SRI VENKATESWARA COLLEGE OF ENGINEERING
(AUTONOMOUS)
Karakambadi Road Tirupati-517 507

Department of Electronics & Communication Engineering

Course Structure
R 20 Regulations

Electronics and Communication Engineering

Semester-0
Induction Program
(Common for all branches)

S.No	Course Name	Category	L-T-P-C
1	Physical Activities - Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation to all branches - career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch - corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills - focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

Semester - 1 (Theory - 5, Lab 4, MC-1)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P/D**	**Credits**
1.	MA20ABS101	Linear Algebra and Calculus	BS	3-0-0	3
2.	PH20ABS103	Applied Physics	BS	3-0-0	3
3.	EG20AHS101	Communicative English	HS	3-0-0	3
4.	EE20AES103	Fundamentals of Electrical Circuits	ES	3-0-0	3
5.	ME20AES102	Engineering Drawing	ES	1-0-0/2	2
6.	ME20AES103	Engineering Graphics Lab	ES	0-0-2	1
7.	PH20ABS104	Applied Physics Lab	BS	0-0-3	1.5
8.	EG20AHS102	Communicative English Lab	HS	0-0-3	1.5
9.	EE20AES104	Fundamentals of Electrical Circuits Lab	ES	0-0-3	1.5
10.	MA20AMC101	Logical Skills for Professionals-I	MC	2-0-0	0
Total					**19.5**

Semester – 2 (Theory – 4, Lab –5 , MC-2)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	MA20ABS201	Differential Equations and Vector Calculus	BS	3-0-0	3
2.	CH20ABS103	Chemistry	BS	3-0-0	3
3.	CS20AES101	Problem Solving using C	ES	3-0-0	3
4.	EC20AES201	Electronic Devices & Circuits	ES	3-0-0	3
5.	ME20AES101	Engineering Workshop	ES	0-0-3	1.5
6.	CS20AES103	IT Workshop	ES	0-0-3	1.5
7.	CS20AES102	Problem Solving using C Lab	ES	0-0-3	1.5
8.	CH20ABS104	Chemistry Lab	BS	0-0-3	1.5
9.	EC20AES202	Electronic Devices & Circuits Lab	ES	0-0-3	1.5
10.	CH20AMC201	Environmental Science	MC	2-0-0	0
11.	EG20AMC101	Speech & Oral Communication	MC	2-0-0	0
Total					**19.5**

Semester – 3 (Theory –5 , Lab –3, SC -1, MC-3)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	MA20ABS302	Complex Variables & Transforms	BS	3-0-0	3
2.	EC20APC301	Digital Logic Design	PC	3-0-0	3
3.	EC20APC302	Electronic Circuit -Analysis and Design	PC	3-0-0	3
4.	EC20APC303	Signals & Systems	PC	3-0-0	3
5.	BA20AHS301	Managerial Economics and Financial Analysis	HS	3-0-0	3
6.	EC20APC304	Basic Simulation Lab	PC	0-0-3	1.5
7.	EC20APC305	Digital Logic Design Lab	PC	0-0-3	1.5
8.	EC20APC306	Electronic Circuit -Analysis and Design Lab	PC	0-0-3	1.5
9.	IT20ASC301	Skill oriented course- Application Development using Python	SC	1-0-2	2
10.	CH20AMC301	Mandatory course (AICTE suggested): Biology For Engineers	MC	2-0-0	0.0
11.	MA20AMC301	Logical Skills for Professionals -II	MC	2-0-0	0.0
12.	EG20AMC301	Enhancing English Language Skills **(Lateral Entry Students only)**	MC	2-0-0	0.0
Total					**21.5**

Semester – 4 (Theory – 5, Lab – 3,SoC-1, AC-1,MC-3)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	CS20AES401	Data Structures using C	ES	3-0-0	3
2	MA20ABS402	Probability Theory and Stochastic Processes	BS	3-0-0	3
3	EC20APC401	Analog Communications	PC	3-0-0	3
4	EC20APC402	Electro Magnetic Waves and Transmission Lines	PC	3-0-0	3
5	EC20APC403	Linear & Digital IC Applications	PC	3-0-0	3
6	EC20APC404	Analog Communications Lab	PC	0-0-3	1.5
7	CS20AES402	Data Structures using C Lab	ES	0-0-3	1.5
8	EC20APC405	Linear & Digital IC Applications Lab	PC	0-0-3	1.5
9	EG20ASC301	Skill oriented course-Soft Skills	SC	1-0-2	2
10	SH20AAC401	Extra Academic Activities (NSS/Yoga/Cultural/Games and Sports/ Societal Relationship)	AC	0-0-2	0.0
11	BA20AMC201	Mandatory course (AICTE suggested): Universal Human Values	MC	2-0-0	0.0
11	*BA20AHS201	Mandatory course (AICTE suggested): Universal Human Values	HS	3-0-0	*3
12.	MA20AMC401	Engineering Mathematics (Lateral Entry Students only)	MC	2-0-0	0.0
Total					**21.5**
13.	Industry/Research Internship minimum of 4 weeks (Mandatory)during summer vacation				
14.	Honors / Minor courses (Hours distribution can be 3-0-2 or 3-1-0 also)			4-0-0	**4**

