear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters– Tong testers – Power analyzer.

UNIT-IV

Space Heating and Ventilation: Ventilation – Air–Conditioning (HVAC) and Water Heating**:** Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning –Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT-V

Economic Aspects and Financial Analysis: Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

Computation of Economic Aspects

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment –Numerical examples.

Text Books:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill

2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd– 2nd edition, 1995

Reference Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevierpublications. 2012

2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.

3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.

4. Energy management hand book by W.C.Turner, John wiley and sons.

5. Energy management and conservation –k v

B.TECH VI SEMESTER **OEC**

L	T	P	C
3	0	0	3

20ME6T07 INDUSTRIAL ROBOTICS (OPEN ELECTIVE-II)

Pre-requisite: Kinematics and Mathematics

Course Objective:

1. The student will be exposed to the concepts of automation and fundamentals of robotics
2. The students will be exposed to the concepts of transformations and robot kinematics,
3. The students will understand the functioning of sensors and actuators
4. The students will be exposed to robot programming languages and Programming.
5. The student will be exposed to the applications of robotics in manufacturing.

Course Outcomes: At the end of the course, student will be able to

CO1 Understand various applications of robotics and classification of coordinate system and control systems.

CO2 Build the concepts of components of industrial robotics.

CO3 Apply kinematic analysis with D-H notation, forward and inverse kinematics and Solve dynamic analysis with Lagrange – Euler and Newton – Euler formulations.

CO4 Model trajectory planning for a manipulator by avoiding obstacles.

CO5 Understand different types of actuators and applications of robots in manufacturing.

SYLLABUS

UNIT-I:

Introduction: Automation and Robotics – An over view of Robotics – present and future applications. Components of the Industrial Robotics: common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, Design of end effectors, Precision of Movement: Resolution, Accuracy and Repeatability, Speed of Response and Load Carrying Capacity.

UNIT-II: MOTION ANALYSIS AND CONTROL:

Motion Analysis: Basic Rotation Matrices, Composite Rotation Matrices. Homogeneous transformations as applicable to rotation and translation – problems. Manipulator Kinematics-H notation-H method of Assignment of frames-H Transformation Matrix, joint coordinates and world coordinates, Forward and inverse kinematics – problems.

UNIT-III:

Differential transformation of manipulators, Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formations – Problems. Trajectory planning and avoidance of obstacles, path planning, Slew motion, joint interpolated motion straight line motion.

UNIT-IV:

Robot actuators and Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors, comparison of Actuators, Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors, Tactile and Range sensors, Force and Torque sensors – End Effectors and Tools.

UNIT-V:

Robot Application in Manufacturing: Material Transfer – Material handling, loading and unloading- Processing – spot and continuous arc welding & spray painting – Assembly and Inspection. Robotic Programming Methods – Languages: Lead Through Programming, Textual Robotic Languages such as APT, MCL.

Text Book(s)

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rd edition.

References

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall
3. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
4. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley

5. Introduction to Robotics by SK Saha, The McGrah Hill Company, 6th, 2012
6. Robotics and Control / Mittal R K &Nagrath I J / TMH

			L	T	P	C
B.TECH VI SEMESTER		**OEC**	3	0	0	3

20ME6T08 **3D PRINTING (OPEN ELECTIVE-II)**

Pre-requisite: Manufacturing Process

Course Objective:

The course aims at the importance of Additive Manufacturing, Classifications, models, specifications of various Additive Manufacturing Techniques. To learn the different tools, soft-wares required and the applications of Additive Manufacturing

Course Outcomes: At the end of the course, student will be able to

CO1:	Understand the working principle and process parameters of AM processes
CO2:	Explore the applications of AM processes in various fields
CO3:	Apply the suitable process and material for fabricating a given product
CO4:	Use the suitable post process based on product application
CO5:	Design and develop a product for AM Process

SYLLABUS

UNIT-I:

Additive Manufacturing Process: Basic Principles of the Additive Manufacturing Process, Generation of Layer Information, Physical Principles for Layer Generation. Elements for Generating the Physical Layer, Classification of Additive Manufacturing Processes, Evaluation of the Theoretical Potentials of Rapid Prototyping Processes.

UNIT-II:

Machines for Rapid Prototyping: Overview of Polymerization: Stereolithography (SL), Sintering/Selective Sintering: Melting in the Powder Bed, Layer Laminate Manufacturing (LLM) and Three-Dimensional Printing (3DP).

UNIT-III:

Rapid Prototyping: Classification and Definition, Strategic Aspects for the Use of Prototypes, Applications of Rapid Prototyping in Industrial Product Development. Rapid Tooling: Classification and Definition of Terms, Properties of Additive Manufactured Tools, Indirect Rapid

UNIT-IV:

Tooling Processes: Molding Processes and Follow-up Processes, Indirect Methods for the Manufacture of Tools for Plastic Components, Indirect Methods for the Manufacture of Metal Components

UNIT-V:

Direct Rapid Tooling Processes: Prototype Tooling: Tools Based on Plastic Rapid Prototyping Models and Methods, Metal Tools Based on Multilevel AM Processes, Direct Tooling: Tools Based on Metal Rapid Prototype Processes.

Text Books:

1. Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, Ian Gibson, David W Rosen, Brent Stucker, Springer, 2015, 2nd Edition.
2. 3D Printing and Additive Manufacturing: Principles & Applications, Chua Chee Kai, Leong Kah Fai, World Scientific, 2015, 4th Edition.

References:

1. Rapid Prototyping: Laser-based and Other Technologies, Patri K. Venuvinod and Weiyin Ma, Springer, 2004.
2. Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, D.T. Pham, S.S. Dimov, Springer 2001.
3. Rapid Prototyping: Principles and Applications in Manufacturing, Rafiq Noorani, John Wiley & Sons, 2006.

B.TECH VI SEMESTER	**OEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20EC6T07 **ELECTRONIC CIRCUITS AND NETWORKS (OPEN ELECTIVE-II)**

Course Objectives:

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

1. To understand the Differentiator and Integrator circuits
2. To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
3. To Introduce to Time-base Generators and Principles of Synchronization and Frequency division.
4. To Understand Sampling Gates and to Design NAND and NOR gates using various logic families.
5. To understand and Design gates using various logic families.

Course Outcomes:

At the end of this course the student will able to:

CO1: Understand the basic concepts of Optoelectronic Devices

CO2: Design linear wave shaping circuits.

CO3: Design Non- linear wave shaping circuits.

CO4: Design Different Time Base Generators

CO5: understand the concepts of one port networks

SYLLABUS

UNIT-I: Optoelectronic Devices

Introduction, Photo sensors, Photoconductors, Photodiodes, Phototransistors, Light-Emitting Diodes, Liquid Crystal Displays, Cathode Ray Tube Displays, Emerging Display Technologies, Opto couplers.

UNIT-II: LINEAR WAVE SHAPING

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT-III: NON-LINEAR WAVE SHAPING

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT-IV: VOLTAGE TIME BASE GENERATORS

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

UNIT-V: Synthesis of one port networks

Synthesis of one port networks
Synthesis of reactive one-ports by Foster's and Cauer methods (forms I and II) - Synthesis of LC, RC and RL driving-point functions.

Text Books:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.

2. K. S. Suresh Kumar, ―Electric Circuit Analysis‖, Pearson Publications, 2013.

Reference Books:

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

B.TECH VI SEMESTER **OEC**

L	T	P	C
3	0	0	3

20EC6T08 PRINCIPLES OF COMMUNICATIONS (OPEN ELECTIVE – II)

Course Objectives:

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

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Familiarize with the fundamentals of digital communication systems
4. Familiarize with various techniques for digital modulation and demodulation of signals
5. Distinguish the figure of merits of various analog modulation methods

Course Outcomes:

At the end of this course the student will able to:

CO1: Differentiate various Analog modulation schemes

CO2: Analyze demodulation schemes and their spectral characteristics

CO3: Analyze demodulation schemes and their spectral characteristics

CO4: Analyze demodulation schemes and their spectral characteristics

CO5: Analyze noise characteristics of various analog modulation methods

SYLLABUS

UNIT-I: Introduction: Overview of Communication system, Communication channels, Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double sideband with Carrier (DSB-C), Double side band without Carrier DSB-SC, Single Side Band Modulation SSB, Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator, Radio Transmitter and Receiver

UNIT-II: Angle Modulation, Frequency and Phase modulation, frequency deviation, Bandwidth, FM Modulators and Demodulators, Narrow band and wide band FM, FM Broadcasting.

UNIT-III: Pulse digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse Position Modulation, Generation and Demodulation, Frequency Division Multiplexing, Time Division Multiplexing

UNIT-IV: Digital Representation of Analog Signals, Pulse Code Modulation (PCM), Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Mathematical Representation of Noise.

UNIT-V: Noise in Amplitude Modulation: Analysis, Signal to Noise Ratio, Figure of Merit. Noise in Frequency Modulation: Pre-emphasis, De-Emphasis and SNR Improvement, Phase Locked Loops.

Text Book:

1. Herbert Taub and Donald L. Schilling, ―Principles of Communication Systems., Tata McGrawHill.

2. Rishabh Anand, Communication Systems, Khanna Publishers

Reference Books:

1. B.P.Lathi,―Modern Digital and Analog communication Systems, 3rd Edition, Oxford University Press.

2. Simon Haykin, ―Communication Systems, 4th Edition, Wiley India

B. TECH VI SEMESTER

	L	T	P	C
OEC	3	0	0	3

20EC6T09 **MICROCONTROLLERS & ITS APPLICATIONS (OPEN ELECTIVE-II)**

Course Objectives:

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

1. To understand the basics of 8051 Microcontroller and its functionalities
2. To understand the 8051 family instruction set
3. To develop machine language programming in microprocessors.
4. Todesign and develop microcontroller based interfacing for real time applications using low level language like ALP.
5. To understand the basics of ARM architectures and its functionalities.

Course Outcomes:

At the end of this course the student will able to:

CO1: To be able to understand the overview of 8051 Micro controller in general.

CO2: To be able to understand the instruction set of 8051 microcontroller

CO3: To be able to understand the Assembly Language Programming in microcontrollers.

CO4: To be able to understand the microcontroller is interfacing with I/O devices, memory, and serial communication using ALP.

CO5: To be able to understand the overview of ARM Architecture in general.

SYLLABUS

UNIT-I: Introduction to 8051 Microcontrollers

Overview of 8051 microcontrollers, Architecture, I/O ports, Memory organization, Addressing modes, SFRs, Counters and timers, Synchronous serial-cum, Asynchronous serial communication, Interrupts and priorities.

UNIT-II: 8051 FAMILY MICROCONTROLLERS INSTRUCTION SET

Basic assembly language programming, Data transfer instructions, Data and bit- manipulation instructions, Arithmetic instructions, Instructions for logical operations on the test among the registers, Program flow control instructions, Interrupt control flow.

UNIT-III: 8051 REAL TIME CONTROL

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the serial communication Interrupts, programming Timers and Counters, serial port and its programming,

UNIT-IV: I/O and Memory Interface and Serial Communication and Bus Interface

I/O and Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer, USART, External Communication Interfaces-RS232,USB

UNIT-V: ARM Architecture:

ARM processor fundamentals, ARM Architecture –Register, exceptions and interrupts, interrupt vector table, ARM instruction set- Data processing, Branch, load and store instructions; Software instructions, Program status register instructions loading constants

TEXTBOOKS:

1. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System
   Design, 2/e, Pearson Education, 2005.
2. Kenneth. J. Ayala, The 8051 Microcontroller, 3/e, Cengage Learning, 2004.

REFERENCE:

1. Mazidi and Mazidi, The 8051 Microcontroller and Embedded Systems, 2/e, Pearson Education, 2007
2. ARM system Developers guide, Andrew N Sloss, Dominic Symes, Chris Wright, Elsevier,2012

B. TECH VI SEMESTER

OEC	L	T	P	C
	3	0	0	3

INTRODUCTION TO MACHINE LEARNING
20CS6T07 (OPEN ELECTIVE –II)

Course Objective:

This course will enable students to,

- To introduce the basic concepts and techniques of Machine Learning.
- To develop the skills in using recent machine learning software for solving practical problems.
- To be familiar with a set of well-known supervised, semi-supervised and unsupervised learning algorithms

Course Outcomes:

After studying this course, the students will be able to

CO1: Choose the learning techniques and investigate concept learning

CO2: Identify the characteristics of decision tree and solve problems associated with

CO3: Apply effectively neural networks for appropriate applications

CO4: Apply Bayesian techniques and derive effectively learning rules

CO5: Evaluate hypothesis and investigate instant based learning and reinforced learning

SYLLABUS:

UNIT-I:

Introduction: Well-posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

UNIT-II:

Decision Tree Learning: Decision tree representation, Appropriate problems for decision treelearning, Basic decision tree learning algorithm, hypothesis space search in decision treelearning, Inductive bias in decision tree learning, Issues in decision tree learning.

UNIT-III:

Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptions, Back propagation algorithm.

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Naive Bayes classifier, Bayesian belief networks.

UNIT-IV:

Learning Sets of Rules: Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

UNIT-V:

Instance Based Learning: Introduction, k-nearest neighbour learning, locally weighted regression, radial basis function, cased-based reasoning,

Reinforcement Learning: Introduction, Learning Task, Q Learning

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.

REFERENCES:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning,2nd edition, springer series in statistics.
2. EthemAlpaydın, Introduction to machine learning, second edition, MIT press.

B. TECH VI SEMESTER

	L	T	P	C
OEC	3	0	0	3

INFORMATION SECURITY
20CS6T08 (OPEN ELECTIVE –II)

Course Objectives:

- Understand the concepts of classical encryption techniques and concepts of finite fields and number theory
- Understand Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
- Understand the Design issues and working principles of various authentication protocols, PKI standards
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications.

Course Outcomes:

CO1: Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication

CO2: Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.

CO3: Apply different digital signature algorithms to achieve authentication and create secure applications

CO4: Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP

CO5: Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications

SYLLABUS

UNIT - I: Classical Encryption Techniques:

The OSI Security Architecture, Security Attacks, Services & Mechanisms, Symmetric Cipher Model, Substitution Techniques: Caesar Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers, One-Time Pad, Transposition Techniques: Rail fence, Row Transposition cipher, Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.

UNIT - II:

Symmetric Key Cryptography: Data Encryption Standard (DES), Advanced Encryption Standard (AES), Block Cipher Modes of Operations.

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem

UNIT – III:

Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security.

Digital Signatures: NIST Digital Signature Algorithm, Key Management and Distribution

UNIT - IV:

User Authentication: Remote User Authentication Principles, Kerberos.

Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload.

UNIT - V:

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS)

Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration

TEXT BOOKS:

1. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition. [Units 1,2,3,4,5]
2. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition. [Units 1,2,3,4,5]

REFERENCES:

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyaya, Mc-GrawHill, 3rd Edition, 2015.
2. Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

B. TECH VI SEMESTER

OEC	L	T	P	C
	3	0	0	3

AGILE TECHNOLOGIES
20CS6T09 (OPEN ELECTIVE –II)

COURSE OBJECTIVES:

1. To have an understanding of the Agile Manifesto and Principles
2. To Apply Agile based techniques in each of the development phases.

COURSE OUTCOMES:

CO1: Understand the Agile Manifesto and Principles.
CO2: Apply agile software development practices to create high-quality software.
CO3: Acquire Knowledge on software design, set of software technologies and APIs.
CO4: Examine and demonstrate knowledge of Agile development
CO5: Demonstrate the Agile Approach to estimate project variables, control and Risk Management

SYLLABUS

UNIT-I

Agile Software Development: Genesis of Agile, Introduction and Background, Traditional Model Vs Agile Model, Values of Agile, Agile Manifesto and Principles, Stakeholders, Challenges.

UNIT-II

Lean Approach: Waste Management, Kaizen and Kanban, Add process and products add Value, Roles related to life cycle, Differences between Agile and Traditional Plans, Differences at different life cycle phases, Key techniques, Principles, Understand as a means of assessing the initial status of the project, How agile helps to build quality.

UNIT-III

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, **Agile Requirements:** User story definition, Characteristics and contents of user stories, Acceptance tests and verifying stories, Product Velocity, Burn down chart, Sprint planning and retrospective, Daily Scrum, Scrum roles- Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

UNIT-IV

Agile Software Design and Development: Agile Design practices, Role of design principles including Single Responsibility principle, Open Closed Principle, Liskov Substitution principle, Interface Segregation principles, Dependency Inversion principle in Agile Design, Refactoring- Need and significance, Refactoring techniques, Continuous Integration, Automated Build tools, Version Control.

UNIT-V

Agile Testing and Review: Agile Testing Techniques, Test Driven Development, User Acceptance Test, Agile Metrics and Measurements, The Agile Approach to estimate project variables, Agile control- The 7 control parameters, Agile Approach to Risk, Agile approach to Configuration Management, Atern Principles and Philosophy, Best practices to manage Scrum.

TEXT BOOKS:

1. Robort C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013(Units 1, 3, 5)

2. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson(Units 3,4)

3. Mike Cohn, Succeeding with Agile: Software Development Using Scrum, Addison Wesley Series.(Units 3, 4)

REFERENCES:

1. David J. Anderson and Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.

2. Hazza and Dubinsky, ―Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer,.

3. Craig Larman, ―Agile and Iterative Development: A Managers Guide, Addison-Wesley.

4. Kevin C. Desouza, ―Agile Information Systems: Conceptualization, Construction, and management, Butterworth-Heinemann.

B. TECH VI SEMESTER

	L	T	P	C
OEC	3	0	0	3

20IT6T07 FUNDAMENTALS OF MACHINE LEARNING (OPEN ELECTIVE –II)

Course Objective:

This course will enable students to,

- To introduce the basic concepts and techniques of Machine Learning.
- To develop the skills in using recent machine learning software for solving practical problems.
- To be familiar with a set of well-known supervised, semi-supervised and unsupervised learning algorithms

Course Outcomes:

After studying this course, the students will be able to

CO1: Choose the learning techniques and investigate concept learning

CO2: Identify the characteristics of decision tree and solve problems associated with

CO3: Apply effectively neural networks for appropriate applications

CO4: Apply Bayesian techniques and derive effectively learning rules

CO5: Evaluate hypothesis and investigate instant based learning and reinforced learning

SYLLABUS:

UNIT-I:

Introduction: Well-posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

UNIT-II:

Decision Tree Learning: Decision tree representation, Appropriate problems for decision treelearning, Basic decision tree learning algorithm, hypothesis space search in decision treelearning, Inductive bias in decision tree learning, Issues in decision tree learning.

UNIT-III:

Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptions, Back propagation algorithm.

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Naive Bayes classifier, Bayesian belief networks.

UNIT-IV:

Learning Sets of Rules: Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

UNIT-V:

Instance Based Learning: Introduction, k-nearest neighbour learning, locally weighted regression, radial basis function, cased-based reasoning,

Reinforcement Learning: Introduction, Learning Task, Q Learning

TEXT BOOKS:

2. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.

REFERENCES:

3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning,2nd edition, springer series in statistics.
4. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

B. TECH VI SEMESTER

	L	T	P	C
OEC	3	0	0	3

20IT6T08 DATABASE MANAGEMENT SYSTEMS (OPEN ELECTIVE –II)

Course Objectives:

- Understand the basic database concepts, applications, schema and various models.
- Familiarize with entity relation model for a data base and write queries using SQL.
- Emphasize the importance of normalization, transaction management and concurrency control in databases

Course Outcomes:

CO1: Understand the concept of database, database models and familiarize with Entity Relationship models

CO2: Demonstrate the use of constraints, relational algebra operations.

CO3: Apply SQL queries to interact with database and understand the basics of NOSQL.

CO4: Apply normalization in database design to eliminate anomalies.

CO5: Understand the basic concepts of transaction processing and concurrency control.

SYLLABUS

UNIT-I: Database System Applications:

A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

UNIT-II: Introduction to the Relational Model:

Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III: SQL:

QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

NOSQL: Definition of NOSQL, History of NOSQL and Different NOSQL products, Applications, features of NoSQL, Difference between SQL and NoSQL.

UNIT-IV: Schema Refinement (Normalization):

Introduction to Schema Refinement, Functional Dependencies Reasoning about FDs, Normal Forms, Properties of decomposition, Normalization, Schema refinement in database design, Other kinds of dependencies.

UNIT-V: Transaction Management and Concurrency Control:

Properties of transactions, Transactions and Schedules, Concurrent execution of transactions, Lock-based concurrency control, deadlocks, Performance of locking.

Concurrency control: 2PL, Serializability, recoverability, Introduction to lock management, dealing with deadlocks.

TEXT BOOKS:

1. Raghu rama Krishnan, Johannes Gehrke, “Data base Management Systems”, 3rd Edition, TATA McGraw Hill.
2. "Professional NOSQL” by Shashan k Tiwari, 2011, WROX Press.