*UHV is considered as Credit Based Course from 2021 Batch

Semester – 5 (Theory – 5, Lab –2,Soc-1,MC-2,Ts-1,IP-1)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	EC20APC501	Antennas and Wave Propagation	PC	3-0-0	**3**
2	EC20APC502	Digital Communications	PC	3-0-0	**3**
3	EC20APC503	Microprocessors & Microcontrollers	PC	3-0-0	**3**
4	**Open Elective Course/ Job oriented elective-1**		OE	3-0-0	**3**
	CE20AOE502	Principles of Waste Management			
	ME20AOE501	Industrial Automation			
	EE20AOE502	Programmable Logic Controllers			
	AM20AOE501	Introduction to Operating Systems			
	CS20AOE502	Computer Architecture & Organization			
	CH20AOE501	Chemistry of Polymers & Applications			
5	**Professional Elective courses-1**		PE	3-0-0	**3**
	EE20APE502	Control System Engineering.			
	EC20APE501	Mechatronics			
	EC20APE502	Nanoelectronics			
6	EC20APC504	Digital Communications Lab	PC	0-0-3	**1.5**
7	EC20APC505	Microprocessors & Microcontrollers Lab	PC	0-0-3	**1.5**
8.	EC20ASC501	**Skill advanced course/ soft skill course*** PCB Design and Prototype Development	SC	1-0-2	**2**
9.	BA20AMC501	**Mandatory course (AICTE suggested)** Constitution of India	MC	2-0-0	**0**
10.	IT20AMC501	Problem Solving and Programming **(Lateral Entry Students only)**	MC	2-0-0	**0**
11.	EC20ATS501	**Technical Seminar Presentation-I**	TS	0-0-0	**0.5**
12.	EC20AIP501	**Evaluation of Summer Internship**	IP	0-0-0	**1.5**
Total					**22**
13.	**Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)**			**4-0-0**	**4**
14.	**MOOC/NPTEL Course**			**0-0-0**	**2**

Semester – 6 (Theory – 5, Lab –3,SoC-1,MC-2,TS-1)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	EC20APC601	Digital Signal Processing	PC	3-0-0	3
2.	EC20APC602	Microwave Engineering and Optical Communications	PC	3-0-0	3
3.	EC20APC603	VLSI Design	PC	3-0-0	3
4.	**Professional Elective courses-2**		PE	3-0-0	3
	EC20APE601	Electronic Measurements and Instrumentation			
	EC20APE602	Information Theory and Coding			
	EC20APE603	Introduction to Digital Signal Processing			
	EC20APE604	RADAR Systems.			
5.	**Open Elective Course/Job oriented elective-2**		OE	3-0-0	3
	CE20AOE601	Disaster Management			
	ME20AOE601	Fundamentals of Additive Manufacturing			
	EE20AOE603	Optimization Techniques through MATLAB			
	CS20AOE602	JAVA Programming			
	AM20AOE502	Web Technologies			
	EG20AOE601	Technical Communication & Presentation Skills			
6.	EC20APC604	Digital Signal Processing Lab	PC	0-0-3	1.5
7.	EC20APC605	Microwave and Optical Communications Lab	PC	0-0-3	1.5
8.	EC20APC606	VLSI Design Lab	PC	0-0-3	1.5
9.	EC20ASC601	**Skill advanced course/ soft skill course*** Graphical System Design Using Lab-view / CISCO	SC	1-0-2	2
10.	BA20AMC502	**Mandatory course (AICTE)** Intellectual Property Rights & Patents.	MC	3-0-0	0.0
11.	EC20ATS601	**Technical Seminar Presentation-II**	TS	0-0-0	0.5
12.	AM20AMC601	AI Tools Techniques and Applications **(Lateral Entry Students only)**	MC	2-0-0	**0**
13.	Industrial/Research Mini Project (Mandatory) 4 weeks during summer vacation.				
		Total			**22**
14.	**Honors / Minor courses** (The hours distribution can be 3-0-2 or 3-1-0 also)			**4-0-0**	**4**
15.	**MOOC/NPTEL Course**			**0-0-0**	**2**