REFERENCE:

1. Peter Rob & Carlos Coronel, “Data base Systems design, Implementation, and Management”, 7th Edition, Pearson Education, 2000.
2. Silberschatz, Korth, “Data base System Concepts”, 6th Edition, McGraw Hill, 2010.
3. ElmasriNavathe, “Fundamentals of Database Systems”, 5th Edition, Pearson Education, 2007.
4. C.J.Date, “Introduction to Database Systems”, 7th Edition, Pearson Education, 2002

B. TECH VI SEMESTER

OEC	L	T	P	C
	3	0	0	3

OPERATIONS RESEARCH
20HS6T01 (OPEN ELECTIVE –II)

Course Objectives:

1) Identify and develop operational research models from the verbal description of the real system.
2) Understand the mathematical tools that are needed to solve optimization problems.
3) Use mathematical software to solve the proposed models.
4) Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

Course Outcomes:

CO1: Understand the methodology of Operations Research& concepts of linear programming

CO2: Formulate the solutions to transportation problems

CO3: Explain the solutions for various sequencing problems

CO4: Illustrate the solutions to different replacement policies

CO5: Apply game theory to solve real world problems

SYLLABUS

UNIT-I

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions.

UNIT-II

Transportation Problem. Formulation, Solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: MODI method.

UNIT-III

Assignment model. Formulation. Hungarian Method for optimal solution. Solving Unbalanced problem. Sequencing Models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines Processing n Jobs through m Machines.

UNIT-IV

Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy.

UNIT-V

Game Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.

Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

TEXT BOOKS:

1) P. SankaraIyer,"Operations Research", Tata McGraw-Hill, 2008.
2) A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005.

REFERENCES:

1) J K Sharma. "Operations Research Theory & Applications, 3e", Macmillan India Ltd, 2007.
2) P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.

B. TECH VI SEMESTER

OEC	L	T	P	C
	3	0	0	3

20MB6T01 ORGANIZATIONAL BEHAVIOUR (OPEN ELECTIVE –II)

Course Objectives

1 To understand the fundamentals of Organizational Behaviour.

2 For the understanding and balancing of Values and Emotions at work place.

3 To improve the student's Personality and Attitude.

4 To understand and improve the skill of perception and Group Behaviour.

5 Understanding and managing organizational culture, leadership and conflict.

Course Outcomes

Learning Organizational Behavior enables engineers:

CO1: To understand the psychology of workers and other members in the organization.

CO2: To be equipped with the right knowledge and skills regarding organizational processes, group behavior, organizational structure and culture.

CO3: To build up strategies for development at their work place.

CO4: To motivate and control employees.

CO5: To resolve organizational conflict effectively.

SYLLABUS

UNIT I

Fundamentals of OB: Definition, Scope and Importance of OB, Relationship between OB and the individual, Evolution of OB, Models of OB (Autocratic, Custodial, Supportive, Collegial & SOBC), Limitations of OB.

Unit II

Values, Attitudes and Emotions: Introduction, Values, Attitudes, Definition and Concept of Emotions, Emotional Intelligence - Fundamentals of Emotional Intelligence, The Emotional Competence Framework, Benefits of Emotional Intelligence, difference between EQ and IQ. Stress at workplace: Work Stressors – Prevention and Management of stress – Balancing work and Life, Workplace spirituality.

Unit III

Personality & Attitude: Definition Personality, importance of personality in Performance, The Myers-Briggs Type Indicator and The Big Five personality model, Johari Window, Transaction Analysis. Attitude – Definition, Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude.

Unit IV

Perception: Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect). Motivation:

Definition & Concept of Motive & Motivation. Group and Team Dynamics: Meaning Group Dynamics, Types of Groups, Group Development, Team Effectiveness & Team Building.

Unit V

Organizational Culture: Types of Culture, Creating and Maintaining Organization Culture, Managing Cultural Diversity. Organizational Change: Types of Organizational change, Forces that acts as stimulants to change, overcome the Resistance to Change, Developing a Learning Organization. Leadership: Introduction, Managers V/s Leaders. Overview of Leadership- Traits and Types. Conflict Management: Sources of Conflict, Types of Conflict, Conflict Management Approaches.

Text Books

1. Pareek Udai: "Understanding Organizational Behavior", Oxford University Press, New Delhi, 2007.

1. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, New Delhi,2008.

2. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma: "Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.

References

1. Jerald Greenberg and Robert A Baron: "Behavior in Organizations", PHI Learning Pvt Ltd, New Delhi, 2009.

2. Robbins, Stephen P. Organizational behavior, 14/E. Pearson Education India, 2001.

B. TECH VI SEMESTER

OEC	L	T	P	C
	3	0	0	3

20MB6T02 PROJECT MANAGEMENT (OPEN ELECTIVE –II)

Course Objectives

The objective of this course is to enable the students to gain basic knowledge about the concept of project, project management, project life-cycle, project appraisal; to acquaint the students about various issues of project management.

SYLLABUS

Unit -I

Basics of Project Management –Concept– Project environment – Types of Projects – Project life cycle – Project proposals – Monitoring project progress – Project appraisal and Project selection – Causes of delay in Project commissioning– Remedies to avoid overruns. Identification of Investment opportunities – Sources of new project ideas, preliminary screening of projects – Components for project feasibility studies.

Unit- II

Market feasibility -Market survey – Categories of Market survey – steps involved in conducting market survey– Demand forecasting techniques, sales projections.

Unit- III

Technical and Legal feasibility: Production technology, materials and inputs, plant capacity, site selection, plant layout, Managerial Feasibility Project organization and responsibilities. Legalities – Basic legal provisions. Development of Programme Evaluation & Review Technique (PERT) –Construction of PERT (Project duration and valuation, slack and critical activities, critical path interpretation) – Critical Path Method (CPM)

Unit- IV

Financial feasibility – Capital Expenditure – Criteria and Investment strategies – Capital Investment Appraisal Techniques (Non DCF and DCF) – Risk analysis – Cost and financial feasibility – Cost of project and means of financing — Estimation of cash flows – Estimation of Capital costs and operating costs; Revenue estimation – Income – Determinants – Forecasting income –Operational feasibility - Breakeven point – Economics of working.

Unit -V

Project Implementation and Review: Forms of project organization – project planning – project control – human aspects of project management – prerequisites for successful project implementation – project review – performance evaluation – abandonment analysis.

Text Books

1. Prasanna Chandra, ―Projects, Planning, Analysis, Selection, Financing, Implementation and Review, Tata McGraw Hill Company Pvt. Ltd., New Delhi 1998.
2. Gido: Effective Project Management, 2e, Thomson, 2007.

References

1. Singh M.K, ―Project Evaluation and Management‖.
2. Vasanth Desai, Project Management, 4th edition, Himalaya Publications 2018.
3. Clifford F. Gray, Erik W. Larson, ―Project Management, the Managerial Emphasis, McGraw Hill, 2000.

B. TECH VI SEMESTER

	L	T	P	C
OEC	3	0	0	3

20AM6T07 BIG DATA ANALYTICS (OPEN ELECTIVE –II)

Pre-requisite: Data Base Management System

Course objectives:

In this course student will learn about

1. To understand the need of Big Data, challenges and different analytical architectures
2. Installation and understanding of Hadoop Architecture and its ecosystems
3. Processing of Big Data with Advanced architectures like Spark.
4. Describe graphs and streaming data in Spark.

Course Outcomes: At the end of the course, student will be able to

CO1: Discuss the challenges and their solutions in Big Data

CO2: Understand and work on Hadoop Framework and eco systems.

CO3: Explain and Analyze the Big Data using Map-reduce programming in Both Hadoop and Spark framework.

CO4: Demonstrate spark programming with different programming languages.

CO5: Demonstrate the graph algorithms and live streaming data in Spark.

SYLLABUS

Unit-I:

Introduction to big data: Data, Types of digital data, Evolution and Definition of big data, Challenges of big data, Characteristics and Need of big data.

Introduction to Hadoop: Introducing Hadoop, need of Hadoop, limitations of RDBMS, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Hadoop Distributors.

HDFS (Hadoop Distributed File System): HDFS Daemons, Anatomy of file read, Anatomy of file write, working with HDFS commands.

Unit-II:

Introduction to MAPREDUCE Programming: Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Mapper, Reducer, Combiner, Partitioner, Searching, Sorting , Compression, Hadoop EcoSystem.

Unit-III:

Introduction to Pig: Key Features of pig, The Anatomy of Pig, Pig on Hadoop , Pig Philosophy, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, Relational Operators.

Introduction to HIVE: HIVE features, HIVE architecture, HIVE datatypes, HIVE File Formats, HIVE Query Language.

Unit-IV:

NoSQL: Introduction to NOSQL, Types of NoSQL Databases, and Advantages of NoSQL databases, CAP Theorem, BASE, SQL versus NoSql.

NoSQL databases: Introduction to MongoDB, Data types in MongoDB, MongoDB query language.

Unit-V:

Spark: Introduction to data analytics with Spark, Spark Stack, Programming with RDDS, Working with key/value pairs, Spark SQL, Schema RDDs,

Sparking Streaming: High level architecture of Spark Streaming, DStreams, Transformations on DStreams, Different Types of Transformations on DStreams.

Text Books:

[1].SeemaAcharya, SubhashiniChellappan, Big Data and Analytics, Wiley Publishers

[2].Holden Karau, Andy Konwinski, Patrick Wendell, MateiZaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly Media, Inc.

Reference Books:

[1]. TomWhite, Hadoop,“TheDefinitiveGuide”,3rdEdition,O’ReillyPublications, 2012.

[2].David Loshin, "BigDataAnalytics: From Strategic Planning to Enterprise IntegrationwithTools,Techniques,NoSQL,andGraph”,MorganKaufmannPublishers, 2013

[3].Hadoopin PracticebyAlexHolmes, MANNING

[4].Hadoop in Action byChuckLam, MANNING

[5] Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch , “Understanding Big Data Analytics for Enterprise ClassHadoopandStreamingData”, 1st Edition, TMH,2012.

[6] HienLuu, Beginning Apache Spark 2

E-resources and Other digital materials:

[1].Big Data Use cases for Beginners | Real Life Case Studies | Success Stories https://www.youtube.com/watch?v=HHR0-iJp2sM

[2]. Alexey Grishchenko, Hadoopvs MPP, https://0x0fff.com/hadoop-vs-mpp/

[3]. Random notes on bigdata- SlideShare: Available www.slideshare.net/yiranpang/random-notes-on-big-data-26439474

B. TECH VI SEMESTER

OEC	L	T	P	C
	3	0	0	3

20AD6T07 VISUAL ANALYTICS (OPEN ELECTIVE –II)

Pre-requisite: There is no prerequisite to learn this course.

Course Objective: *This* ***course*** explains apply the fundamentals of Tableau tool, Use all the basic functionality to visualize their data, Connect to various data sources, Build a variety of basic charts, Combine insights into a useable dashboard, Share and publish visualizations.

Course Outcomes: At the end of the course, student will be able to

CO1: Examine, navigate, and learn to use the various features of Tableau

CO2: Create and design visualizations and dashboards for your intended audience

CO3: apply predicative analytics to improve business decision making

CO4: Assess the quality of the data and perform exploratory analysis

CO5: Combine the data to and follow the best practices to present your story

SYLLABUS

UNIT-1:

Introduction: Tableau Application Suite, Installing and Activating Tableau Desktop, Data Preparation, Finding the Dataset, Understanding the Data, The Tableau Workspace, Saving, Opening, and Sharing Your Workbooks, Setting Up a Data Connector, Adding a Table to a Data Model, Data Extracts and Live Connections, Data Protection and Data Governance, Data Types, Data Collection with IFTTT and Google Sheets, Website Analysis with Google Analytics, Performance Optimization.

UNIT-2:

Data Visualizations and Aggregate Functions: Chart Types, Scatter Plots, Bar Charts, Legends, Filters, and Hierarchies, Line Charts, Straight Lines, Step Charts, Continuous Date Fields, Highlight Tables, Heat maps, Bullet Charts, Aggregate Functions, Calculated Fields, Aggregations in Calculated Fields, Text Operators, Splits, Date Fields, and Formats, Working with NULL Values, Parameters

UNIT-3:

Table Calculations and Maps: Different Types of Calculations, Quick Table Calculations, Customized Table Calculations, Bump Charts, Dual Axis Charts, Keywords and Syntax, Cohort Analysis, Regional Averages, Different Types of Maps, Map Layers, Maps with Pie Charts: Creating a Pie Chart Map, Dual Axis Map Embedding the Chart in Tooltips, Mapbox Maps, Mapbox in Tableau, Using the Background Map, Spatial Data.

UNIT-4:

Advanced Analytics and Interactive Dashboards: Overview of the Tableau Analytics Pane, Constant, Average, and Reference Lines, Trend Lines, Forecasts, Model Description, Cluster Analysis, Clustering in Tableau, Python, R, and MATLAB Integration, Connecting Tableau with TabPy, Security, The Dashboard Pane, Placing Charts on the Dashboard, Dashboard Actions, Filter Actions, Adding Web Content via URL Actions, Design Tips for Creating a Dashboard

UNIT-5:

Data Preparation with Tableau: Connecting to Data, Wildcard Unions, Inspecting the Data, Removing Unneeded Fields, Data Cleaning and Formatting, Cleaning Steps and Built-in Cleaning Features, Unions, Joins, Splits Grouping, Running the Flow and Outputting the Data, Saving Flows.

Text Book:

Alexander Loth, “**Visual Analytics with Tableau**”, ISBN: 978-1-119-56020-3, Wiley 2019

Reference Books:

1. "**Visual Thinking for Design”** by Colin Ware
2. "**Storytelling With Data: A Data Visualization Guide for Business Professionals”** by Cole Nussbaumer Knaflic
3. "**Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”** by Nathan Yau

B.TECH VII SEMESTER **OEC**

L	T	P	C
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20CE7T13 CONSTRUCTION TECHNOLOGY AND MANAGEMENT (OPEN ELECTIVE-III)

Course Objectives:

- To introduce to the student the concept of project management including network drawing and monitoring
- To introduce various equipments like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to constriction.
- to introduce the importance of safety in construction projects

Course Outcomes:

CO1: appreciate the importance of construction planning

CO2: understand the functioning of various earth moving equipment

CO3: the methods of production of aggregate products and concreting and usage of machinery required for the works.

CO4: apply the gained knowledge to project management and construction techniques

SYLLABUS

UNIT-I:

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts– critical Path Method – Applications

UNIT-II:

Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT-III:

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types

UNIT–IV:

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers –graders – scrapers– draglines - clamshell buckets

UNIT –V:

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers– selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering

Text Books:

1. Construction Planning Equipment and Methods, Peurifoy and Schexnayder, Shapira, Tata Mcgrawhill
2. Construction Project Management Theory and Practice, Kumar Neeraj Jha (2011), Pearson.
3. Construction Technology, Subir K. Sarkar and Subhajit Saraswati, Oxford University press.
4. Project Planning and Control with PERT and CPM, B. C. Punamia and K K Khandelwal, Laxmi Publications Pvt Ltd. Hyderabad.

Reference Books:

1. Construction Project Management - An Integrated Approach, Peter Fewings, Taylor and Francis
2. Construction Management Emerging Trends and Technologies, Trefor Williams , Cengage learning.
3. Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20CE7T14 GREEN BUILDINGS (OPEN ELECTIVE-III)

Course Objectives:

- To introduce the different concepts of green building techniques and how they may be synthesized to best fit a construction.
- To Know the importance of Green buildings
- To know and implement energy conservation and renewable resources
- To understand the knowledge of ECBC, LEED, GRIHA etc.

Course Outcomes:

CO1: Able to describe the importance and necessity of green building.

CO2: Able to suggest materials and technologies to improve energy efficiency of building.

CO3: Able to assess a building on the norms available for green building.

SYLLABUS

UNIT-I:

Introduction of Green Buildings, Salient features of green buildings, Advantages of Green Buildings- Sustainable site selection and planning of buildings to improve comfort, day lighting, ventilation, planning for drainage.

UNIT-II:

ENERGY EFFICIENT BUILDINGS Passive cooling and day lighting – Active solar and photovoltaic, building energy analysis methods, Lighting system design, Lighting economics and aesthetics, Impacts of lighting efficiency, Technological options for energy management.

UNIT-III:

ENERGY CONSERVATION Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings, waste to energy management in residential complexes or gated communities.

UNIT-IV:

RENEWABLE ENERGY RESOURCES Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar, windand hydro power appliances, success case studies of fully solar, wind and hydro power energies.

UNIT-V:

ENERGY REQUIREMENT AND GREEN BUILDING RATING SYSTEMS Energy

Conservation Building Code (ECBC) requirement for green buildings, Requirement for green rating systems - Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment (GRIHA), Building automation and building management systems.

Text Books:

1. 'Handbook on Green Practices published by Indian Society of Heating Refrigerating and Airconditioning Engineers', 2009
2. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddyand K.S. Nanjunda Rao.
3. 'Green Building Handbook' by Tomwoolley and Samkimings, 2009

Reference Books:

1. 'Complete Guide to Green Buildings' by Trish riley.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.
3. 'Standard for the design for High Performance Green Buildings' by Kent Peterson, 2009
4. Ganesan T P, "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20EE7T13 CONCEPT OF POWER SYSTEM ENGINEERING (OPEN ELECTIVE-III)

Course Objective: To develop problem solving skills and understanding of Power System concepts through the application of techniques and principles of electrical Power Generation methods.

Course Outcomes: At the end of the course, student will be able to

CO1: Various electrical Power System Components, Supply systems

CO2: Thermal Power Station working procedure, each module path directions

CO3: Hydro Power Station working procedure, classifications

CO4: Nuclear Power Station working procedure, Chain Reaction

CO5: Solar power generation & Wind Power Generation, Applications

SYLLABUS

UNIT-I: **Power System Components**

Single line Diagram of Power system, Different kinds of supply system, conventional and Non-conventional energy sources, Applications.

UNIT-II: Thermal Power Stations

Choice of site Selection, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super, heaters, Economizers, electrostatic precipitators

UNIT-III: Hydro & Nuclear Power Stations

Choice of site, arrangement of hydroelectric installations, Hydrology. Mass curve, flow duration curve, classification of Hydro Power Plants, Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components

UNIT-IV: Solar power generation & Wind Power Generation

Solar radiation spectrum. Radiation measurement. Applications of solar thermal systems Solar Photovoltaic (SPV) systems, Introduction to wind energy, basic principles of wind energy conversion.

UNIT-V: Transmission & Distribution

Transmission structure, classifications, types of conductors, primary & secondary distribution, Substation Equipments , layout.

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, S.Bhatnagarand, A Chakrabarti, DhanpatRai& Co. Pvt. Ltd.

2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers
3. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20EE7T14 INSTRUMENTATION (OPEN ELECTIVE-III)

Course Objectives:

1. To study the basics of measuring system.
2. To study various Electrical transducers and to measure the various types of Non–electrical quantities
3. To study various types of digital voltmeters
4. To study the working principles of various types of oscilloscopes and their applications.
5. To study various types of signal analyzers

Course Outcomes:

CO1: Able to study the basics of measuring system.

CO2: Acquire proper knowledge to use various types of Transducers and able to monitor and measure various parameters such as strain, Fow, temperature and pressure

CO3: Acquire proper knowledge and working principle of various types of digital voltmeters.

CO4: Able to measure various parameters like phase and frequency of a signal with the help of CRO.

CO5: Acquire proper knowledge and able to handle various types of signal analyzers.

SYLLABUS

UNIT-I

Basics of Measuring System: Measuring Systems, Performance Characteristics – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors and Random Errors, Statistical analysis of random errors.

UNIT-II

Transducer Basics and Applications: Definition of transducers – Classification of transducers – Advantages of Electrical transducers –Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers. Measurement of Temperature, Pressure, Strain and Flow.

UNIT-III

Digital Voltmeters: Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Microprocessor based ramp type DVM, digital frequency meter – Digital phase angle meter.

UNIT-IV

Oscilloscope: Cathode ray oscilloscope – Time base generator – Horizontal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope, data logger, Transient recorder.

UNIT-V

Signal Analyzers: Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters

Text Books:

1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai & Co

Reference Books:

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson/Prentice Hall ofIndia
4. Modern Electronic Instrumentation and Measurement techniques – by A.D HelfrickandW.D.Cooper, Pearson/Prentice Hall of India.
5. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20ME7T10 GREEN ENGINEERING SYSTEMS (OPEN ELECTIVE -III)

Pre-requisite: Thermodynamics, Environmental Sciences

Course Objective: The course aims to highlight the significance of alternative sources of energy, green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmental friendly.

Course Outcomes: At the end of the course, student will be able to

CO1: Evaluate the impact of technology on environment

CO2: Compare biological ecology to industrial ecology

CO3: Design eco-friendly product

CO4: Create sustainable products, facilities, processes and infrastructure

CO5: Asses the life cycle of a product to evaluate its impact on energy and materials use. Determine the effects of air and water quality

SYLLABUS

UNIT-I:

INTRODUCTION: SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-II:

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT-III:

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-IV: ENERGY EFFICIENT SYSTEMS:

(A) ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT-V: ENERGY EFFICIENT PROCESSES:

Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

Text Books:

1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/ TMH
2. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006
3. Green Manufacturing Processes and Systems, Edited / J. Paulo Davim/Springer 2013

References:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao/New age international

2. Principles of Solar Engineering / D.YogiGoswami, Frank Krieth& John F Kreider / Taylor & Francis
3. Non-Conventional Energy / Ashok V Desai /New Age International (P) Ltd
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa
5. Non conventional Energy Source/ G.D Roy/Standard Publishers
6. Renewable Energy Resources-2nd Edition/ J.Twidell and T. Weir/ BSP Books Pvt.Ltd
7. Fuel Cell Technology –Hand Book / Gregor Hoogers / BSP Books Pvt. Ltd.

B.TECH VII SEMESTER	OEC	L	T	P	C
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20ME7T11 HYBRID ELECTRIC VEHICLES (OPEN ELECTIVE -III)

Pre-requisite: Internal-Combustion engines.

Course Objective:

The main objective of this course is to provide the knowledge on architecture of Hybrid Electric Vehicles, Fuel cells and their sub-systems. The focus is as well on explaining the requirements of hybrid electric vehicles and Fuel-cells for automobile applications. At the same time, various design considerations in fuel cell vehicles and electric vehicles will be explained.

Course Outcomes: At the end of the course, student will be able to

CO1:	Compare and contrast the working of Conventional and Electric Vehicles.
CO2:	Comprehend the use of Series and Hybrid Electric vehicle drive trains
CO3:	Apply the fundamentals of to develop the propulsion and storage systems for Hybrid Electric Vehicles.
CO4:	Perform a case study on Hybrid Electric vehicle drive trains for different parameters
CO5:	Describe the working principle of various types of fuel-cells.

SYLLABUS

UNIT-I:

ELECTRIC VEHICLES: Introduction, Electric Vehicle Principle- Components of Electric Vehicle Constituents of a conventional vehicle-Drive cycles and Drive Terrain, Operating principle of Fuel Cell, Differences between conventional battery and Electric battery, Transmission differences between conventional and Electric Vehicles, Differences between conventional lighting system and Electric vehicle lighting system.

UNIT-II:

HYBRID ELECTRIC VEHICLES: Introduction, A Brief history of Hybrid Electric vehicles (HEVs),Basics of Hybrid Electric Vehicles (HEVs), Architecture of HEVs-Series HEVs, Parallel HEVs, Series-Parallel HEVs.

HYBRID ELECTRIC VEHICLE DRIVE TRAINS: Parallel Hybrid Drive trains with Torque coupling, Parallel Hybrid Drive trains with both Speed coupling, Parallel Hybrid Drive trains with both speed Torque coupling.

UNIT-III:

ELECTRIC PROPULSION SYSTEMS: DC Motors- Operating principle and control of DC motors, Induction Motor Drives: Operating principle and Control Mechanisms, Brushless Motor Drives-Principle and Construction, Switched Reluctance Motor (SRM) Drives- Basic structure, Drive Convertor, Modes of Operation.

ENERGY STORAGE SYSTEMS: Electrochemical Batteries, Lead-Acid Batteries, Nickel Based Batteries, Lithium Based Batteries, Ultra Capacitors- Basic Principles and Performance, Ultrahigh-speed flywheels- Basic Principle and Power Capacity, Fly Wheel technologies.

UNIT-IV:

DESIGN OF SERIES HYBRID ELECTRIC VEHICLE DRIVES: Design of Series Hybrid Electric Vehicle Drive- Control Strategies, Sizing of Major Components and Case Study for designing for various parameters.

DESIGN OF PARALLEL HYBRID ELECTRIC VEHICLE DRIVES: Design of Parallel Hybrid Electric Vehicle Drive- Control Strategies of Drive Train and Design of Drive Train Parameters.

UNIT-V:

FUEL CELL ELECTRIC VEHICLES: Operating principles of fuel cells, Fuel and oxidant consumption, Fuel cell system characteristics, Fuel cell technologies- Proton Exchange membrane fuel cells, Alkaline Fuel cells, Phosphoric acid fuel cells, Molten carbonate fuel cells, Solid oxide fuel cells, Fuel supply- Hydrogen storage-Hydrogen production, Ammonia as hydrogen carrier, Non-Hydrogen fuel cells, Fuel Cell Hybrid Vehicle Drive Train.

Text Books:

1) MehrdadEhsani, YiminGao, Ali Emadi, 2nd edition, Modern Electric, Hybrid Electric and Fuel cell vehicles, CRC Press, Taylor and Francis Group, 2010.
2) Chris Mi, M.AbulMasrur and David WenzhongGao, 1st Edition, Hybrid Electric Vehicles, John Wiley & Sons, Ltd, 2011.

B. TECH VII SEMESTER **OEC**

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20EC7T10 DATA COMMUNICATIONS (OPEN ELECTIVE-III)

COURSE OBJECTIVES:
The main objectives of this course are given below:

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

1. To focus on information sharing and networks.
2. To Introduce flow of data, categories of network, different topologies.
3. To focus on different coding schemes.
4. To brief the students regarding protocols and standards.
5. To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices, etc.

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Know basic knowledge of data Communication
CO2: Know basic knowledge of Analog & Digital Signals
CO3: Understand the basic knowledge of Analog Transmission
CO4: know Different types of transmission media
CO5: Focus on DTE-DCE Interface

SYLLABUS

UNIT-I:

Introduction to data communication and networking: Reason to study data communication, Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works. Study of OSI and TCP/IP protocol suit: The Model, Functions of the layers, TCP/IP Protocol Suites

UNIT-II:

Study of Signals: Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals, Digital Signals. Study of Digital transmission: Digital to Digital Conversion, Analog to Digital Conversion.

UNIT-III:

Study of Analog transmission: Digital to Analog Conversion, Analog to Analog Conversion. Study of Multiplexing: Many to one/one to Many, Frequency division Multiplexing, Wage division Multiplexing, Time division Multiplexing, Multiplexing applications.

UNIT-IV:

Types of transmission media: Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching. Error Detection and Correction: Types of Errors, Detection, Parity Check, Vertical Redundancy Check, Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction.

UNIT-V:

Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems. Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Gateways Routers, Routing Algorithms, Distance Vector Routing, Link State Routing.

Text Books:

1. Data communication & Networking by Bahrouz Forouzan.

2. Computer Networks by Andrew S. Tanenbaum

Reference Books:

1. Data and Computer Communications by William Stallings

2. Kleinrock, Leonard. Queueing Systems, Vol 1: Theory. New York, NY: Wiley J., 1975. ISBN: 0471491101.

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20EC7T11 MECHATRONICS (OPEN ELECTIVE III)

Course Objective: The main objective of this course is

- To introduce the integrative nature of Mechatronics.
- To describe the basic programming, different components and devices of mechatronics systems.

Course Outcomes:
At the end of this course the student will able to:

CO1: Basic concepts of mechatronics

CO2: To design mechatronics system with the help of Microprocessor

CO3: To design PLC and other electrical and Electronics Circuits

CO4: To understand the concept of solid state Devices

CO5: To know Dynamic models & controllers

SYLLABUS

UNIT-I:

Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors.

UNIT-II:

Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontrollers – Block diagram

UNIT-III:

Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC, Basic programming in PLC.

UNIT-IV:

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-V:

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trend

TEXT BOOKS:

1. Bolton, ―Mechatronics‖, Printice Hall, 2000
2. Ramesh S Gaonkar, ―Microprocessor Architecture, Programming, and Applications with the 8085‖, 5th Edition, Prentice Hall, 2008.

REFERENCE BOOKS:

1. Mechatronics System Design / Devdas shetty/Richard/Thomson.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

B. TECH VII SEMESTER

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BIOMEDICAL INSTRUMENTATION.

20EC7T12 (OPEN ELECTIVE III)

Course Objectives:

1. To introduce student to basic biomedical engineering technology
2. To understand the anatomy & physiology of major systems of the body in designing equipment for medical treatments.
3. To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.

Course- Outcomes:
After going through this course the student will able

CO1.To understand Physiological System of the Body and Bioelectric Potentials.

CO2.To understand Electrodes, Transducer and Sensors used in Biomedical field.

CO3 To understand the problem and identify the necessity of equipment for diagnosis and therapy.

CO4 To understand the importance of electronics engineering in medical field.

CO5 To understand the importance of telemetry in patient care

SYLLABUS

UNIT-1: INTRODUCTION TO BIOMEDICAL INSTRUMENTATION

Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

UNIT-II: ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III: CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV: PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Laparoscope, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention,

UNIT-V: DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring**.**

Text Books:

1. Bio-Medical Instrumentation‖, Cromwell , Wiebell, Pfeiffer
2. Hand Book of Bio-Medical Instrumentation‖, Instrumentation‖, Kandahar. McGraw-Hill

References

1. Introduction to Bio-Medical Equipment Technology‖, 4th Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
2. “Bio-Medical Electronics and Instrumentation”, Onkar N. Pandey, Rakesh Kumar, Katson Books.

B. TECH VII SEMESTER

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ARTIFICIAL NEURAL NETWORKS.
20CS7T10 (OPEN ELECTIVE III)

Course Objectives:

- To deal with the historical developments of artificial intelligence leading to artificial neural networks (ANN).
- To introduce the basic concepts and models of ANN for solving real world problems.

Course Outcomes:

At the end of this course the student will be able to:

CO1- Understand biological neuron & artificial neuron and basic building blocks of ANN.

CO2-Understand different single layer/multiple layer Perceptron learning algorithms.

CO3- Understand and analyze Adaline and Madeline Networks and their applications

CO4- Learning algorithms based on basic gradient descent, backpropagation and their modifications.

CO5- Understand self-organization learning, ART, Radial basis Functions.

SYLLABUS

UNIT - I: Introduction to Artificial Neural Networks:

Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between them and the Computer, Comparison Between Artificial and Biological Neural Network Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network (ANN) terminologies.

UNIT - II: Fundamental Models of Artificial Neural Networks:

Introduction, McCulloch - Pitts Neuron Model, Learning Rules, Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square (LMS)Rule,Competitive Learning Rule, Out Star Learning, Boltzmann Based Learning, Hebb Net.

Perceptron Networks: Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks

UNIT – III: Adaline and Madaline Networks:

Introduction, Adaline, Madaline. Associative Memory Networks: Introduction, Algorithms for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi- directional Associative Memory.

UNIT - IV: Feedback Networks:

Introduction, Discrete Hopfiled Net, Continuous Hopfiled Net, Relation between BAM and Hopfiled Nets.

Feed Forward Networks: Introduction, Back Propagation Network (BPN), Radial Basis Function Network (RBFN).

UNIT - V: Self Organizing Feature Map:

Introduction, Methods Used for Determining the Winner, Kohonen Self Organizing Feature Maps, Learning Vector Quantization (LVQ),Max Net, Maxican Hat, Hamming Net

Adaptive Resonance Theory: Introduction, ART Fundamentals, ART 1, ART2.

TEXT BOOKS:

1. Sivanandam, S Sumathi, S N Deepa; "Introduction to Neural Networks", 2nd ed.,TATA McGraw HILL : 2005.

REFERENCES:

1. "Simon Haykin, "Neural networks A comprehensive foundations", 2nd ed., Pearson Education, 2004.
2. B Yegnanarayana, "Artificial neural networks", 1st ed., Prentice Hall of India P Ltd, 2005.
3. Li Min Fu, "Neural networks in Computer intelligence", 1st ed., TMH, 2003

B. TECH VII SEMESTER

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CYBER SECURITY
20CS7T11 (OPEN ELECTIVE III)

Course Objective:

- Understand the importance of Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

Course Outcomes:

CO1: Understand and classify various forms of Cybercrimes

CO2: Interpret the reasons for Cyber offence

CO3: Detect and analyze vulnerabilities in Mobile and Wireless devices

CO4: Analyze tools used to perform cyber crimes

CO5: Understand cyber security Laws

SYLLABUS:

UNIT-I: Introduction, Cybercrime:

Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes

UNIT-II: Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT-III: Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile.

UNIT-IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

UNIT-V: Cybercrimes and Cyber security:

The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning.

REFERENCES:

1. Information Security, Mark Rhodes, Ousley, MGH.

B. TECH VII SEMESTER **OEC**

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SOFTWARE TESTING METHODOLOGIES
20CS7T12 (OPEN ELECTIVE III)

Course Objectives:

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To Understand different levels of Testing
- Apply Black Box and White Box Testing Techniques
- To learn how to plan a test project, design test cases and data, conduct testing operations, and generate a test report.
- To understand software test automation problems and solutions.

Course Outcomes:

CO1: Have an ability to apply software testing knowledge and engineering methods.

CO2: Ability to identify the needs of software test automation, and define a test tool to support test automation.

CO3: Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

CO4: Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.

CO5: Apply techniques and skills to use modern software testing tools to support software testing projects.

SYLLABUS

UNIT-I: Software Testing:

Introduction, Evolution, Dichotomies, Goals & Typical Objectives of Testing, Model for testing, Software Testing Principles, **Software Testing Terminology and Methodology:** Software Testing Terminology, Errors, Defects, Failures, Root Causes and Effects, Software Testing Life Cycle, Software Testing Methodology.

UNIT-II: Verification and Validation:

Verification & Validation Activities, Categories of Test Techniques: Dynamic Testing,

Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing,

White-Box Testing: Need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

UNIT-III: Static Testing:

Inspections, Structured Walkthroughs, Technical reviews, Benefits of Static Testing, Static Vs Dynamic Testing.

Levels of Testing: Unit testing, Integration Testing,. Function testing, System testing and Acceptance testing.

Regression testing: Progressive Vs Regressive testing, Objectives of regression testing, Regression testing techniques

UNIT-IV: Test Management:

Test Organization, Test Planning, Test Design and Test case specifications, Structure of a Testing Group, Reasons for the growth of a Test suite, Test suite Minimization, Test suite prioritization, Types of test case prioritization, prioritization techniques, Measuring the effectiveness of a prioritized test suite. Software Quality Management: Software Quality metrics, SQA models

Debugging: Debugging process, Debugging Techniques, Correcting Bugs, Debuggers

UNIT-V: Automation and Testing Tools:

Need for automation, Testing Tool Considerations, Test Tool Classification, Benefits and Risks of Test automation, Special Considerations for Test execution and Test Management Tools, Principles for tool selection, Testing tools- success factors, Guidelines for automated testing, overview of some commercial testing tools.

Object oriented testing Testing Web based Systems: Challenges in testing for web based software, quality aspects, web **engineering**, testing of web based systems, Testing mobile systems.

TEXT BOOKS:

1. Software testing techniques - Baris Beizer, International Thomson computer press, second edition. (Unit 1)
2. Software Testing, Principles and Practices, Naresh Chauhan, Oxford Publishers(Unit 2,3,4,5)

REFERENCES:

Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

1. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson

B. TECH VII SEMESTER

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INTERNET OF THINGS
20IT7T10 (OPEN ELECTIVE III)

Course Objectives:

- Understand the architecture of Internet of Things and connected world.
- Explore on use of various hardware, communication and sensing technologies to build IoT applications
- Develop the real time IoT applications to make smart world.
- Understand challenges and future trends in IoT.

Course Outcomes:

CO1: Design and Deployment of IoT.

CO2: Design and comparing M2M with IoT.

CO3: Understand Platform design and modeling of IoT

CO4: Apply IoT in different devices using Python

CO5: Implement IoT and cloud platforms.

SYLLABUS

UNIT-I: Introduction to Internet of Things (IoT):

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT Enabling Technologies, IoT levels and deployment, domains Specific IoTs.

UNIT-II: IoT and M2M :

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III: IoT Platforms Design Methodology:

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data Structures, control flow, functions, modules, packages, file handling. Raspberry PI with Python, other IoT devices.

UNIT-IV: IoT Protocols:

Messaging Protocols- MQ Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) Transport Protocols-Light Fidelity (Li-Fi), Bluetooth Low Energy (BLE) IoT Protocols: Addressing and Identification: Internet Protocol Version 4 (IPV4), Internet Protocol Version 6(IPV6), Uniform Resource Identifier (URI)

UNIT-V: IoT Physical Servers And Cloud Offerings: Introduction to cloud storage models and communication APIs, WAMP –Auto Bahn for IoT, Xively cloud for IoT, case studies illustrating IoT design –home automation, smart cities, smart environment.

TEXT BOOKS:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014. (Units1,2,3,5)
2. Matt Richardson, Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 3rd Edition, 2014. (Unit 3)
3. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram " Internet of Things" Wiley (Unit 4).

REFERENCE BOOKS:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", John Wiley and Sons2014.

B. TECH VII SEMESTER

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COMPUTER VISION
20IT7T11 (OPEN ELECTIVE III)

Course Objectives:

- To review image processing techniques for computer vision.
- To understand shape and region analysis.
- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To understand motion analysis.
- To study some applications of computer vision algorithms

Course Outcomes:

CO1: Implement fundamental image processing techniques required for computer vision.
CO2: Perform shape analysis.
CO3: Apply Hough Transform for line, circle, and ellipse detections.
CO4: Apply 3D vision techniques.
CO5: Develop applications using computer vision techniques

SYLLABUS

UNIT - I:

IMAGE PROCESSING FOUNDATIONS

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology –texture.

UNIT - II: SHAPES AND REGIONS

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT – III: HOUGH TRANSFORM

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

UNIT - IV: 3D VISION AND MOTION

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion

.**UNIT - V: APPLICATIONS**

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

TEXT BOOKS:

1.D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.

2. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.
2. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.
3. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.
4. Simon J. D. Prince, ―Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.

B. TECH VII SEMESTER

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FUZZY SETS
20HS7T01 (OPEN ELECTIVE III)

COURSE OBJECTIVES:

1) Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
2) Explain different types operations performed on fuzzy sets.
3) Provide the knowledge of Arithmetic operations on fuzzy numbers.
4) Emphasis on different kinds of crisp and fuzzy relations
5) Enable students to know the validity of arguments by fuzzy logic.

COURSE OUTCOMES:

CO1: Understand basic knowledge of fuzzy sets and fuzzy logic.
CO2: Apply various kinds of operations on fuzzy sets.
CO3: Understand the concepts of fuzzy arithmetic to solve fuzzy equations.
CO4: Illustrate the properties of fuzzy sets to design modeling software system.
CO5: Apply fuzzy logic to solve the problems in neural networks.

SYLLABUS

UNIT-I

Fuzzy Sets(all theorems without proofs): Introduction, Crisp sets, Fuzzy sets: Basic types and basic concepts, additional properties of α-cuts, representations of Fuzzy sets, extension principle for Fuzzy sets.

UNIT-II

Operations on Fuzzy Sets(all theorems without proofs): Types of operations, Fuzzy complements, Fuzzy intersections: t-norms, Fuzzy unions: t-conorms, Combinations of operations, Aggregation operations.

UNIT-III

Fuzzy Arithmetic(all theorems without proofs): Fuzzy numbers, Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equations.

UNIT-IV

Fuzzy Relations(all theorems without proofs): Crisp versus Fuzzy relations, Projection and cylindrical extensions, Binary Fuzzy relations, Binary relations on a single set, Fuzzy equivalence relations, Fuzzy compatibility relations, Fuzzy ordering relations, Fuzzy morphisms.

UNIT-V

Fuzzy Logic(all theorems without proofs): Classical logic: an over view, multivalued logics, Fuzzy propositions, Fuzzy quantifiers, Linguistic hedges, Inference from conditional Fuzzy propositions, Inference from conditional and qualified propositions, Inference from quantified propositions.

TEXT BOOKS:

1. George J. Klir& Bo Yuan, Fuzzy Sets & Fuzzy Logic, Pearson Education, PHI, 1995.
2. H. J. Zimmermann, Fuzzy Set Theory and its Applications, 4th edition, Springer.

REFERENCES:

1. Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3rd edition, Wiley, 2010.
2. John Yen & Reza Langari, Fuzzy Logic, Pearson.

B. TECH VII SEMESTER

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20MB7T01 DIGITAL MEDIA MANAGEMENT (OPEN ELECTIVE III)

Course Objective

Digital marketing channels that can helps the students to understand the increased business visibility and brand awareness. Moreover, having a professional presence on social media helps them to reach a broader target audience to secure more leads and convert them into loyal customers.

SYLLABUS

Unit – I

Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

Unit – II

Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels. Marketing in the Digital Era Segmentation – Importance of Audience Segmentation, How different segments use Digital Media –

Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

Unit – III

Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Writing the Marketing Plan and Implementing the Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget.

Unit – IV

Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

Unit – V

Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention. Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

TEXT BOOKS

1 Richard Gay, Alan Charles worth and Rita Essen, Online Marketing, Oxford University Press, 2016.

REFERENCES

1. Dave Chaffey, Fiona Ellis-Chadwick, Richard Mayer, Kevin Johnston. Internet Marketing Strategy, Implementation and Practice,3rd Ed .Prentice Hall.

2. Rob Stokes e-Marketing: The essential guide to marketing in a digital world. 5th Ed. Quirk e-Marketing (Pty) Ltd.

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20MB7T02 ENTREPRENEURSHIP DEVELOPMENT (OPEN ELECTIVE III)

SYLLABUS

UNIT –I

Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

UNIT -II

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

UNIT -III

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

UNIT -IV

Project Planning and control: The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

UNIT -V

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

Text / Reference Books:

1. Forbat, John, “Entrepreneurship” New Age International.

2. Havinal, Veerbhadrappa, “Management and Entrepreneurship” New Age International

3. Joseph, L. Massod, “Essential of Management", Prentice Hall of India.

B. TECH VII SEMESTER

OEC	L	T	P	C
	3	0	0	3

20AD7T10 **DATA ANALYSIS AND VISUALIZATION WITH PYTHON (OPEN ELECTIVE III)**

Pre-requisite:

Course Objective: *This course* explains vital data science concepts and teaches you how to accomplish the fundamental tasks that occupy data scientists. You'll explore data visualization, graph databases, the use of NoSQL, and the data science process. You'll use the Python language and common Python libraries as you experience firsthand the challenges of dealing with data at scale.