Semester – 7 (Theory – 6,Soc-1,TS-1,PW-1,IP-1)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	**Professional Elective courses-3**		PE	3-0-0	3
	EC20APE701	Analog and Digital IC Design			
	EC20APE702	FPGA Design			
	EC20APE703	Low Power VLSI Circuits and Systems			
2.	**Professional Elective courses-4**		PE	3-0-0	3
	EC20APE704	Digital Image Processing			
	EC20APE705	Electronic Defense Systems			
	EC20APE706	Smart Sensor Networks.			
3.	**Professional Elective courses-5**		PE	3-0-0	3
	EC20APE707	Data Communication and Networking			
	EC20APE708	Satellite Communications			
	EC20APE709	Wireless Sensor Networks.			
4.	**Open Elective Course/Job oriented elective-3**		OE	3-0-0	3
	CE20AOE701	Air Pollution and Quality Control			
	ME20AOE703	Introduction to Industrial Engineering			
	EE20AOE701	Embedded Systems			
	AM20AOE601	Machine Learning Tools and Techniques.			
	CS20AOE503	Structured Query Language			
	EE20AOE704	Introduction to Smart Grid & Electric vehicles			
	MA20AOE701	Numerical Methods for Engineers			
5.	**Open Elective Course/Job oriented elective-4**		OE	3-0-0	3
	CE20AOE704	Environmental Impact Analysis and Management			
	ME20AOE704	Introduction to Product Marketing			
	EE20AOE703	IoT applications in Electrical Engineering			
	AM20AOE701	Cyber Security Techniques			
	CS20AOE601	Data Analysis using 'R'			
	PH20AOE701	Nano Materials			
6.	***Humanities and Social Science Elective**		HS	3-0-0	3
	BA20AHS703	Entrepreneurship and Incubation			
	BA20AHS704	Enterprise Resource Planning			
	BA20AHS705	**Management Science**			
7.	EC20ASC701	**Skill advanced course/ soft skill course*** IoT and Industrial Automation	SC	1-0-2	2
8.	EC20ATS701	**Technical Seminar Presentation-III**	TS	0-0-1	0.5
9.	EC20APW701	**Project Work Stage-I**	PW	0-0-0	2
10.	EC20AIP701	**Evaluation of Industrial / Research Mini Project**	IP	0-0-0	3
Total					**25.5**
11.	**Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)**			**4-0-0**	**4**

Semester – 8 (Project)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	EC20APW801	Project Work Stage-II / Full Internship in Industry	PW	**0-0-0**	**8.5**
Total credits					**8.5**

Open Elective/ Job Oriented Elective:
(Offered by Electronics & Communication Engineering Department
to other Department students)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AOE501	Basic VLSI design	OE/JOE	**3-0-0**	**3**
2	EC20AOE502	Digital Electronics	OE/JOE	**3-0-0**	**3**
3	EC20AOE601	Electronic Instrumentation & Measurements	OE/JOE	**3-0-0**	**3**
4	EC20AOE602	Signal Processing	OE/JOE	**3-0-0**	**3**
5	EC20AOE701	IC Applications	OE/JOE	**3-0-0**	**3**
6	EC20AOE702	Principles of Communication Engineering	OE/JOE	**3-0-0**	**3**
7	EC20AOE703	Sensors & Systems	OE/JOE	**3-0-0**	**3**
8	EC20AOE704	Internet of Things	OE/JOE	**3-0-0**	**3**
9	EC20AOE705	Introduction to Image Processing	OE/JOE	**3-0-0**	**3**
10	EC20AOE706	Microcontroller & Applications	OE/JOE	**3-0-0**	**3**

Honors/Minors

(Offered by Electronics & Communication Engineering Department)

Note: Eligible and interested students can register either for Honors or for Minors in IV Semester as per the guidelines