Course Outcomes: At the end of the course, student will be able to

CO1: Describes benefits of data science, facets of data

CO2: Illustrates data science process and describes the need of machine learning

CO3: Describes the problems of handling large data

CO4: Introduces distributed data storage and processing frame works

CO5: Describes about graph databases and text analytics

SYLLABUS

Unit-1:

Preliminaries: What Kinds of Data?, Why Python for Data Analysis?, Python as Glue, Solving the "Two-Language" Problem, Why Not Python?, Essential Python Libraries, Installation and Setup.

Python Language Basics, IPython, and Jupyter Notebooks: The Python Interpreter, IPython Basics, Python Language Basics.

NumPy Basics: Arrays and Vectorized Computation:

The NumPy ndarray: A Multidimensional Array Object, Universal Functions: Fast Element-Wise Array Functions, Array-Oriented Programming with Arrays, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation.

Unit-2:

Introduction to pandas Data Structures: Series, DataFrame, Index Objects

Essential Functionality: Reindexing, Dropping Entries from an Axis, Indexing, Selection, and Filtering, Integer Indexes, Arithmetic and Data Alignment, Function Application and Mapping, Sorting and Ranking, Axis Indexes with Duplicate Labels, Summarizing and Computing Descriptive Statistics: Correlation and Covariance, Unique Values, Value Counts, and Membership.

Unit-3:

Data Loading, Storage, and File Formats Reading and Writing Data in Text Format: Reading Text Files in Pieces, Writing Data to Text Format, Working with Delimited Formats, JSON Data, XML and HTML: Web Scraping

Binary Data Formats: Using HDF5 Format, Reading Microsoft Excel Files

Data Cleaning and Preparation:

Handling Missing Data: Filtering Out Missing Data, Filling In Missing Data

Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Renaming Axis Indexes, Discretization and Binning, Detecting and Filtering Outliers, Permutation and Random Sampling, Computing Indicator/Dummy Variables

Unit-4:

Data Wrangling: Join, Combine, and Reshape:

Hierarchical Indexing: Reordering and Sorting Levels, Summary Statistics by Level, Indexing with a DataFrame's columns.

Combining and Merging Datasets: Database-Style DataFrame Joins, Merging on Index, Concatenating Along an Axis, Combining Data with Overlap.

Reshaping and Pivoting: Reshaping with Hierarchical Indexing, Pivoting "Long" to "Wide" Format, Pivoting "Wide" to "Long" Format.

Unit-5:

Plotting and Visualization

A Brief matplotlib API Primer: Figures and Subplots, Colors, Markers, and Line , Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File, matplotlib Configuration.

Plotting with pandas and seaborn: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots, Facet Grids and Categorical Data, Other Python Visualization Tools.

Text Book:

"Python for Data Analysis" Data Wrangling With Pandas, Numpy, And Ipython Second Edition by Wes McKinney, Oreilly Publications.

B. TECH VII SEMESTER

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OEC	3	0	0	3

20AM7T10 NoSQL DATABASES (OPEN ELECTIVE III)

Pre-requisite: Linear Algebra, Calculus, Python Programming

Course Objective: *This* ***course*** explains define, compare and use the four types of NoSQL Databases, demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases, explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases, ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

Course Outcomes: At the end of the course, student will be able to

CO1: Identify the type of NoSQL database to implement based on business requirements

CO2: Apply NoSQL data modeling from application specific queries

CO3: Understand NoSQL Storage Architecture

CO4: Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing

CO5: Apply indexing and ordering of data sets

SYLLABUS

Unit-1:

Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented

Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

Unit-2:

Interacting with NoSQL: If NoSql Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

Unit-3:

NoSQL Storage Architecture: Working With Column-Oriented Databases, Hbase Distributed Storage Architecture, Document Store Internals, Understanding Key/Value

Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

Unit-4:

NoSQL Stores: Similarities between Sql and Mongodb Query Features, Accessing Data

From Column-Oriented Databases like Hbase, Querying Redis Data Stores, Changing Document Databases, Schema Evolution in Column-Oriented Databases, Hbase Data Import And Export, Data Evolution In Key/Value Stores.

Unit-5:

Indexing and Ordering Data Sets: Essential Concepts behind a Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

Reference Books:

1) Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley Professional,2012.
2) Dan McCreary and Ann Kelly, Making Sense of NoSQL, Manning Publications,2013.
3) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011, ISBN:978-0-470-94224-6
4) Gaurav Vaish, Getting Started with NoSQL, Packt Publishing, 2013.

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20CE7T15 WASTE WATER TREATMENT
(OPEN ELECTIVE-IV)

Course Objectives: To study about waste water treatment

Course Outcomes: Able to provide waste management techniques

SYLLABUS

UNIT–I:

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and Cooling water treatment methods.

UNIT–II:

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems, Industrial waste water discharges into streams. Lakes and oceans- consequent problems.

UNIT–III:

Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries, Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods. Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

UNIT-IV:

Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

UNIT–V:

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

Text Books:

1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi.

Reference Books:

1. Liquid waste of Industry by Newmerow.
2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

B.TECH VII SEMESTER

	L	T	P	C
OEC	3	0	0	3

20CE7T16 REPAIR AND REHABILITATION OF CONCRETE STRUCTURES
(OPEN ELECTIVE-IV)

Course Objectives:

- Familiarize Students with deterioration of concrete in structures
- Equip student with concepts of NDT and evaluation
- To evaluate the performance of the materials for repair
- To strategize different repair and rehabilitation of structures.

Course Outcomes:

CO1: Explain deterioration of concrete in structures

CO2: Carryout analysis using NDT and evaluate structures

CO3: Students must gain knowledge on quality of concrete

CO4: Examine how the Concrete repair industry equipped with variety of repair Material s and techniques .

SYLLABUS

UNIT–I:

Maintenance and Repair Strategies Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT-II:

Causes of Damage To Structures Causes of Distress in Structures - Extrinsic and Intrinsic causes for damage of structures; Effect of Chemical and Marine Environment on structures.

UNIT-III:

Semi Destructive Tests for Damage Assessment Core Test, LOK test, CAPO test, Penetration Tests Non-Destructive Tests for Damage Assessment Rebound Hammer Test, Ultrasonic Pulse Velocity test, Resistivity Test, Carbonation Test, Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT-IV:

Materials for Repair: Criteria for durable concrete repair, selection of repair materials, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete, FRP sheets.

UNIT-V:

Techniques for Repair: Crack repair techniques – Crack Stitching, Mortar and dry pack, vacuum concrete, Shotcreting, Epoxy injection, Mortar repair for cracks Methods of Strengthening: Repairs to overcome low member strength – Jacketing, blanketing

Text Books:

1. 'Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina

Reference Books:

1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers
2. ShettyM.S., "Concrete Technology – Theory and Practice", S. Chand and Company, 2008.
3. Dov Kominetzky. M. S., "Design and Construction Failures", Galgotia Publications Pvt.Ltd., 2001
4. Ravishankar.K., Krishnamoorthy. T. S, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
5. CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008,
6. Gambhir. M. L., "Concrete Technology", McGraw Hill, 2013

B.TECH VII SEMESTER

	L	T	P	C
OEC	3	0	0	3

20EE7T15 POWER QUALITY
(OPEN ELECTIVE-IV)

Course Objective:

- To introduce the power quality problem
- To educate on production of voltages sags, over voltages and harmonics and methods of control.
- To study overvoltage problems
- To study the sources and effect of harmonics in power system
- To impart knowledge on various methods of power quality monitoring.

Course Outcome:

At the end of this course the student should be able to

CO1: Differentiate between different types of power quality problems.

CO2: Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.

CO3: Analyze power quality terms and power quality standards.

CO4: Explain the principle of voltage regulation and power factor improvement methods.

CO5: Explain the power quality monitoring concepts and the usage of measuring instruments.

SYLLABUS

Unit-I

Introduction to Power Quality: Terms and definitions of transients, Long Duration Voltage Variations: Under Voltage and Sustained Interruptions; Short Duration Voltage Variations: interruption, Sag, Swell; Voltage Imbalance; Notching DC offset; waveform distortion; voltage fluctuation; power frequency variations.

Unit-II

Voltage Sag: Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, and Active Series Compensator.

Unit-III

Electrical Transients: Sources of Transient Over voltages- Atmospheric and switching transients-motor starting transients, pf correction-capacitor switching transients, ups switching transients, neutral voltage swing etc; devices for over voltage protection.

Unit-IV

Harmonics: Causes of harmonics; current and voltage harmonics, measurement of harmonics, THD; effects of harmonics on – Transformers, AC Motors, Capacitor Banks, Cables, and Protection Devices, Energy Metering, Communication Lines etc. harmonic mitigation techniques.

Unit-V

Monitoring and Instrumentation: Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

Text Books:

1. Roger C Dugan, McGrahan, Santoso & Beaty, "Electrical Power System Quality" McGraw Hill
2. Arinthom Ghosh & Gerard Ledwich, "Power Quality Enhancement Using Custom Power Devices" Kluwer Academic Publishers
3. Sankaran, " Power Quality" CRC Press.

Reference Books:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
4. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis) Power Quality in Power systems and Electrical Machines–EwaldF.fuchs, Mohammad A.S. Masoum–Elsevier.

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20EE7T16 ELECTRIC VEHICLES

(OPEN ELECTIVE-IV)

Course Objective:

- To study the different drive train configurations of electric vehicles
- To propose the various propulsion and energy storage systems for EHVs
- To know the sizing of propulsion motors and other systems involved in EH vehicles
- To carry out different design case studies of EHv and BEVs

Course Outcomes: At the end of the course, the student will be able to:

CO1: Assess the performance, societal and environmental impact of EHVs having known their past history

CO2: Implement various drive train topologies and control strategies in Electric and Hybrid vehicles

CO3: Recommend, Design/Size and Control different electric propulsion units and other components of EHVs and BEVs

CO4: Appropriately select the energy storage system and strategize its management in EHVs

CO5: Define Ancillary Service Management and explain different ancillary services.

SYLLABUS

UNIT-I INTRODUCTION TO ELECTRIC VEHICLES:

History of electric vehicles (EV) and hybrid electric vehicle (EHV), need and importance of EV and HEV, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies, Power/energy supplies requirements for EV/HEV applications, vehicle power source characterization, and transmission characteristics.

UNIT-II HYBRID ELECTRIC DRIVE-TRAINS: Basic architecture and concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis

UNIT-III ELECTRIC PROPULSION UNIT:

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, and Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV BATTERY ENERGY STORAGE SYSTEMS:

Battery Basics - Lead-Acid Battery -Cell Discharge Operation - Cell Charge Operation-Construction-Battery Parameters - Battery Capacity-Discharge Rate - State of Charge- State of Discharge- Depth of Discharge-Technical Characteristics - Practical Capacity -Battery Energy -Constant Current Discharge -Specific Energy - Battery Power -Specific Power -Batteries for EV applications.

UNIT-V MODELLING OF EV/HEV:

Modelling and analysis of EV/HEV drive train sizing of motor, and design of traction power electronics, various vehicle subsystems.

TEXT BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2010.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press,2009.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

REFERENCES:

1. Jefferson, C.M., Barnard and R.H., Hybrid Vehicle Propulsion, WIT Press, Boston, 2002
2. Jack Erjavec and Jeff Arias, “Hybrid, Electric and Fuel Cell Vehicles”, Cengage Learning, 2012
3. SerefSoylu “Electric Vehicles - The Benefits and Barriers”, InTech Publishers, Croatia, 2011
4. Jack Erjavec and Jeff Arias, “Alternative Fuel Technology – Electric, Hybrid and Fuel Cell Vehicles”, Cengage Learning Pvt. Ltd., New Delhi, 2007
5. Seth Leitman, “Build Your Own Electric Vehicle” McGraw hill, New York, USA, 2013

B.TECH VII SEMESTER **OEC**

L	T	P	C
3	0	0	3

20ME7T12 **MICRO-ELECTRO- MECHANICAL SYSTEMS (OPEN ELECTIVE -IV)**

Pre-requisite: Calculus and Differential Eq., Fundamentals of Physics (Mechanics, Optics, Electricity and magnetism), Fundamentals of Inorganic Chemistry.

Course Objective: The main objective of this course is to introduce the integrative nature of Micro Electro Mechanical systems. To describe the different components and devices of Micro Electro Mechanical systems.

Course Outcomes: At the end of the course, student will be able to

CO1: Explain MEMS and Principles of sensing and actuation

CO2: Explain Thermal Sensors and Actuators & Magnetic Sensors and Actuators

CO3: Explain Micro-Opto-Electro Mechanical Systems

CO4: Explain Radio Frequency (RF) MEMS & Micro Fluidic Systems

CO5: Explain Chemical And Bio Medical Micro Systems

SYLLABUS

UNIT-I:

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT-II:

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, magnetic MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT-III: MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS:

Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

UNIT-IV:

RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectrophoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

UNIT-V: CHEMICAL AND BIO MEDICAL MICRO SYSTEMS:

Sensing mechanism & principle, membrane transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (Enose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

Text Books:

1. MEMS, NitaigourPremchandMahalik, TMH Publishing co.

References:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. Bio-MEMS (Micro systems), Gerald Urban, Springer.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.

B.TECH VII SEMESTER	**OEC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20ME7T13 **SOLAR ENERGY SYSTEMS (OPEN ELECTIVE -IV)**

Pre-requisite: Thermodynamics, Environmental Sciences

Course Objective: To impart knowledge on non-conventional sources of energy and techniques used in exploiting solar, wind, tidal and geothermal sources of energy and bio-fuels.

Course Outcomes: At the end of the course, student will be able to

CO1: Significance of renewable energy and describe the principles of solar radiation. Analyze various solar collectors.

CO2: Know the various storage methods and application of solar energy.

CO3: Understand the concept of converting wind energy into electrical energy using both horizontal and vertical axis wind machines.

CO4: Know biomass disasters, functional operation of geothermal systems. Generalize the operation of ocean, tidal and wave energy systems.

CO5: understand the operating principle of direct energy conversion systems .and to recognize the need and ability to engage in lifelong learning for further developments in this field.

SYLLABUS

UNIT-I: FUNDAMENTALS OF SOLAR RADIATION:

Energy conservation principle, Energy scenario (world and India), Solar angles, Solar time, Solar radiation: Outside earth's atmosphere, Earth surface, measurements of solar radiation: Pyrometer, Sunshine recorder, Pyro heliometer.

UNIT-II: ENERGY STORAGE SYSTEMS:

Energy –Environment-Economy Necessity of energy storage, Specifications of energy storage devices, energy storage Methods-Mechanical Energy Storage-Thermal Energy Storage-Sensible Heat Storage-Solid media storage.

UNIT-III: SOLAR COLLECTORS:

Classifications, comparison of concentrating and non-concentrating types – Liquid flat plate collectors, Evacuated tube collectors. Modified flat plate collectors: Compound parabolic concentrator(CPC), Cylindrical parabolic Concentrator, Fixed mirror solar concentrator, Paraboloid Dish Collector.

UNIT-IV: SOLAR THERMAL DEVICES:

Solar water heater, Solar space heating and cooling systems, Solar industrial heating systems, Solar refrigeration and air conditioning systems, Solar Desalination – Solar cooker: domestic, community – Solar pond – Solar drying.

UNIT-V: SOLAR PHOTOVOLTAIC SYSTEMS:

Solar cell fundamentals, Energy band model of semiconductors, Working Principle of photovoltaic cell, solar cell classification, solar cell technologies, solar PV systems-classification. Solar cell –module-array Construction.

Text Books:

1. Goswami D.Y., Kreider, J. F. and Francis., "Principles of Solar Engineering', Taylor and Francis, 2000.
2. Chetan Singh Solanki, "Solar Photovoltatics – Fundamentals, Technologies and Applications", PHI Learning Private limited, 2011.
3. Sukhatme S.P., Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
4. Solar Energy International, "Photovoltaic – Design and Installation Manual" – New Society Publishers, 2006.
5. Roger Messenger and Jerry Vnetre, "Photovoltaic Systems Engineering", CRC Press, 2010.

Reference Books:

1. B.H.Khan "Non – conventional Energy Resources" Tata McGraw Hill education Pvt. Ltd.
2. G.D. Rai, "Non-Conventional Energy Sources", Dhanpat Rai and Sons .

B. TECH VII SEMESTER

OEC	L	T	P	C
	3	0	0	3

INTRODUCTION TO EMBEDDED SYSTEMS

20EC7T13 (OPEN ELECTIVE –IV)

Course Objectives:

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

1. The basic concepts of an embedded system are introduced.
2. The various elements of embedded hardware and their design principles are explained
3. Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed
4. Embedded system implementation and testing tools are introduced and discussed.
   Technology capabilities and limitations of the hardware, software components
5. Design Methodologies

Course Outcomes:

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

CO1: Understand the basic concepts of an embedded system and able to know an embedded system design Approach to perform a specific function.

CO2: The various embedded firmware design approaches on embedded environment.

CO3: Identify the unique characteristics of real-time systems

CO4: Design, implement and test an embedded system.

CO5: Define the unique design problems and challenges of real-time systems

SYLLABUS

UNIT-I: Introduction to Embedded systems

What is an embedded system Vs. General Computing system, history, classification, major application areas, and purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded systems

UNIT-II: Embedded Hardware Design

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real-time clock, Application specific and Domain specific embedded systems-Examples

UNIT-III:

Embedded Firmware design approaches, Embedded Firmware Development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA,Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV:

Factors to be considered in selecting a controller, 8051 Architecture, RTOS and Scheduling Operating basics, types, RTOS, Tasks, Process and Threads, Multiprocessing and Multitasking, Types of multitasking, Non preemptive Scheduling, Preemptive Scheduling.

UNIT-V: Design and Development

Embedded system development Environment – IDE, Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry

Text books:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

2. Embedded Systems, Rajkamal, TMH, 2009.

References:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE

2. Embedded Systems: A Contemporary Design Tool Paperback by James K. Peckol

B. Tech VII Semester

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	OEC	3	0	0	3

20EC7T14 INTERNET OF THINGS (OPEN ELECTIVE –IV)

COURSE OBJECTIVES:
The main objectives of this course are given below:

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

1. To introduce the terminology, technology and its applications
2. To introduce the concept of M2M (machine to machine) with necessary protocols
3. To introduce the Python Scripting Language which is used in many IoT devices
4. To introduce the Raspberry PI platform, that is widely used in IoT applications
5. To introduce the implementation of web-based services on IoT devices

COURSE OUTCOMES:

At the end of this course the student will able to:

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

CO1: Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.

CO2: Understand IoT sensors and technological challenges faced by IoT devices, with a focus on Bwireless, energy, power, and sensing modules

CO3: Market forecast for IoT devices with a focus on sensors

CO4: Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

SYLLABUS

UNIT-I: Introduction to Internet of Things

Definition and Characteristics of IoT, Sensors, Actuators,
Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

UNIT-II: IoT and M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III: IoT Physical Devices and Endpoints

Introduction to Arduino and Raspberry Pi- Installation,
Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

UNIT-IV: Controlling Hardware-

Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors

Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor

UNIT-V: IoT Physical Servers and Cloud Offerings–

Introduction to Cloud Storage models and
communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

REFERENCE BOOKS:

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
2. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

B. TECH VII SEMESTER **OEC**

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20EC7T15 ANALOG AND DIGITAL IC APPLICATIONS (OPEN ELECTIVE –IV)

Course Objectives:

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

1. To understand the analysis & design of different types of active filters using op-amps
2. To learn the internal structure, operation and applications of different analog ICs
3. In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.
4. Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.
5. Understand the concepts of Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL

Course Outcomes:

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

CO1: Design circuits using operational Amplifier for various applications

CO2: Understand the concept of A/D & D/A Converters

CO3: Analyze and design amplifiers and active filters using Op-amp.

CO4: Understand the concepts of Combinational logic circuits in digital system

CO5: Understand the concepts of sequential logic circuits in digital system

SYLLABUS

UNIT-I: OPERATIONAL AMPLIFIER

The Ideal Operational Amplifier; Operational Amplifier Internal Circuit. Op-Amp parameters & Measurement, DC Characteristics, input & output off set voltages & currents, slew rate, CMRR, PSRR, drift, AC Characteristics and Compensation Techniques.

UNIT-II: OPERATIONAL AMPLIFIER APPLICATIONS

Basic Op-Amp Applications; Inverting and Non-inverting amplifier,. Integrator and differentiator, Difference amplifier, Instrumentation Amplifier; AC Amplifier; V to I and I to V Converters. Op-Amp Circuits using Diodes, Sample and Hold Circuit, Comparator, Regenerative Comparator (Schmitt Trigger).

D-A AND A-D CONVERTERS Introduction; Series Op-Amp Regulator; Basic DAC Techniques Weighted Resistor DAC,R-2R DAC ; AD Converters, Flash ADC and Successive approximation Converter.

UNIT-III: FILTERS USING OP-AMP & 555 TIMERS

Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters.

Description of Functional Diagram of 555 Timer; Monostable Operation; Astable Operation and its Applications and PLL, Applications PLL. VCO and its applications.

UNIT-IV: Digital Design Using HDL

Design flow, program structure, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

UNIT-V: Combinational And sequential Logic Design

Combinational Logic Design: Adders & Sub tractors, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder.

Sequential Logic Design: Flip-Flops, Counters, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Register. Linear feedback shift register and applications.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGrawHill,4th Edition,2005
2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.

REFERENCES:

1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.2004
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

B. TECH VII SEMESTER **OEC**

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20CS7T13 DATA ANALYTICS (OPEN ELECTIVE –IV)

Course Objectives:

1. To understand Data Analytics lifecycle and Business Challenges.
2. To understand Analytical Techniques
3. To understand various tools and technologies to handle big data

Course Outcomes:

CO1: Understand big data and data analytics life cycle.
CO2: Explore various supervised learning methods.
CO3: Explore various unsupervised learning methods.
CO4: Understand and apply ARIMA model on time series data.
CO5: Learn various technology and tools in big data analytics.

SYLLABUS

UNIT-I

Introduction to Big Data Analytics: Big Data Overview, State of the Practice in Analytics, Key Roles for the new big data Ecosystem, Examples of Big Data Analytics. Data Analytics Life Cycle: Data Analytics life cycle Overview, Discovery, Data Preparation, Model,Planning, Model Building, Communicate Results, Operationalize, Case Study.

UNIT-II

Supervised Learning: Decision Trees – Overview of Decision Trees, The General Algorithm, Decision Tree Algorithms, Evaluating a Decision Tree. Naive Bayes: Baye's Theorem, Naïve Baye's Classifier, Diagnostics of Classifiers.
Regression –Linear Regression, Logistic Regression.

UNIT-III

Unsupervised Learning: Association Rule Mining–Overview, Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules. Cluster Analysis – Overview of Clustering, k-means

UNIT IV

Time Series Analysis: Overview of Time Series Analysis, ARIMA Model
Text Analysis: Text Analysis Steps, Example, Collecting Raw Data, Representing Text, TFIDF, Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

UNIT-V

Technology and Tools: MapReduce and Hadoop- Analytics for Unstructured Data, The Hadoop Ecosystem In-DataBase Analytics: SQL Essentials, In-Database Text Analysis, Advanced SQL.

TEXT BOOKS:

1. David Dietrich, Barry Hiller, “Data Science and Big Data Analytics”, EMC education services, Wiley publications, 2012.

REFERENCE BOOKS:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with
advanced analytics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O“
Reilly, 2011.
3. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.

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20CS7T14 BLOCK CHAIN TECHNOLOGY (OPEN ELECTIVE –IV)

Course Objectives

By the end of the course, students will be able to

- Understand how major block chain systems work.
- To securely interact with them.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from block chain technology into their own projects.

Course Outcomes

CO 1: Understand the design principles of Bitcoin and Ethereum.

CO 2: Understand and apply Nakamoto consensus.

CO 3: Analyze the differences between proof-of-work and proof-of-stake consensus.

CO 4: Understand cryptocurrency

CO 5: Understand cryptocurrency Regulations

SYLLABUS

Unit I: Basics:

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. • Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

Unit II: Blockchain:

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

Unit III: Distributed Consensus:

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

Unit IV: Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

Unit V: Cryptocurrency Regulation:

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.

Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Text Book

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

B. TECH VII SEMESTER **OEC**

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20CS7T15 SOFTWARE PROJECT MANAGEMENT (OPEN ELECTIVE –IV)

Course Objectives:

At the end of the course, the student shall be able to:

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course Outcomes:

Upon the completion of the course students will be able to:-

CO1: Apply the process to be followed in the software development life-cycle models.

CO2: Apply the concepts of project management & planning.

CO3: Implement the project plans through managing people, communications and change

CO4: Conduct activities necessary to successfully complete and close the Software projects

CO5: Implement communication, modeling, and construction & deployment practices in software development.

SYLLABUS

UNIT I:

Conventional Software Management: The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT II:

The Old Way and The New: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of The Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT III:

Model Based Software Architectures: A Management perspective and technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.

UNIT IV:

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT V:

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education, 2005.
2. Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.

REFERENCES:

1. Software Project Management, Joel Henry, Pearson Education.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.
3. Effective Software Project Management, Robert K.Wysocki, Wiley,2006.

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20IT7T13 CLOUD COMPUTING (OPEN ELECTIVE –IV)

Course Objectives:

- Explain the technology and principles involved in building a cloud environment
- To implement Virtualization
- Understand various types of cloud and its services
- Contrast various programming models used in cloud computing

Course Outcomes:

CO1: Describe the principles of parallel and distributed computing and evaluation of cloud computing from existing technologies

CO2: Illustrate Virtualization for Data-Center Automation.

CO3: Explain and characterize different cloud deployment models and service models

CO4: Program data intensive parallel applications in cloud.

CO5: Understand commercial cloud computing technologies such as AWS, AZURE and AppEngine

SYLLABUS

UNIT-I: Introduction:

Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Microsoft Aneka.

UNIT-II: Virtualization:

Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples: Xen, VMware, Microsoft Hyper – V.

UNIT-III: Cloud Computing Architecture:

Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy.

UNIT-IV: Data Intensive Computing: Map-Reduce Programming:

What is Data-Intensive Computing? Characteristics, Challenges, Historical Perspective. Technologies for Data Intensive Computing: Storage Systems, Programming Platforms.

Cloud Applications: Scientific Applications, Healthcare: ECG Analysis in the Cloud, Social Networking, Media Applications, Multiplayer Online Gaming.

UNIT-V: Cloud Platform in Industry and Cloud Applications:

Cloud Platforms in Industry: Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google App Engine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

TEXTBOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud Computing McGraw Hill Education.

REFERENCES:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014
2. Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds. Cloud computing: Principles and paradigms. Vol. 87. John Wiley & Sons, 2010.
3. Hwang, Kai, Jack Dongarra, and Geoffrey C. Fox. Distributed and cloud computing: from parallel processing to the internet of things. Morgan Kaufmann, 2013.

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20IT7T14 **BUSINESS INTELLIGENCE (OPEN ELECTIVE –IV)**

Course Objectives:

- Introduce the concepts and components of Business Intelligence (BI)
- Evaluate the technologies that make up BI (data warehousing, OLAP)
- Identify the technological architecture that makes up BI systems

Course Outcomes:

CO1: Understand concepts and components of Business Intelligence.

CO2: Explain the complete life cycle of BI development.

CO3: Illustrate technology and processes associated with Business Intelligence framework.

CO4: Demonstrate a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal.

CO5: Ability to design expert system using AI tools.

SYLLABUS

UNIT-I:

Business intelligence: Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence

Decision support systems: Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system

UNIT-II:

Role of OLAP tools in the BI architecture, OLAP performance directly on operational databases, A peek into the OLAP operations on multidimensional data, Leveraging ERP data using analytics. **Getting started with business intelligence:** Using analytical information for decision support, Information sources before dawn of BI, Business intelligence (BI) defined, Evolution of BI and role of DSS, EIS, MIS and digital dashboards, Need for BI at virtually all levels, BI for past, present and future, The BI value chain, Introduction to business analytics.

UNIT-III:

BI Definitions and concepts: BI Component framework, Need of BI, BI Users, Business Intelligence applications, BI Roles and responsibilities, Best practices in BI/DW, The complete BI professional, Popular BI tools.

Basis of data integration: Need for data warehouse, Definition of data warehouse, data mart,OSS, Raiph Kimball's approach vs. W.H.Inmon's approach, Goals of a data warehouse, constituents of a data warehouse, Extract, transform, load, data Integration, Data integration technologies, Data quality, Data profiling.

UNIT-IV:

Business Intelligence Applications:

Marketing models: Relational marketing, Sales force management,

Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.

Data envelopment analysis: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices

UNIT-V:

Knowledge Management: Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management

Artificial Intelligence and Expert Systems:

Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems

TEXT BOOKS:

1. Fundamental of Business Intelligence" Grossmann W, Rinderle-Ma Springer, 2015
2. "Fundamentals of Business Analytics" – By R N Prasad and SeemaAcharya, Publishers: Wiley India.

REFERENCE BOOKS:

1. Larissa T Moss and Shaku Atre – Business Intelligence Roadmap : TheCompleteProject Lifecycle for Decision Support Applications, Addison WesleyInformation Technology
2. David Loshin - Business Intelligence: The Savvy Manager's Guide, Publisher: Morgan Kaufmann.

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20HS7T02 POLYMER CHEMISTRY (OPEN ELECTIVE –IV)

PREREQUISITES: Chemistry I and Chemistry II of AICTE syllabus

Course Outcomes

CO1: After studying this course, the learners are expected to: Relate polymer properties to their structure and conformation

CO2: Analyse different mechanisms of polymer formation and use this information in the synthesis of different polymers.

CO3: Distinguish between enthalpic and entropic contributions to polymerisation/crystallization.

CO4: Distinguish between absolute and relative methods for molecular weight determination.

CO5: Determine the flow properties of polymer melts and solutions.

CO6: Interpret experimental data and determine parameters such as polymerization ratesand copolymer composition.

CO7: Estimate the solubility of a given polymer in various solvents and blends.

CO8: Evaluate the effect of factors such as polymer structure, molecular weight, branching and diluents on crystallinity.

CO9: Assess the effect of synthetic polymers on the environment.

SYLLABUS

Unit 1. Definitions, origin, nomenclature, classification and types of macromolecules; molecular weight (MW) and its distribution; Determination of molecular weight – methods for measuring number average, weight average, viscosity average MW; gel permeation chromatography; spectroscopic techniques to determine chemical composition and molecular microstructure, thermal transitions; melting temperature and glass transition temperature. Colligative properties, osmotic pressure, light scattering, refractive index, viscosity, small angle X-ray scattering (6)

Unit 2tep-Growth Polymerization: Reactivity of functional groups; kinetics; molecular weight in open and closed system cyclization vs. linear polymerization, cross-linking and gel point; process condition; step-copolymerization, examples of step polymers (3)

Unit 3. Free radical Polymerization: Nature of chain polymerization and its comparison with step polymerization; radical vs. ionic polymerizations; structural arrangements of monomer units; kinetics of chain polymerization; molecular weight and its distribution; chaintransfer, inhibition, retardation, auto-acceleration; energetic characteristics; techniques of radical polymerization – bulk, solution, emulsion, suspension polymerization; examples of polymers made by radical chain polymerization (4)**.** Ionic Polymerization: Propagation and termination of cationic polymerization, anionic and ring opening polymerization, active polycarbanions (2)

Unit 4. Copolymerization: types of copolymers, copolymer compositions, reactivity ratio; radical and ionic co-polymerizations; Block and Graft copolymer synthesis, examples (2). Thermodynamics of polymer solutions; Flory-Huggins theory, theta conditions; solubility parameters; fractionation of macromolecules, osmotic pressure, lower criticalsolution temperature (3)

Unit 5. Naturally occurring polymers, biodegradability, biosynthesis, polymers frombio/renewable resources (2)

Polymers for Electronics: Polymer resists for integrated circuit fabrication, lithography and photolithography, Electron beam, X-ray and ion sensitive resists, Conducting polymers, types, properties and applications, electroluminescence, molecular basis of electrical conductivity, Photonic applications and non-linear optics, optical information storage (3)

Text Books:

1. NPTEL Polymer Chemistry Course, D. Dhara, IIT Kharagpur
2. Polymer chemistry and Physics of Modern Materials, 2nd edn, J. M. G. Cowie, Stanley Thornes, UK, 1998
3. Contemporary Polymer Chemistry, 3rd edn. H. R. Allcock, F. W. Lampe and J. E.Mark, Pearson
4. Polymers: Chemistry and Physics of Modern Materials, J.M.G. Cowie, CRC Press
5. Introduction to Physical Polymer Science, L. H. Sperling, Wiley
6. Introduction to Soft matter, I. W. Hamley, John Wiley and Sons, 2007
7. Polymer Chemistry, 2nd edn, P. C. Hiemenz and T. P. Lodge, CRC Press (2007)

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20MB7T03 TOTAL ENGINEERING QUALITY MANAGEMENT (OPEN ELECTIVE –IV)

Course Objective

To understand the Engineering and Management aspects of Planning, Designing, Controlling and Improving Quality in Manufactured products.

Course Outcome

1. To understand the fundamentals of quality
2. To understand the role of TQM tools and techniques in elimination of wastages and reduction of defects
3. To develop quality as a passion and habit
4. To Facilitate the understanding of Quality Management principles and process.
5. The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

SYLLABUS

UNIT I

Quality Gurus And TQM Kitemarks: Definition, Need & Evolution of TQM – Contributions of Quality Guru's – Edward Deming – Joseph Juran – Philip Crosby – Genichi Taguchi – Walter Shewart – Criteria for Deming's Prize.

UNIT II

Product Design & Analysis : Dimensions of product and service quality, Basic Design Concepts and TQM – Design Assurance – Design Validation –Failure Mode Effect Analysis – Fault Tree Analysis – Design for Robustness – Value Analysis.

UNIT III

Process Improvement & Modern Production Management Tools

Control Charts – Process Capability, -Bench Marking, Six Sigma Approach – Total Productive Maintenance – Just-In-Time – Lean Manufacturing Paradigms.

UNIT IV

Quality Improvement Tools & Continuous Improvement

Traditional Q-7Tools, New Q-7 Tools, Quality Function Deployment (QFD), Kaizen 5S, Poka-Yoke, Failure Mode and Effects Analysis(FMEA) – Stages, Types, Taguchi Quality Loss Function(QFD) – Total Productive Maintenance (TPM).

UNIT V

Quality Management Systems ISO 9000, ISO 9001: 2008, QS 9000, ISO 14000, TS16949:2002 and EMS14001 certifications of quality systems- Elements, Documentation, Quality Auditing — Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors.

TEXT BOOKS

1. Total Engineering Quality Management, Sunil Sharma, 1st Edition, MacMillan India Limited.
2. Total Quality Management, Poornima M. Charantimath, 2nd Edition, Pearson Education.
3. Dale H. Besterfiled, et at., “Total quality Management”, Pearson Education Asia, Third Edition, Indian Reprint 2006.

REFERENCES

1. “Quality and Performance Excellence”, James R Evans, Edition, 7th Edition, Cengage Learning.
2. “Quality Management”, Howard S Gitlow, Alan J Oppenheim, Rosa Oppenheim, David M Levine,3rd Edition , Tata McGraw Hill Limited.
3. “Fundamentals of Quality Control & Improvement”, Amitava Mitra, 3rd Edition, Wiley Publications, 2012.
4. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, 8th Edition, First Indian Edition, Cengage Learning, 2012.

B. TECH VII SEMESTER **OEC**

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20MB7T04 STRESS MANAGEMENT (OPEN ELECTIVE –IV)

OBJECTIVES

This course examines different sources from where individuals experience a stress response. Through diligent individual and group study, students will be able to learn to apply stress management principles in order to achieve high levels of performance and understand the role of relationships to the management of stress and health.

Course Outcomes

1. Understand the physiological systems that are affected by stressors and the long-term effects and illnesses that can result from stressors.
2. Understand the specific applications of stress as it relates to the workplace and different target groups.
3. Create effective stress management plans for individual clients and for workplace environments. Enhancing significance of training and development, performance evaluation

SYLLABUS

UNIT I: UNDERSTANDING STRESS

Meaning – Symptoms – Work Related Stress – Individual Stress – Reducing Stress - Sources of stress –Consequence of stress-Burnout-symptoms of Burnout- Stress vs Burnout-Model of stress-strategies for coping stress (individual and organizational strategies)

UNIT II: TIME MANAGEMENT

Techniques – Importance of Planning the day –developing concentration – Prioritizing, Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say "No."

UNIT III:CAREER PLATEAU

Career plateau – Identifying Career plateaus – Structural and Content - Plateauing – Making a fresh start – Importance of Sabbaticals – Counseling out – Executive leasing – Sustaining a marketable Career.

UNIT IV:CRISIS MANAGEMENT

Implications – People issues – Structure issues – Environmental issues –Learning to keep calm - Preventing interruptions – Controlling crisis – Pushing new ideas – Empowerment – Work place Humour, Developing a sense of Humour – Learning to laugh – Role of group cohesion and team spirit.

UNIT V: SELF DEVELOPMENT

Improving personality – Leading with Integrity – Enhancing Creativity – Effective Decision Making – Sensible Communication – The Listening Game – Managing Self – Mediation for peace – Yoga for Life

TEXT BOOKS

1. Bhatia R.L., The Executive Track: An Action Plan for Self Development Wheeler Publishing, New Delhi

2. Charavathy. S.K, “Human Values for Manager”, McGraw Hill/Henely Management Series

REFERENCES

1. Jeffr Davison, Managing Stress, Prentice Hall of India, New Delhi

2. Jerrold S Greenberg, Comprehensive Stress Management, Jain Books, 2009

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20AD7T13 NATURAL LANGUAGE PROCESSING (OPEN ELECTIVE –IV)

Pre-requisite: Nil

Course Educational Objective: The Objective of the course is to make learn the basic elements of C programming, control structures, derived data types, Modular programming, user defined structures, basics of files and its I/O operations.

Course Outcomes: At the end of this course, the student will be able to

CO1: Familiar with the basic components of NLP.

CO2: Applying N-gram models to predict a sequence of text.

CO3: Build a basic language understanding system using preliminary concepts of NLTK library.

CO4: Exposure on advanced techniques for understanding patterns in text

CO5: Understand the semantics of linguistic components in a natural dialogue

Syllabus

UNIT – I:

Introduction

Knowledge in Speech and Language Processing; Ambiguity; Models and Algorithms; Language, Thought and Understanding; History Regular Expressions Regular Expression; Words; Corpora; Text Normalization; Minimum Edit Distance

UNIT – II

N-gram Language Models

N-Grams; Evaluating Language Models, Generalization and Zeros, Smoothing: Laplace Smoothing; Add-k Smoothing; Backoff and Interpolation; Kneser-Ney Smoothing

UNIT – III

Natural language processing tools in Python (NLTK Package)

Part-I: Introduction to NLTK; Tokenizing; Filtering Stop words; Stemming; Tagging parts of speech; Lemmatizing; Chunking; Chinking

Part-II: Using Named Entity Recognition (NER); Getting Text to Analyze; Using a Concordance; Making a Dispersion Plot;

UNIT – IV

Information Extraction:

Relation Extraction Algorithms; Using Patterns to extract relations; Relation extraction via supervised learning; Semi supervised relation extraction via bootstrapping; Distant Supervision for Relation Extraction; Evaluation of Relation Extraction; Extracting Times; Extracting Events and their Times; Template Filling

UNIT – V

Word Senses and WordNet

• Defining Word Senses; How many senses do words have?

• Relations between senses

WordNet: Sense relations in WordNet; Word Sense Disambiguation; Alternate WSD algorithms and Tasks

Text Books:

1. Daniel Jurafsky, James H. Martin ,"Speech and Language Processing" , Third Edition, PHI, 2020.
2. https://realpython.com/nltk-nlp-python/#getting-text-to-analyze

Reference Books:

1. Natural Language Processing with Python: Analysing Text with the Natural Language Toolkit, Steven Bird, Ewan Klein, 2011
2. Applied Text Analysis with Python: Enabling Language-Aware Data Products with Machine Learning, Benjamin Bengfort, Rebecca Bilbro, 2018
3. Speech and Language Processing, 2nd Edition, Daniel Jurafsky, James H. Martin, 2009

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20AM7T13 DEEP LEARNING (OPEN ELECTIVE –IV)

Pre-requisite: Linear Algebra, Calculus, Python Programming

Course Objective: *This **course*** explains understanding basics of deep neural networks, CNN architectures of deep neural networks, concepts of Artificial Neural Networks, basics of Data science in Deep learning, applications of deep learning in AI and Data Science

Course Outcomes: At the end of the course, student will be able to

CO1: Explain the basics in deep neural networks

CO2: Apply Convolution Neural Network for image processing

CO3: Explain the basics of Artificial Intelligence using deep learning

CO4: Apply deep learning algorithms for data science

CO5: Apply deep learning algorithms for variety applications

SYLLABUS

Unit-1:

DEEP NETWORKS BASICS

Linear Algebra: Scalars -- Vectors -- Matrices and tensors; Probability Distributions -- Gradient-based Optimization – Machine Learning Basics: Capacity – Over fitting and under fitting – Hyper parameters and validation sets -- Estimators -- Bias and variance -- Stochastic gradient descent -- Challenges motivating deep learning; Deep Networks: Deep feed forward networks; Regularization -- Optimization .

Unit-2:

CONVOLUTIONAL NEURAL NETWORKS

Convolution Operation -- Sparse Interactions -- Parameter Sharing -- Equivariance -- Pooling -- Convolution Variants: Strided -- Tiled -- Transposed and dilated convolutions; CNN Learning: Nonlinearity Functions -- Loss Functions -- Regularization -- Optimizers -- Gradient Computation.

Unit-3:

DEEP LEARNING ALGORITHMS FOR AI

Artificial Neural Networks – Linear Associative Networks – Perceptrons -The Back propagation Algorithm - Hopfield Nets - Boltzmann Machines - Deep RBMs - Variational Auto encoders - Deep Backprop Networks- Auto encoders

Unit-4:

DATA SCIENCE AND DEEP LEARNING

Data science fundamentals and responsibilities of a data scientist - life cycle of data science – Data science tools - Data modeling, and featurization - How to work with data variables and data science tools - How to visualize the data - How to work with machine learning algorithms and Artificial Neural Networks

Unit-5:

APPLICATIONS OF DEEP LEARNING

Detection in chest X-ray images -object detection and classification -RGB and depth image fusion -NLP tasks - dimensionality estimation - time series forecasting - building electric power grid for controllable energy resources - guiding charities in maximizing donations and robotic control in industrial environments.

Text Books:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, ``Deep Learning'', MIT Press, 2016

2. Stone, James. (2019). Artificial Intelligence Engines: A Tutorial Introduction to the Mathematics of Deep Learning, Sebtel Press, United States, 2019

3. Vance, William, Data Science: A Comprehensive Beginners Guide to Learn the Realms of Data Science (Hardcover - 2020), Joiningthedotstv Limited

4. Wani, M.A., Raj, B., Luo, F., Dou, D. (Eds.), Deep Learning Applications, Volume 3,Springer Publications 2022

5. Charu C. Aggarwal, ``Neural Networks and Deep Learning: A Textbook'', Springer International Publishing, 2018.

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B. TECH HONORS	**HN**	**4**	**0**	**0**	**4**

20ECHN01 **MICRO ELECTRONIC DEVICES (Honors Engineering Course)**

Course Objectives:

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

1 Explain and apply basic concepts of semiconductor physics relevant to devices.

2 Describe, explain, and analyze the operation of important semiconductor devices in terms of their physical structure.

3 Explain, describe, and use physics-based device and circuit models for semiconductor devices of varying levels of complexity, select models appropriate to a specific need, and apply those models to analyze multi-component circuits.

4 Analyze and design microelectronic circuits for linear amplifier and digital applications.

5 Confront integrated device and/or circuit design problems, identify the design issues, and develop solutions.

COURSE OUTCOMES:

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

CO1: Explain and apply the semiconductor concepts of drift, diffusion, donors and acceptors, majority and minority carriers, excess carriers, low level injection, minority carrier lifetime, quasi-neutrality, and quasi-statics

CO2: Explain the underlying physics and principles of operation of p-n junction diodes, Metal oxide-semiconductor (MOS) capacitors, bipolar junction transistors (BJTs),and MOS field effect transistors (MOSFETs), and describe and apply simple large signal circuit models for these devices which include charge storage elements.

CO3: Create an incremental (small signal) linear equivalent circuit (LEC) model for a multi terminal non-linear electronic device knowing its large signal characteristics, and understand and apply standard LEC models for p-n diodes, BJTs, and MOSFETs, including capacitances.

CO4: Explain how devices and integrated circuits are fabricated and describe discuss modern trends in the microelectronics industry.

SYLLABUS

UNIT-I: IC FABRICATION TECHNOLOGY

Material properties; crystal growth and doping; diffusion; oxidation; epitaxial; ion implantation; deposition of films using CVD, LPCVD and sputtering techniques; wet and dry etching and cleaning; lithographic process; device and circuit fabrication; process modeling and simulation.

UNIT-II: VLSI DESIGN

Introduction to NMOS and CMOS circuits; NMOS and CMOS processing technology; CMOS circuits and logic design; circuit characterization and performance estimation; structured design and testing; symbolic layout systems; CMOS subsystem design; system case studies.

UNIT-III: PHYSICS AND MODELLING OF MICROELECTRONIC DEVICES

Physics and properties of semiconductor - a review; PN junction diode; bipolar transistor; metal semiconductor contacts; JFET and MESFET; MOSFET and scaling; CCD and photonic devices.

UNIT-IV: ANALOG IC DESIGN

Basic concepts; BICMOS process and technology; current and voltage sources; differential and operational amplifiers; multipliers and modulators; phase-lock techniques; D-to-A and A- to-D converters; micro power circuits; high voltage circuits; radiation resistant circuits; filter design considerations.

UNIT-V: VLSI ARCHITECTURES

Overview of CISC processor architectures; Instruction set architecture of CISC processor; hardware flow-charting methods; implementing microprocessor logic from hard-ware flowcharts; RISC instruction set architecture; Pipelined execution of RISC instructions; pipeline execution unit design; control hazards; design of memory hierarchy.

Text Books:

1. Howe, R. T., and C. G. Sodini, Microelectronics: An Integrated Approach, Upper Saddle River, NJ: Prentice Hall, 1996.

2. Behzad Razavi, RF Microelectronics, Pearson Education.

Reference Books:

1. Fonstad, C. G. Microelectronic Devices and Circuits. New York, NY: McGraw-Hill, 1994.

2. Sedra, A. S., and K. C. Smith. Microelectronic Circuits, 4th edition.

B. TECH HONORS	**HN**	**L**	**T**	**P**	**C**
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20ECHN02 WIRELESS SENSOR NETWORKS (Honors Engineering Course)

Course Outcomes:

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

1. To know the basic concepts of Sensor Networks
2. To understand the concept of Deployment and Configuration
3. To know Routing protocols
4. To understand the concept of Transport Layer And Security Protocols
5. To know Data storage & Manipulations

SYLLABUS

UNIT-I: INTRODUCTION

Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Mobile Adhoc NETworks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks ,Sensor Node Hardware and Network Architecture: Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC, Network architecture, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts.

UNIT-II: DEPLOYMENT AND CONFIGURATION

Localization and positioning, Coverage and connectivity, Single-hop and multi hop localization, self-configuring localization systems, sensor management Network Protocols: Issues in designing MAC protocol for WSNs, Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and Zig Bee, Dissemination protocol for large sensor network.

UNIT-III: ROUTING PROTOCOLS

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with

Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing

UNIT-IV: TRANSPORT LAYER AND SECURITY PROTOCOLS

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

UNIT-V: DATA STORAGE AND MANIPULATION

Data centric and content based routing, storage and retrieval in network, compression technologies for WSN, Data aggregation technique. Applications: Detecting unauthorized activity using a sensor network, WSN for Habitat Monitoring.

Text Books:

1. Holger Kerl, Andreas Willig, ―Protocols and Architectures for Wireless Sensor Network‖, John Wiley and Sons, 2005 (ISBN: 978-0-470-09511-9)
2. Raghavendra, Cauligi S, Sivalingam, Krishna M., ZantiTaieb, ―Wireless Sensor Network‖, Springer 1st Ed. 2004 (ISBN: 978-4020-7883-5).

Reference Books:

1. Kazem, Sohraby, Daniel Minoli, TaiebZanti, ―Wireless Sensor Network: Technology, Protocols and Application‖, John Wiley and Sons 1st Ed., 2007(ISBN: 978-0-471-74300-2).
2. B. Krishnamachari, ―Networking Wireless Sensors‖, Cambridge University Press.

B. TECH HONORS	**HN**	**L**	**T**	**P**	**C**
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20ECHN03 CMOS DIGITAL IC APPLICATIONS (Honors Engineering Course)

Course Outcomes:

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

CO1: To know the basic concepts of MOS Design

CO2: To understand the concept of Combinational MOS Logic Circuits

CO3: To understand the concept of Sequential MOS Logic Circuits

CO4: To understand the concept of Dynamic Logic Circuits:

CO5: To know Semiconductor Memories

SYLLABUS

UNIT-I: MOS Design

Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II: Combinational MOS Logic Circuits

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III: Sequential MOS Logic Circuits

Behavior of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch, and edge triggered flip-flop.

UNIT-IV: Dynamic Logic Circuits:

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

TEXT BOOKS:

1. Ken Martin, "Digital Integrated Circuit Design", Oxford University Press, 2011.
2. Sung-Mo Kang, Yusuf Leblebici, "CMOS Digital Integrated Circuits Analysis and Design", TMH, 3rd Edition, 2011.

REFERENCE BOOKS:

1. Ming-BO Lin, "Introduction to VLSI Systems: A Logic, Circuit and System Perspective", CRC Press, 2011
2. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, "Digital Integrated Circuits – A Design Perspective", 2nd Edition, PHI.

B. TECH HONORS	HN	L	T	P	C
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20ECHN04 IMAGE AND VIDEO PROCESSING (Honors Engineering Course)

Course objectives:

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

1. To Analyse how the Transformation Techniques used in Image processing.
2. To Understand the different Enhancement Methods to improve Image Quality and Perception.
3. To Obtain Compression standards and Application of techniques.
4. To Define Video formation and processing of Video.
5. To Describe the estimation of Motion with different processing steps.

Course Outcomes:

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

CO1: Identify transformations on image for specific purpose.

CO2: Develop various Enhancement methods for better perception by human or machine.

CO3: Understand various Compression approaches.

CO4: Analyse Video formation and methods to process video.

CO5: Define Different Motion estimation approaches and Different Resolutions in video considerations.

SYLLABUS

UNIT-I: Fundamentals of Image processing and Image Transforms:

Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms.

UNIT-II: Image Processing Techniques

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering Image Segmentation: Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation

UNIT-III: Image Compression

Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models: Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards

UNIT-IV: Basic Steps of Video Processing

Analog video, Digital Video, Time varying Image Formation models: 3D motion models, Geometric Image formation, Photometric Image formation, sampling of video signals, filtering operations

UNIT-V: 2-D Motion Estimation

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TEXT BOOKS:

1. Gonzaleze and Woods , "Digital Image Processing", 3rd edition , Pearson education publications.

2. Yao wang, Joem Ostarmann and Ya – quin Zhang, "Video processing and communication" ,1st ed , PHI

REFERENCE TEXT BOOK:

1. M. Tekalp "Digital video Processing", Prentice Hall International, 2011.

B. TECH HONORS	**HN**	**L**	**T**	**P**	**C**
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20ECHN05 ANALOG VLSI DESIGN (Honors Engineering Course)

Course Outcomes:

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

CO1: Understand the concept of Single stage Amplifier

CO2: Know the concept of Differential Amplifier

CO3: Able to analyze the frequency response of CS Stage

CO4: Understand the concept of Operational Amplifier

CO5: Understand the concept of PLL

SYLLABUS

UNIT-I: Single stage Amplifier

General considerations, MOS I/V Characteristics, second order effects, MOS device models.

Single stage Amplifier: CS stage with resistance load, divide connected load, current source load, triode load, CS stage with source degeneration, source follower, common-gate stage, cascade stage, choice of device models.

UNIT-II: Differential Amplifiers

Basic difference pair, common mode response, Differential pair with MOS loads, Gilbert cell.

Passive and active Current mirrors: Basic current mirrors, Cascade mirrors, active current mirrors.

UNIT-III: Frequency response of CS stage

source follower, Common gate stage, Cascade stage and Difference pair. Noise in CS stage, C- G stage, source follower, cascade stage, differential pair.

UNIT-IV: Operational Amplifiers

One Stage OP-Amp. Two Stage OP-Amp, Gain boosting, Coommon Mode Feedback, Slew rate, PSRR. Compenastion of 2stage OP-Amp, Other compensation techniques.

Oscillators: Ring Oscillators, LC Oscillators, VCO, Mathematical Model of VCO.

UNIT-V: PLL

Simple PLL, Charge pump PLL, Non-ideal effects in PLL, Delay locked loops and applications. **Band gap References** and Switched capacitor filters.

Text Books:

1. “Analog Integrated Circuit Design”, David. A. Johns and Ken Martin, John Wiley and Sons, 2001.
2. “Design of Analog CMOS Integrated Circuit”, Behzad Razavi, Tata McGraw HILL, 2002.

References:

1. “Analog VLSI – Signal Information and Processing”, Mohammed Ismail &Feiz , John Wiley and Sons.
2. “CMOS Analog Circuit Design”, Philip Allen & Douglas Holberg, Oxford University Press, 2002.

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B. TECH HONORS	**HN**	**4**	**0**	**0**	**4**

20ECHN06 SPREAD SPECTRUM COMMUNICATIONS (Honors Engineering Course)

Course Objectives:

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

1. Understand the concept of Spread Spectrum and study various types of Spread spectrum sequences and their generation.
2. Understand various Code tracing loops for optimum tracking of wideband signals via spread spectrum signals.
3. Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal.
4. Understand the principles of Code Division Multiple Access (CDMA) and use of Spread spectrum concept in CDMA.
5. Understand the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction.

Course Outcomes:

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

CO1: Generate various types of Spread spectrum sequences and can simulate CDMA system.

CO2: Understand various Code tracing loops for optimum tracking of wideband signals via spread spectrum signals.

CO3: Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal

CO4: Can provide detection and cancellation schemes for Multiuser in CDMA cellular radio.

CO5: Analyze the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction

SYLLABUS

UNIT-I:

Introduction to Spread Spectrum Systems

Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum, Code Division Multiple Access. Binary Shift Register Sequences for Spread Spectrum Systems: Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes.

UNIT-II:

Code Tracking Loops

Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non- Coherent Tracking Loop, Double Dither Non Coherent Tracking Loop.

UNIT-III:

Initial Synchronization of the Receiver Spreading Code

Introduction, Problem Definition and the Optimum Synchronizer, Serial Search Synchronization Techniques, Synchronization using a Matched Filter, Synchronization by Estimated the Received Spreading Code.

UNIT-IV:

Cellular Code Division Multiple Access (CDMA) Principles

Introduction, Wide Band Mobile Channel, the Cellular CDMA System, Single User Receiver in a Multi User Channel, CDMA System Capacity. Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

UNIT-V:

Performance of Spread Spectrum Systems in Jamming Environments

Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding. Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

TEXT BOOKS:

1. Rodger E Ziemer, Roger L. Peterson and David E Borth - ―Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.

2. Mosa Ali Abu-Rgheff – ―Introduction to CDMA Wireless Communications.‖ Elsevier Publications, 2008.

REFERENCE BOOKS:

1. George R. Cooper, Clare D. Mc Gillem - ―Modern Communication and Spread Spectrum,‖ McGraw Hill, 1986.
2. Andrew j. Viterbi - ―CDMA: Principles of spread spectrum communication, ‖ Pearson Education, 1st Edition, 1995

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20ECHN07 ADVANCED DIGITAL SIGNAL PROCESSING (Honors Engineering Course)

Pre-requisite: Basic knowledge about transformation techniques, random variables differentiation and integration

Course Objectives:

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

1. To learn and understand the concepts of stationary and non-stationary random signals and analysis & characterization of discrete-time random processes
2. To enunciate the significance of estimation of power spectral density of random processes
3. To introduce the principles of optimum filters such as Wiener and Kalman filters
4. To introduce the principles of adaptive filters and their applications to communication engineering
5. To introduce the concepts of multi-resolution analysis

Course Outcomes:

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

CO1: Articulate and apply the concepts of special random processes in practical applications

CO2: Choose appropriate spectrum estimation techniques for a given random process

CO3: Apply optimum filters appropriately for a given communication application

CO4: Apply appropriate adaptive algorithm for processing non-stationary signals

CO5: Apply and analyse wavelet transforms for signal and image processing based applications

SYLLABUS

UNIT-I: DISCRETE-TIME RANDOM PROCESSES

Random variables - ensemble averages a review, random processes - ensemble averages, autocorrelation and autocovariance matrices, ergodic random process, white noise, filtering random processes, spectral factorization, special types of random processes - AR, MA, ARMA

UNIT-II: SPECTRUM ESTIMATION

Bias and consistency, Non-parametric methods - Periodogram, modified-Periodogram - performance analysis. Bartlett's method, Welch's method, Blackman-Tukey method. Performance comparison. Parametric methods - autoregressive (AR) spectrum estimation - autocorrelation method, Prony's method, solution using Levinson Durbin recursion.

UNIT-III: OPTIMUM FILTERS

Wiener filters - FIR Wiener filter - discrete Wiener Hopf equation, Applications - filtering, linear prediction. IIR Wiener filter - causal and non-causal filters. Recursive estimators - discrete Kalman filter.

UNIT-IV: ADAPTIVE FILTERS

Principles and properties of adaptive filters - FIR adaptive filters. Adaptive algorithms - steepest descent algorithm, the LMS algorithm - convergence. Applications of adaptive filtering - noise cancellation, channel equalization.

Unit-V MULTIRESOLUTION ANALYSIS

Short-time Fourier transform - Heisenberg uncertainty principle. Principles of multi-resolution analysis - sub-band coding, the continuous and discrete wavelet transform - properties. Applications of wavelet transform - noise reduction, image compression.

Text Books:

1.Monson H. Hayes, "Statistical digital signal processing and modeling", John Wiley and Sons Inc. New York, Indian reprint

2.P. P. Vaidyanathan, "Multirate systems and filter banks", Prentice Hall Inc. 1993

Reference Books:

1. .John G. Proakis & Dimitris G.Manolakis, ―Digital Signal Processing – Principles, Algorithms & Applications‖, Fourth Edition, Pearson Education/ Prentice Hall, 2007.
2. Sophoncles J. Orfanidis, "Optimum signal processing", McGraw Hill, 2000

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20ECHN08 OPTICAL NETWORKS
(Honors Engineering Course)

Course Objective:

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

1. To impart knowledge on
2. To be well-versed in functionalities of various optical components and networking architectures like SONET /SDH used in Optical Networking
3. To be prepared for cost effective laying Access Networks like Fiber to the Home in India.
4. To Understand Wavelength routing and networking.
5. To Understand Packet switching and Access networks

Course Outcome:

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

CO1: Apply knowledge of basic optical components for realizing any optical function

CO2: Identify and formulate different networking Topologies.

CO3: Design Optical Network Routing Algorithms.

CO4: Apply the basic Networking knowledge to realize any sort of end to end communication and Analyze the Time division multiplexing in optical domain

CO5: Manage the optical networks in its configuration, fault and performance

SYLLABUS

UNIT-I: OPTICAL SYSTEM COMPONENTS

Light propagation in optical fibers – Loss & bandwidth, Dispersion effects, Non-Linear effects; Solitons- Optical Network Components – Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Switches, Wavelength Converters

UNIT-II: OPTICAL NETWORK ARCHITECTURES

Introduction to Optical Networks: SONET / SDH standards, Metro politon Area Networks, Layered Architecture- Broadcast and Select Networks– Topologies for Broadcast Networks, Media Access Control Protocols, Test beds for WDM; Outline of Wavelength Routing Architecture.

UNIT-III: WAVELENGTH ROUTING NETWORKS

Optical layer, Node Designs, Routing and Wavelength Assignment, Virtual topology design problem, Regular virtual topology design- Predetermined Virtual topology and Light path routes-Architectural variations.

UNIT-IV: PACKET SWITCHING AND ACCESS NETWORKS

Photonic Packet Switching – OTDM, Multiplexing and De multiplexing, Synchronisation, Broadcast OTDM networks, Switch-based networks- Access Networks – Network Architecture overview, OTDM networks- Optical Access Network Architectures- Future Access Networks, FTTH Scenario in India and Foreign Countries.

Unit-V NETWORK DESIGN AND MANAGEMENT

Transmission System Engineering – System model, Power penalty - transmitter, receiver, Optical amplifiers, crosstalk, dispersion- Wavelength stabilization ; Overall design considerations- Control and Management – Network management functions, Configuration management, Performance management, Fault management, Optical safety.

Text Books:

1. Rajiv Ramaswami, Kumar N. Sivarajan and Galen H. Sasaki "Optical Networks: A Practical Perspective", Harcourt Asia Pvt. Ltd., Third Edition 2010.

2. Mohammad Ilyas, Hussein T. Mouftah, "Handbook of Optical Communication Networks", Taylor and Francis, First edition, 2007.

Reference Books:

1. Biswanath Mukherjee, "Optical Communication Networks", McGrawHill Revised Edition 2006.
2. C.Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks :Concept, Design and Algorithms",Prentice Hall of India, First Edition, 2002.

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B. TECH HONORS	**HN**	**4**	**0**	**0**	**4**

20ECHN09 VLSI SIGNAL PROCESSING
(Honors Engineering Course)

Course Objective:

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

1. Introduce students to the fundamentals of VLSI signal processing and expose them to examples of applications.
2. Design and optimize VLSI architectures for basic DSP algorithms.
3. Design and optimize VLSI architectures for basic DSP algorithms.
4. Introduce students to the fundamentals of VLSI signal processing and expose them to examples of applications.

Course Outcomes:

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

CO1: Ability to modify the existing or new DSP architectures suitable for VLSI.
CO2: Understand the concepts of folding and unfolding algorithms and applications.
CO3: Ability to implement fast convolution algorithms.
CO4: Low power design aspects of processors for signal processing and wireless applications.
CO5: Ability to implement Digital filter structures.

SYLLABUS

UNIT-I: Introduction to DSP

Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms Pipelining and Parallel Processing Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power Retiming Introduction, Definitions and Properties, Solving System of Inequalities, Retiming Techniques

UNIT-II: Folding and Unfolding

Folding- Introduction, Folding Transform, Register minimization Techniques, Register minimization in folded architectures, folding of Multirate systems Unfolding- Introduction, An Algorithm for Unfolding, Properties of Unfolding, critical Path, Unfolding and Retiming, Applications of Unfolding

UNIT-III: Systolic Architecture Design

Introduction, Systolic Array Design Methodology, FIR Systolic Arrays, Selection of Scheduling Vector, Matrix Multiplication, and 2D Systolic Array Design, Systolic Design for Space Representations contain Delays.

UNIT-IV: PACKET SWITCHING AND ACCESS NETWORKS

Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

Unit-V Fast Convolution: Introduction

Digital lattice filter structures, bit level arithmetic, architecture, redundant arithmetic. Numerical strength reduction, synchronous, wave and asynchronous pipe lines, low power design.

Low Power Design: Scaling Vs Power Consumption, Power Analysis, Power Reduction techniques, Power Estimation Approaches

Text Books:

1. Keshab K. Parthi[A1] , VLSI Digital signal processing systems, design and implementation[A2] , Wiley, Inter Science, 1999.

2. Mohammad Isamail and Terri Fiez, Analog VLSI signal and information processing, McGraw Hill, 1994

Reference Books:

1. S.Y. Kung, H.J. White House, T. Kailath, VLSI and Modern Signal Processing, Prentice Hall, 1985.
2. Jose E. France, Yannis T sividls, Design of Analog Digital VLSI Circuits for Telecommunications and Signal Processing’ Prentice Hall, 1994.

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20ECHN10 WIRELESS COMMUNICATIONS (Honors Engineering Course)

Course Objectives:

S.No.	At the end of the course, student will be able to
1.	To study the characteristic of wireless channel
2.	To understand the design of a cellular system
3.	To study the various digital signalling techniques and multipath mitigation techniques
4.	To understand the concepts of multiple antenna techniques

Course Outcomes:

S.No.	At the end of the course, student will be able to
CO1:	Characterize a wireless channel and evolve the system design specifications
CO2:	Design a cellular system based on resource availability and traffic demands
CO3:	Identify suitable signalling and multipath mitigation techniques for the wireless channel and system under consideration.
CO4:	Understand The Concept Of Multipath Mitigation Techniques
Co5:	Understand The Concept Of Multiple Antenna Techniques

SYLLABUS

UNIT-I: WIRELESS CHANNELS

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – fading due to Multipath time delay spread – flat fading – frequency selective fading ,fast fading – slow fading.

UNIT-II: CELLULAR ARCHITECTURE

Multiple Access techniques – FDMA, TDMA, CDMA – Capacity calculations– Cellular concept- Frequency reuse – channel assignment- hand off- interference & system capacity, Coverage and capacity improvement.

UNIT-III: DIGITAL SIGNALING FOR FADING CHANNELS

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels

UNIT-IV: MULTIPATH MITIGATION TECHNIQUES

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception.

Unit-V MULTIPLE ANTENNA TECHNIQUES

MIMO systems – spatial multiplexing -System model -Pre-coding – Beam forming – transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TEXT BOOKS:

1. Rappaport,T.S., ―Wireless communications‖, Pearson Education, Second Edition, 2010.(UNIT I, II, IV)
2. Andreas.F. Molisch, ―Wireless Communications‖, John Wiley – India, 2006. (UNIT III,V)

REFERENCES:

1. Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011
2. Van Nee, R. and Ramji Prasad, ―OFDM for wireless multimedia communications, Artech House, 2000

B. TECH HONORS	HN	L	T	P	C
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20ECHN11 ADAPTIVE SIGNAL PROCESSING
(Honors Engineering Course)

Course Objectives:

S.No.	At the end of the course, student will be able to
1.	To Analyse Statistical information of Random signals.
2.	To understand the different Estimations of Adaptive signals.
3.	To Design Adaptive filters.
4.	To Define Optimum filters for Non stationary information.

Course Outcomes:

	At the end of the course, student will be able to
CO1:	Determine different Statistics of Random information.
CO2:	Develop Estimation parameters of adaptive data.
CO3:	Understand various adaptive filtering approaches.
CO4:	Analyse Optimization Process.
CO5:	Design Kalman filters for Random Process

SYLLABUS

UNIT-I: Review of random variables

Distribution and density functions, moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Schwarz Inequality Orthogonality principle in estimation, Central Limit theorem, Random processes, wide-sense stationary processes, autocorrelation and auto covariance functions, Spectral representation of random signals, Wiener Khinchin theorem Properties of power spectral density, Gaussian Process and White noise process. Random signal modeling: MA(q), AR(p) , ARMA(p, q) models.

UNIT-II: Parameter Estimation

Theory Principle of estimation and applications, Properties of estimates, unbiased and consistent estimators, Minimum Variance Unbiased Estimates (MVUE), Cramer Rao bound, Efficient estimators; Criteria of estimation: the methods of maximum likelihood and its properties ; Bayesian estimation : Mean square error and MMSE, Mean Absolute error, Hit and Miss cost function and MAP estimation.

UNIT-III: Estimation of signal in presence of white Gaussian Noise

Linear Minimum Mean-Square Error (LMMSE) Filtering: Wiener Hoff Equation, FIR Wiener filter, Causal IIR Wiener filter, Noncausal IIR Wiener filter, Linear Prediction of Signals, Forward and Backward Predictions, Levinson Durbin Algorithm, Lattice filter realization of prediction error filters.

UNIT-IV: Adaptive Filtering

Principle and Application, Steepest Descent Algorithm Convergence characteristics; LMS algorithm, convergence, excess mean square error, Leaky LMS algorithm; Application of Adaptive filters ;RLS algorithm, derivation, Matrix inversion Lemma, Intialization, tracking of nonstationarity.

Unit-V Kalman filtering

State-space model and the optimal state estimation problem, discrete Kalman filter, continuous-time Kalman filter, extended Kalman filter.

TEXT BOOKS

1.Discrete Random Signals and Statistical Signal Processing, By Charles W. Therrien, Prentice Hall Signal Processing Series

2. 4.J. G. Proakis et. al., Algorithms for Statistical Signal Processing, Pearson Education, 2002.

REFERENCE TEXT BOOK

1.M. H. Hayes, Statistical Digital Signal Processing and Modeling, John Wiley & Sons, Inc.,

2.D.G. Manolakis, V.K. Ingle and S.M. Kogon: Statistical and Adaptive Signal Processing, McGraw Hill, 2000.

B. TECH HONORS	**HN**	**L**	**T**	**P**	**C**
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20ECHN12 SOFTWARE DESIGN RADIO (Honors Engineering Course)

Prerequisite: Basic knowledge digital signal processing, communication systems, and wireless communication systems is desirable.

Course Objectives:

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

1. The course gives students knowledge of fundamental and state of the art concepts in software-defined radio.
2. To understand the Principles of software defined radio.
3. To study the Multi rate signal processing and Digital generation of signals
4. To know the Smart antennas with applications.

Course Outcomes:

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

CO1: Understand the systems required by a software-defined radio to function.

CO2: Make system level decisions and trade-offs for software-defined radio technology and products.

CO3: Understand the basics of designing antenna systems to accommodate the needs of software defined radio.

CO4: Understand how analog and digital technologies are used for software-defined radio.

SYLLABUS

UNIT-I: INTRODUCTION TO SOFTWARE RADIO CONCEPTS

The Need for Software Radios, What Is a Software Radio, Characteristics and Benefits of a Software Radio, Design Principles of a Software Radio.

UNIT-II: RADIO FREQUENCY IMPLEMENTATION ISSUES

The Purpose of the RF Front-End, Dynamic Range: The Principal Challenge of Receiver Design, RF Receiver Front-End Topologies, Enhanced Flexibility of the RF Chain with Software Radios, Importance of the Components to Overall

Performance, Transmitter Architectures and Their Issues, Noise and Distortion in the RF Chain, ADC and DAC Distortion

UNIT-III: MULTIRATE SIGNAL PROCESSING

Introduction Sample Rate Conversion Principles, Poly-phase Filters, Digital Filter Banks. Timing Recovery in classical Analog Receiver, Timing Recovery in Digital Domain, Early-Late gate Synchronizer.

UNIT-IV: DIGITAL GENERATION OF SIGNALS

Introduction, Comparison of Direct Digital Synthesis with Analog Signal Synthesis, Approaches to Direct Digital Synthesis, Analysis of Spurious Signals, Spurious Components due to Periodic Jitter, Band pass Signal Generation, Performance of Direct Digital Synthesis Systems, Hybrid DDS-PLL Systems, Applications of direct Digital Synthesis, ROM compression Techniques, Sine-Phase Difference algorithm approach.

Unit-V SMART ANTENNAS

Introduction, Vector Channel Modeling, Benefits of Smart Antennas, Structure for Beam Forming Systems, Smart Antenna Algorithms, Diversity and Space time Adaptive signal Processing, Algorithms for Transmit STAP, Hardware Implementation of Smart Antenna

Text Books:

1. Jeffrey Hugh Reed, “Software Radio: A Modern Approach to Radio Engineering,” Prentice Hall Professional, 2002.

2. Paul Burns, “Software Defined Radio for 3G,” Artech House, 2002.

Reference Books:

1. Software Radio: A Modern Approach to Radio Engineering By Jeffrey H. Reed Pearson Education Low Price Edition.

2. Telecommunication Breakdown by C. Richard Johnson Jr., William A. Sethares, 2003, Prentice Hall

B. TECH HONORS	**HN**	**L**	**T**	**P**	**C**
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20ECHN13 FPGA Design (Honors Engineering Course)

Course Objectives:

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

1. Be able to understand and design complex digital systems & use the design flow for using FPGA.
2. Be able to create circuits that realize specified digital functions.
3. Be able to identify logic and technology-specific parameters to control the functionality, timing, power, and parasitic effects.
4. Be able to complete a significant VLSI design project having a set of objective criteria & design constraints..

Course Outcomes:

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

CO1: To Know The Basic Concepts of Pld's

CO2: Understand The Basic Concepts of Fpga

CO3: Understand The Basic Concepts of Sram Programmable Fpga

CO4: Understand The Basic Concepts of Anti-Fuse Programmed Fpgas

CO5: To Analyze The Design Applications

SYLLABUS

UNIT-I: INTRODUCTION TO PROGRAMMABLE LOGIC DEVICES

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: FIELD PROGRAMMABLE GATE ARRAYS

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, and Applications of FPGAs

UNIT-III: SRAM PROGRAMMABLE FPGA

Introduction, Programming Technology, Device Architecture, the Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT-IV: ANTI-FUSE PROGRAMMED FPGAs

Introduction, Programming Technology, Device Architecture, the Actel ACT1, ACT2 and ACT3 Architectures.

Unit-V DESIGN APPLICATIONS

General Design Issues, Counter Examples, A Fast Video Controller, and A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

Text Books:

1. Stephen M. Trimberger, “Field Programmable Gate Array Technology”, Springer International Edition.
2. Charles H. Roth Jr, Lizy Kurian John, “Digital Systems Design”, Cengage Learning.

Reference Books:

1. John V. Oldfield, Richard C. Dorf, “Field Programmable Gate Arrays”, Wiley India.
2. Wayne Wolf, “FPGA based System Design”, Prentice Hall Modern Semiconductor Design Series.

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20ECHN14 DSP PROCESSORS & ARCHITECTURES (Honors Engineering Course)

Course Objectives:

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

1. To Understand Signal Processing methods.
2. To Analyse Accuracy while performing Signal Processing.
3. To have Knowledge about Processing with Digital Systems.
4. To Understand PDSP functional units.

Course Outcomes:

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

CO1: compute DFT, Design filters and analyse multirate signals.
CO2: Develop Accurate Processing Units.
CO3: Understand various Functional Modules of PDSPs.
CO4: Analyse Processors Instruction sets and Different families of PDSPs.
CO5: Gain Knowledge of Analog Devices Family of DSP Devices.

SYLLABUS

UNIT-I: Introduction to Digital Signal Processing

Introduction, a Digital signal processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

UNIT-II: Computational Accuracy in DSP Implementations

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-III: Architectures for Programmable DSP Devices

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation

UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-IV: Programmable Digital Signal Processors

Commercial Digital signal processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX Instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

Unit-V Analog Devices Family of DSP Devices

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the Micro Signal Architecture: Woon-Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications- B. Venkataramani and M. Bhaskar, 2002, TMH.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.

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20ECHN15 SOFT COMPUTING TECHNIQUES (Honors Engineering Course)

Course Objectives:

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

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.
3. Understand Soft Computing concepts, technologies, and applications.
4. Understand the underlying principle of soft computing with its usage in various applications.
5. Understand different soft computing tools to solve real life problems.

Course Outcomes:

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

CO1: Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.

CO2: Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic

CO3: To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations

CO4: Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications

CO5: Reveal different applications of these models to solve engineering and other problems.

SYLLABUS

UNIT-I: Introduction

Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, and Knowledge representation - Expert systems.

UNIT-II: Artificial Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network.

UNIT-III: Data Processing

Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT-IV: Fuzzy Logic System

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

Unit-V Genetic Algorithm

Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search techniques for solving optimization problems, Applications.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd.,

2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.

B. TECH HONORS	**HN**	**L**	**T**	**P**	**C**
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20ECHN16 RF & MIXED SIGNAL CIRCUITS (Honors Engineering Course)

Course Objectives:

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

1. Understand the concepts of Switched capacitors Circuits
2. Able to know the concepts of PLLS
3. To study concepts of Data Converter Fundamentals.
4. Understand the concepts of Nyquist Rate A/D Converters ,and applications
5. Understand concepts of the Oversampling Converters and Continuous-Time Filters

Course Outcomes:

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

CO1: Understand the concepts of Switched capacitor circuits.

CO2: Design and analysis of Nyquist Rate A/D Convertors.

CO3: Extend the Mixed Signal Design to Different Applications.

CO4: Concepts of Oversampling Convertors

CO5: Concepts of Continuous-Time Filters.

SYLLABUS

UNIT-I: Switched Capacitor Circuits

Introduction to Switched Capacitor circuits basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, Biquad filters.

UNIT-II: Phased Lock Loop (PLL)

Basic PLL topology, Dynamics of simple PLL, Charge pump PLLsLock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III: Data Converter Fundamentals

DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters-Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV: Nyquist Rate A/D Converters

Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters. Electronics & Communication Engineering.

Unit-V Continuous-Time Filters

Introduction to Gm-C Filters, Bipolar Trans conductors , CMOS trans conductors Using Triode and Active Transistors, Bi CMOS Tran conductors, MOSFET-C Filters.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books:

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

B. TECH MINOR	**MN**	**L**	**T**	**P**	**C**
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20ECMN01 SYSTEMS AND SIGNAL PROCESSING (Minor Engineering Course)

Course Objectives:

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

1. To introduce the terminology of signals and systems.
2. To study the periodic signals.
3. To study the non-periodic signals.
4. To analyze the continuous time signals.
5. To understand the relationships among the various representations of LTI systems.

Course Outcomes:

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

CO1: Characterize the signals and systems.

CO2: Analyze the Fourier series.

CO3: Analyze the Fourier transform.

CO4: Understand the concept of ROC.

CO5: Analyze the linear systems in time and frequency domains.

SYLLABUS

UNIT-I: INTRODUCTION

Definition of Signals and Systems, Elementary signals, Operations on signals, classification and characteristics of Signals, Classification of Systems.

UNIT-II: FOURIER SERIES

Fourier series representation of continuous time periodic signals, properties of Fourier series.

UNIT-III: Data Converter Fundamentals

Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transform.

UNIT-IV: LAPLACE TRANSFORMS

Laplace transform of arbitrary signal, concept of ROC, Laplace transform of standard signals, properties of Laplace transform, Inverse Laplace transform.

Unit-V ANALYSIS OF LINEAR SYSTEMS

Linear system, impulse response, Concept of convolution in time domain and frequency domain, Transfer function of a LTI system, Distortion less transmission through a system, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edition, 2002.

REFERENCE BOOKS

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition, 2002.
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015.

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20ECMN02 NETWORKS AND TRANSMISSION LINES (Minor Engineering Course)

Course Objectives:

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

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady states and transients states in RLC circuits.
3. To understand the two port network parameters.
4. To study the propagation, reflection and transmission of plane waves in bounded and unbounded media.

Course Outcomes:

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

CO1: Gain the knowledge on basic RLC circuits behavior.
CO2: Analyze the Steady state and transient analysis of RLC Circuits.
CO3: Know the characteristics of two port network parameters.
CO4: Analyze the transmission line parameters and configurations.
CO5: To Know the propagation, reflection and transmission of plane waves in bounded and unbounded media.

SYLLABUS

UNIT-I: TRANSIENT ANALYSIS (FIRST AND SECOND ORDER CIRCUITS)

Introduction to transient response and steady state response, Transient response of series –RL, RC RLC Circuits for sinusoidal, square, ramp and pulse excitations, Initial Conditions, Solution using Differential Equations approach and Laplace Transform method.

UNIT-II: TWO PORT NETWORKS

Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one of parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of two port networks in Series, Parallel and Cascaded configurations, Image Parameters, Illustrative problems. DVR & Dr. HS MIC College of Technology

UNIT-III: LOCUS DIAGRAMS

Resonance and Magnetic Circuits: Locus diagrams – Series and Parallel RL, RC, RLC circuits with variation of various parameters – Resonance-Series and Parallel circuits, Concept of band width and quality factor. Magnetic Circuits- Faraday's laws of electromagnetic induction, Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Composite magnetic circuits, Analysis of series and parallel magnetic circuits.

UNIT-IV: TRANSMISSION LINES

I Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristics Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortion lessness and Minimum Attenuation, Illustrative Problems.

Unit-V TRANSMISSION LINES

II SC and OC Lines, Input Impedance Relations, Reflection Coefficient, VSWR, λ/4, λ 2, λ /8 Lines – Impedance Transformations, Significance of Zmin and Zmax, Smith Chart – Configuration and Applications, Single Stub Matching, Illustrative Problems

Text Books:

1. Transmission Lines and Networks – Umesh Sinha, Satya prakashan, 2001.
2. A Text book of Electrical Technology by B.L Theraja and A.K Theraja, S.Chand publications.

Reference Books:

1. Engineering Circuits Analysis – William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition.
2. Principles of Electrical Engineering by V.K Mehta, Rohit Mehta, S.Chand publications.

B. TECH MINOR	MN	L	T	P	C
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20ECMN03 MODULATION TECHNIQUES (Minor Engineering Course)

Course Objectives:

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

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Familiarize with the fundamentals of digital communication systems
5. Familiarize with various techniques for digital modulation and demodulation of signals

Course Outcomes:

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

CO1: Differentiate various Analog modulation schemes

CO2: Analyze demodulation schemes and their spectral characteristics

CO3: Analyze noise characteristics of various analog modulation methods

CO4: Differentiate various Digital modulation schemes

CO5: Basic Knowledge on demodulation schemes

SYLLABUS

UNIT-I: AMPLITUDE MODULATION

Introduction to communication system, Need for modulation, Amplitude Modulation – definition, time domain and frequency domain representation, Power calculation of AM, Generation of AM waves - Square law modulator, Detection of AM Waves - Envelope detector.

UNIT-II: DSBSC & SSB MODULATION

DSBSC (Double side band suppressed carrier) modulation – definition, time domain and frequency domain representation, Generation of DSBSC Waves - Balanced Modulator, Detection of DSB-SC waves – Coherent detection.

SSB Modulation – Definition, Time domain and frequency domain representation, Generation of SSB waves- Phase discrimination method, Detection of SSB Waves, compare AM, DSBSC and SSB.

UNIT-III: ANGLE MODULATION

Frequency Modulation – Definition, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave, Generation of FM Waves - Direct FM, Detection of FM Waves - Balanced Frequency discriminator, zero crossing detector.

UNIT-IV: PULSE DIGITAL MODULATION

Elements of digital communication systems, advantages of digital communication systems, PAM, PWM, PPM, PCM and DM.

Unit-V DIGITAL MODULATION TECHNIQUES

Introduction, ASK, FSK, PSK, DPSK and QPSK generation and reception of each technique.

TEXT BOOKS:

1. Principles of Communication Systems – H Taub& D. Schilling, GautamSahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004

B. TECH MINOR	**MN**	**L**	**T**	**P**	**C**
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20ECMN04 ANALOG ELECTRONICS (Minor Engineering Course)

Course Objectives:

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

1. To introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

Course Outcomes:

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

CO1: Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.

CO2: Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances.

CO3: Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.

CO4: Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.

CO5: Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.

SYLLABUS

UNIT-I: Analysis And Design of Small Signal Low Frequency BJT Amplifiers

Review of transistor biasing, Classification of Amplifiers – Distortion in amplifiers, Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair,

UNIT-II: FET Amplifiers

Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET **,** MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits – gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

UNIT-III: MULTI-STAGE AND POWER AMPLIFIERS

Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers – Class A, Class B, Class C.

FEEDBACK AMPLIFIERS: Concepts of feedback – Classification 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 – Simple problems.

UNIT-IV: OSCILLATORS

Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

Unit-V OPERATIONAL AMPLIFIERS

Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular-wave generators.

TEXT BOOK:

1. Bakshi, U. A., & Godse, A. P. (2009). Analog electronics. 2009.
2. "Microelectronic Circuits" (seventh edition) by A.S. Sedra and K.C. Smith, Oxford University Press, 2015.

REFERENCES:

1. Bakshi, U. A., & Godse, A. P. (2009). *Analog and Digital Electronics*. Technical Publications.
2. Neamen, Donald. *Microelectronic Circuit Analysis and Design*. 3rd ed. New York, NY: McGraw-Hill, 2006. ISBN: 9780073285962.

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20ECMN05 SENSORS AND ACTUATORS (Minor Engineering Course)

Course Objectives:

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

1 To make students familiar with the constructions and working principle of different types of sensors and transducers.

2 To make students aware about the thermal sensors, radiation sensors and measuring instruments and the methods of measurement and the use of different transducers.

3 The objective of the study of aircraft instrumentation is to know the functions of all the flight, gyroscopic and power plant instruments in the aircraft and enable the learners to rectify the problems occurring in the aircraft.

Course Outcomes:

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

CO1: Able to learn about sensor Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), and Characterization.

CO2: Able to know about different sensors like Thermal sensors, Magnetic sensors.

CO3: Able to know about Smart Sensors, Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface and the Automation

CO4: Able to know Actuators

CO5: Able to know sensor materials and Processing Techniques

SYLLABUS

UNIT-I: SENSORS

Difference between sensor, transmitter and transducer - Primary measuring elements - selection and characteristics: Range; resolution, Sensitivity, error, repeatability, linearity and accuracy, impedance, backlash, Response time, Dead band. Signal transmission - Types of signal: Pneumatic signal; Hydraulic signal; Electronic Signal.

Principle of operation, construction details, characteristics and applications of potentiometer, Proving Rings, Strain Gauges, Resistance thermometer, Thermistor, Hot-wire anemometer, Resistance Hygrometer, Photo-resistive sensor.

UNIT-II: THERMAL SENSORS

Introduction – Gas thermometric Sensors – Thermal Expansion Type Thermometric Sensors – Acoustic Temperature Sensor – Dielectric Constant and Refractive Index thermosensors – Helium Low Temperature Thermometer – Nuclear Thermometer – Magnetic Thermometer – Resistance Change Type Thermometric Sensors –Thermoemf Sensors– Junction Semiconductor Types– Thermal Radiation Sensors –Quartz Crystal Thermoelectric Sensors – NQR Thermometry – Spectroscopic Thermometry – Noise Thermometry – Heat Flux Sensors Magnetic sensors: Introduction – Sensors and the Principles Behind – Magneto-resistive Sensors – Anisotropic Magnetoresistive Sensing – Semiconductor Magnetoresistors– Hall Effect and Sensors – Inductance and Eddy Current Sensors– Angular/Rotary Movement Transducers – Synchros – Synchro-resolvers - Eddy Current Sensors – Electromagnetic Flowmeter – Switching Magnetic Sensors SQUID Sensors

UNIT-III: RADIATION SENSORS

Introduction – Basic Characteristics – Types of Photosensistors/Photo detectors– X-ray and Nuclear Radiation Sensors– Fiber Optic Sensors Electro analytical Sensors: Introduction – The Electrochemical Cell – The Cell Potential - Standard Hydrogen Electrode (SHE) – Liquid Junction and Other Potentials – Polarization – Concentration Polarization-– Reference Electrodes - Sensor Electrodes – Electro ceramics in Gas Media.

UNIT-IV: ACTUATORS

Definition, types and selection of Actuators; linear; rotary; Logical and Continuous Actuators, Pneumatic actuator- Electro-Pneumatic actuator; cylinder, rotary actuators, Mechanical actuating system: Hydraulic actuator - Control valves; Construction, Characteristics and Types, Selection criteria.

Electrical actuating systems: Solid-state switches, Solenoids, Electric Motors- Principle of operation and its application: D.C motors - AC motors - Single phase & 3 Phase Induction Motor; Synchronous Motor; Stepper motors - Piezoelectric Actuator.

Unit-V SENSOR MATERIALS AND PROCESSING TECHNIQUES

Materials for sensors: Silicon, Plastics, metals, ceramics, glasses, nano materials Processing techniques: Vacuum deposition, sputtering, chemical vapour deposition, electro plating, photolithography, silicon micro machining, Bulk silicon micro machining, Surface silicon micro machining, LIGA process.

TEXT BOOKS:

1. Patranabis.D, “Sensors and Transducers”, Wheeler publisher, 1994.
2. Jacob Fraden, “Hand Book of Modern Sensors: Physics, Designs and Application” Fourth edition, Springer, 2010.

REFERENCES:

1. W. Bolton – “Mechatronics” –Pearson Education Limited.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004

B. TECH MINOR	MN	L	T	P	C
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20ECMN06 ANTENNA THEORY (Minor Engineering Course)

Pre-requisite: Basic knowledge about Electromagnetic Theory, Transmission Lines and Waveguides

Course Objectives:

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

1. Know and use standard antenna characterization parameters such as: impedance, far-field radiation pattern, scattering pattern, gain, directivity, bandwidth, beam width, polarization, efficiency, antenna temperature.
2. Understand electromagnetic radiation mechanism and its physics and be able to compute radiation from several common antenna structures.
3. Design simple antennas such as dipoles, micro strip patches, and waveguide horns to achieve specified performance.
4. Design antenna arrays with required radiation pattern haracteristics.
5. Understand self and mutual impedance and the basics of numerical analysis forantennas.

Course Outcomes:

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

CO1: Be able to interpret different parameters and properties used to characterize antennas

CO2: Analyze the basic antenna problems.

CO3: Perform and master fundamental descriptions of antenna properties.

CO4: Critically formulate an appropriate model and calculate properties of common antenna types.

CO5: Able to know the concept of printed Antennas

SYLLABUS

UNIT-I: FUNDAMENTAL CONCEPTS

Physical concept of radiation, retarded potentials, Hertzian dipole; Antenna parameters: Radiation pattern, gain, directivity, effective aperture, and reciprocity; Radiation from dipoles ofarbitrary length.

UNIT-II: ANTENNA ARRAYS

Arrays of point sources, end fire and broadside arrays, pattern multiplication, synthesis of binomial and Dolph Chebyshev arrays.

UNIT-III: BROADBAND ANTENNAS

Log-periodic and Yagi antennas, frequency independent antennas, effect of frequency on Linear Arrays, broadcast antennas, Radiation Pattern, RFID Antennas.

UNIT-IV: APERTURE AND REFLECTOR ANTENNAS

Huygens' principle, radiation from apertures in an infinite ground plane, slot and horn antennas, parabolic reflector antennas.

Unit-V PRINTED ANTENNAS

Fundamental wideband printed radiating elements for wireless systems, small printed antennas for wireless systems, Radiation from rectangular and circular patches, feeding techniques.

Text Books:

1. Balanis, C.A., "Antenna Theory and Design", 3rd Ed., John Wiley & Sons, 2005.
2. Kraus, J.D. and Fleisch, D.A., "Electro magnetics with Applications", McGraw-Hill.

Reference Books:

1. Antenna Theory and Design, revised Ed., by Robert S. Elliott, Willey-Interstice & IEEE Press, 2003.
2. Antenna Theory and Design, 2nd Ed., by Warren L. Stutzman, and Gary A. Thiele, John Wiley, 1997.

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20ECMN07 DIGITAL ELECTRONICS (Minor Engineering Course)

Course Objectives:

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

1. To represent numbers and conversion between different representations.
2. To analyze logic processes and implement logical operations.
3. To develop the combinational logic circuits.
4. To understand concept of programmable logic devices like PROM, PLA, PAL.
5. To design and analyze the concepts of sequential circuits.

Course Outcomes:

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

CO1: Understand different number systems and their conversions.

CO2: Analyze the logical operations and Boolean algebra

CO3: Develop combinational circuits and perform logical operations.

CO4: Understand different programmable logic devices.

CO5: Design the sequential logic functions.

SYLLABUS

UNIT-I: Number Systems

Binary- Octal- Decimal- Hexadecimal Number Systems- Conversion of Numbers from One Radix to Another Radix- r‘s Complement- (r-1)‘s Complement- Subtraction of Unsigned Numbers- Signed Binary Numbers- Problems.

UNIT-II: Logic Gates and Boolean Algebra

Basic Gates- Universal Gates- Ex-Or and Ex-Nor Gates- SOP- POS- Boolean Theorems- Dual of Logical Expressions- Minimizations of Logic Functions Using Boolean Theorems- K Map Method- Minimization of Boolean Functions.

UNIT-III: Combinational Logic Circuits

Design of Half Adder- Full Adder- Half Subtractor- Full Subtractor- Ripple Adder and Subtractor- Design of Decoders- Encoders- Multiplexers- Demultiplexers- Magnitude Comparator.

UNIT-IV: Introduction to Programmable Logic Devices (PLDs)

PLA- PAL- PROM- Realization of Switching Functions Using PROM- Comparison of PLA, PAL and PROM.

Unit-V Introduction to Sequential Logic Circuits

Basic Sequential Logic Circuits- Latch and Flip-Flop- RS- Latch Using NAND and NOR Gates- RS, JK, T and D Flip Flops- Conversion of Flip Flops- Flip Flops With Asynchronous Inputs (Preset and Clear)- Design of Registers- Universal Shift Register- Ring Counter- Johnson Counter.

TEXT BOOKS

1. Digital Design, M.Morris Mano, Michael D Ciletti, 4thEdition, PEA, 2003.
2. Fundamentals of Logic Design, Roth, 5thEdition, Cengage, 2004

REFERENCE BOOKS

1. Switching and Finite Automata Theory, Kohavi, 3rd Edition, Jha, Cambridge, 2005
2. Digital Logic Design, Leach, Malvino, Saha, TMH, 2000.

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20ECMN08 MOBILE COMMUNICATIONS (Minor Engineering Course)

Course Objectives:

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

1. To know the evolution of Mobile communication and cell concept to improve capacity of the system.
2. To know the types of channel coding techniques, data transmission modes and services of GSM.
3. To know the types of channel coding techniques, data transmission modes and services of CDMA.
4. Understand Wireless LAN, Bluetooth and WiFi Technologies

Course Outcomes:

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

CO1: Demonstrate knowledge on : cellular concepts like frequency reuse, fading, equalization, GSM ,CDMA

CO2: Apply the concept of GSM in real time applications.

CO3: Compare different multiple access techniques in mobile communication.

CO4: Understand the architecture of Wireless LAN technologies

CO5: Understand the concept of mobile TCP

SYLLABUS

UNIT-I: Mobile Communications

Evolution of Mobile Radio Communication, Examples of Wireless Communication Systems. Paging system, Cordless telephones systems, Cellular telephone Systems, Cellular concept: Frequency reuse, Channel Assignment strategies, Hand off strategies. Interference and System capacity, improving coverage and capacity in cellular systems.

UNIT-II: Global System For Mobile (GSM) Historical overview, System overview

The air interface, Logical and physical channels, Synchronization, Coding, Equalizer, Circuit-switched data transmission, Establishing a connection and handover, Services and billing.

CDMA: Historical overview, System overview, Air interface, Coding, Spreading and Modulation, Logical and Physical channels, Handover.

UNIT-III: Wireless LANs and PANs

IEEE 802.11 Standard – Architecture – Services – Blue Tooth- Wi-Fi – WiMAX

UNIT-IV: Mobile IP

DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast Routing-Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security

Unit-V Mobile TCP

WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML.

TEXT BOOKS:

1. Andreas F.MOlisch - Wireless Communications,J ohn Wiley, 2nd Edition, 2006
2. William.C.Y.Lee,―Mobile Cellular Telecommunications-Analog and Digital Systems‖, Second Edition,Tata Mc Graw Hill Edition ,2006.

REFERENCES:

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
2. P.Muthu Chidambara Nathan, "Wireless Communication"s, PHI, 2008

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20ECMN09 ADVANCED MICROCONTROLLERS (Minor Engineering Course)

Course Objectives:

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

1. To provide solid foundation on the fundamentals of microcontrollers and applications,
2. Interfacing the external devices to the Controllers according to the user requirements
3. Enabling to create novel products and solutions for real time problems.

Course Outcomes:

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

CO1: Understand the fundamentals of Microcontrollers.

CO2: Understand the internal architectures along with the features and their programming.

CO3: Competent with the on chip peripherals of microcontrollers.

CO4: Design different interfacing applications using microcontrollers and peripherals.

CO5: Demonstrate the limitations and strengths of different types of microcontrollers and their comparison.

SYLLABUS

UNIT-I: Overview of Microcomputer systems,

Addresses, General Operation of a computer, Microprocessors in Digital System design, Purpose of microcontroller, differences between microprocessor and microcontroller, Advantages and Disadvantages.

Architecture- RISC and CISC processors, Memory organization, ports, interrupts

UNIT-II: Internal architecture

Introduction to ARM7TDMI processor – Pin Description, Pin functionality, internal architecture, Instruction Set and Instruction Cycle timings, operating modes Types of memory – Code memory, External Memory, Internal memory, Register Set

UNIT-III: PIC16F877

Instructions set, addressing modes, Assembly language Programs. PIC16F877 PERIPHERALS: Timers, , ADC modules, configuration word and programming.

UNIT-IV: SERIAL COMMUNICATION MODULES

UART, EEPROM, Reset, Oscillator modes, configuration word and programming. INTERFACING: Interfacing of keys, Display - LEDs, 7-segment LED (multiplexed display) & LCDs, (Programs in assembly and C).

Unit-V APPLICATIONS OF MICROCONTROLLERS

EX: RPM meter, event counter, temperature, controller (Programs in assembly and C). Development Tools: Simulators, debuggers, cross compilers, in-circuit Emulators for the microcontrollers.

TEXT BOOKS:

1. J.B.PEATMAN Design with PIC microcontrollers-, PHI 1998.
2. Barrnett Cox & Cull, Embedded C programming and the microchip PIC-Thomson Publications 2004.

REFERENCE BOOKS:

1. Ajay .V. Deshmukh Micro Controller theory and Application, TATA McGraw –Hill, 2008, 1st Edition

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B. TECH MINOR	**MN**	**4**	**0**	**0**	**4**

20ECMN10 STATISTICAL SIGNAL PROCESSING (Minor Engineering Course)

Course Objectives:

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

1. Introduce graduate students to the mathematical ideas that form the basis for modern statistically-based analysis of signals and systems.
2. To study the mathematical background of signal detection and estimation.
3. To study and use classical and Bayesian approaches to formulate problems.
4. To study signal detection and parameter estimation from noisy signals.
5. To study filtering methods for parameter estimation.

Course Outcomes:

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

CO1: Generalize the properties of statistical models in the analysis of signals using Stochastic processes.

CO2: Differentiate the prominence of various spectral estimation techniques for Achieving higher resolution in the estimation of power spectral density.

CO3: Outline various parametric estimation methods to accomplish the signal modeling even at higher order statistics.

CO4: Design and development of optimum filters using classical and adaptive algorithms.

CO5: Extrapolate the importance of least squares techniques and ecomposition methods in analyzing the signal estimations.

SYLLABUS

UNIT-I: Review of random variables

Distribution and density functions, moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Schwarz Inequality Orthogonality principle in estimation, Central Limit theorem, Random processes, and wide-sense stationary processes.

UNIT-II: Parameter Estimation

Theory Principle of estimation and applications, Properties of estimates, unbiased and consistent estimators, Minimum Variance Unbiased Estimates (MVUE), Cramer Rao bound, Efficient estimators;

UNIT-III: Estimation of signal in presence of white Gaussian Noise

Linear Minimum Mean-Square Error (LMMSE) Filtering: Wiener Hoff Equation, FIR Wiener filter, Causal IIR Wiener filter, Noncausal IIR Wiener filter

UNIT-IV: Adaptive Filtering

Principle and Application, Steepest Descent Algorithm Convergence characteristics; LMS algorithm, convergence, excess mean square error, Leaky LMS algorithm; Application of Adaptive filters

Unit-V Kalman filtering

State-space model and the optimal state estimation problem, discrete Kalman filter, continuous-time Kalman filter,

TEXT BOOKS

1. Discrete Random Signals and Statistical Signal Processing, By Charles W. Therrien, Prentice Hall Signal Processing Series
2. 2. N. J. Fliege, "Multirate Digital Signal Processing: Multirate Systems -Filter Banks – Wavelets", 1 st Edition, John Wiley and Sons Ltd, 1999.

REFERENCE TEXT BOOK

1. M. H. Hayes, Statistical Digital Signal Processing and Modeling, John Wiley & Sons, Inc.,
2. 4. D. G. Manolakis, V. K. Ingle and S. M. Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000

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20ECMN11 MIXED SYSTEM DESIGN (Minor Engineering Course)

Course Objectives:

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

1. Understand the concepts of Switched capacitors Circuits
2. Able to know the concepts of PLLS
3. To study concepts of Data Converter Fundamentals.
4. Understand the concepts of Nyquist Rate A/D Converters ,and applications
5. Understand concepts of the Oversampling Converters and Continuous-Time Filters

Course Outcomes:

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

CO1: Understand the concepts of Switched capacitor circuits.

CO2: Design and analysis of Nyquist Rate A/D Convertors.

CO3: Extend the Mixed Signal Design to Different Applications.

CO4: Concepts of Oversampling Convertors

CO5: Concepts of Continuous-Time Filters.

SYLLABUS

UNIT-I: Switched Capacitor Circuits

Introduction to Switched Capacitor circuits basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, Biquad filters.

UNIT-II: Phased Lock Loop (PLL):

Basic PLL topology, Dynamics of simple PLL, Charge pump PLLsLock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III: Data Converter Fundamentals

DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters-Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV: Nyquist Rate A/D Converters

Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters. Electronics & Communication Engineering.

Unit-V Continuous-Time Filters

Introduction to Gm-C Filters, Bipolar Trans conductors , CMOS trans conductors Using Triode and Active Transistors, Bi CMOS Tran conductors, MOSFET-C Filters.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books:

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

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20ECMN12 NANO TECHNOLOGY (Minor Engineering Course)

Course Objectives:

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

CO1: Know the background of nanotechnology

CO2: know Different classes of Nanomaterials

CO3: know **Synthesis of Nanomaterials**

CO4: know compound semiconductors

CO5: know Applications of Nanotechnology

Course Outcomes:

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

CO1: Understand the concepts of Switched capacitor circuits.

CO2: Design and analysis of Nyquist Rate A/D Convertors.

CO3: Extend the Mixed Signal Design to Different Applications.

CO4: Concepts of Oversampling Convertors and Continuous-Time Filters.

CO5: Able to know the Applications of nano technology

SYLLABUS

UNIT-I: Nanotechnology

Background to nanotechnology – Definition for Nanotechnology - Scientific Revolutions – Types of nanotechnology – Top-Down and Bottom-Up – Moore's Law – Basic problems and limitations – Opportunities at the Nanoscale

UNIT-II: Different **Classes** of Nanomaterials

Classification based on dimensionality-Quantum Dots,Wells and Wires- Carbon-based nano materials (buckyballs, nanotubes, graphene)-Metalbased nano materials (nanogold, nanosilver and metal oxides) -Nanocomposites-Nanopolymers -Nanoglasses -Nano ceramics -Biological nanomaterials.

UNIT-III: Synthesis of Nanomaterials

Classification of synthesis: Top down and bottom up nanofabrication. Chemical Methods: Metal Nanocrystals by Reduction – Solvothermal Synthesis- Photochemical Synthesis – Sonochemical Routes- Chemical Vapor Deposition (CVD) -Metal Oxide – Chemical Vapor Deposition (MOCVD).Physical Methods:Ball Milling -Electrodeposition – Spray Pyrolysis – Flame Pyrolysis -DC/RF Magnetron Sputtering – Molecular Beam Epitaxy (MBE)

UNIT-IV: Nano MOSFETs

Germanium Nano MOSFETs Strain, Quantization; Advantages of germanium over silicon; PMOS versus NMOS; Compound semiconductors - material properties; MESFETs; Compound semiconductors MOSFETs in the context of channel quantization and strain; Hetero structure MOSFETs exploiting novel materials, strain, quantization.

Unit-V Applications

Solar energy conversion and catalysis – Molecular electronics and printed electronics -Nanoelectronics -Polymers with aspecial architecture – Liquid crystalline systems – Linear and nonlinear optical and electro-optical properties, Applicationsin displays and other devices -Nanomaterials for data storage – Photonics, Plasmonics- Chemical and biosensors -Nanomedicine and Nanobiotechnology -Nanotoxicology challenges.

Text Books:

1. Bhusan, Bharat (Ed), Springer Handbook of Nanotechnology, 2nd Edition, 2007.
2. Hari Singh Nalwa, Nanostructured Materials and Nanotechnology, Academic Press, 2002.

References:

1. Charles P. Poole Jr., Frank J. Ownes, Introduction to Nanotechnology, Wiley Interscience, 2003.
2. Dupas C., Houdy P., Lahmani M., Nanoscience: Nanotechnologies and Nanophysics, Springer-Verlag Berlin Heidelberg, 2007.