B.Tech HONORS

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AHO401	Electronics Packaging	HO	**4-0-0**	**4**
2	EC20AHO402	Structured Digital System Design	HO	**4-0-0**	**4**
3	EC20AHO501	MEMS Technology	HO	**4-0-0**	**4**
4	EC20AHO502	Modern Communication Systems	HO	**4-0-0**	**4**
5	EC20AHO503	MOOC/NPTEL -I	HO	**0-0-0**	**2**
6	EC20AHO601	Advanced Computer Architecture	HO	**4-0-0**	**4**
7	EC20AHO602	Digital Speech Processing	HO	**4-0-0**	**4**
8	EC20AHO603	MOOC/NPTEL -II	HO	**0-0-0**	**2**
9	EC20AHO701	Digital Video Processing	HO	**4-0-0**	**4**
10	EC20AHO702	Testing & Testability	HO	**4-0-0**	**4**

Minor Degree for Circuit Branches(EEE,CSE,CSM,CSC,CSD,IT)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AMI401	Communication Systems-I	MI	**4-0-0**	**4**
2	EC20AMI402	Electronic Instrumentation	MI	**4-0-0**	**4**
3	EC20AMI501	Automotive Electronics	MI	**4-0-0**	**4**
4	EC20AMI502	Communication Systems-II	MI	**4-0-0**	**4**
5	EC20AMI503	MOOC/NPTEL -I	MI	**0-0-0**	**2**
6	EC20AMI601	Digital Integrated Circuits	MI	**4-0-0**	**4**
7	EC20AMI602	Nanotechnology	MI	**4-0-0**	**4**
8	EC20AMI603	MOOC/NPTEL -II	MI	**0-0-0**	**2**
9	EC20AMI701	Digital Image & Video Processing	MI	**4-0-0**	**4**
10	EC20AMI604	Embedded System Design	MI	**4-0-0**	**4**

Minor Degree for Non-Circuit Branches(CIV,MECH)

S.No	Course No	Course Name	Category	L-T-P/D	Credits
1	EC20AMI403	Introduction to Signal Processing	MI	**4-0-0**	**4**
2	EC20AMI402	Electronic Instrumentation	MI	**4-0-0**	**4**
3	EC20AMI401	Communication Systems-I	MI	**4-0-0**	**4**
4	EC20AMI504	MATLAB Programming	MI	**4-0-0**	**4**
5	EC20AMI505	MOOC/NPTEL -I	MI	**0-0-0**	**2**
6	EC20AMI604	Embedded System Design	MI	**4-0-0**	**4**
7	EC20AMI605	Introduction to CMOS VLSI Design	MI	**4-0-0**	**4**
8	EC20AMI606	MOOC/NPTEL -II	MI	**0-0-0**	**2**
9	EC20AMI501	Automotive Electronics	MI	**4-0-0**	**4**
10	EC20AMI702	Introduction to IoT	MI	**4-0-0**	**4**

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech-I Sem

L	T	P	C
3	0	0	3

(MA20ABS101) LINEAR ALGEBRA & CALCULUS

(Common to All Branches)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Unit -1:

Matrices

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-

Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigen vectors. (L3)
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics. (L3)

Unit -2:

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders. (L3)
- Analyze the behavior of functions by using mean value theorems. (L3)

Unit -3:

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variables. (L1)

Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables. (L3)

Unit -4:

Multiple Integrals

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, Cylindrical and Spherical polar co-ordinates.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates. (L5)
- Apply double integration techniques in evaluating areas bounded by region. (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries. (L5)

Unit -5:

Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions,

Evaluation of definite integrals using beta and gamma functions. Evaluation of double and triple integrals using Beta and Gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Beta and Gamma functions and its relations. (L2)
- Conclude the use of Special function in evaluating definite integrals. (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
5. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

CO1. Apply Solve the system of linear equations and reduce the quadratic forms to canonical form by applying matrices.
CO2. Apply mean value theorems for different functions with different intervals.
CO3. Analyze the multivariable calculus to find Jacobean, Maximum and Minimum.
CO4. Apply multiple integrals to find the area and volume for different functions.
CO5. Analyze the concepts of Beta and Gamma special functions for different functions.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem **L T P C**

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(PH20ABS103) APPLIED PHYSICS

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To identify the importance of the optical phenomenon i.e., interference, diffraction and polarization related to its engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de 'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Unit-1:

Wave Optics

Interference- Principle of superposition – Interference of light – Interference by division of wavefront and amplitude -Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index–Applications.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum–Applications.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates–Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the need of coherent sources and the conditions for sustained interference. (L2)
- Identify engineering applications of interference. (L3)
- Analyze the differences between interference and diffraction with applications. (L4)
- Illustrate the concept of polarization of light and its applications. (L2)
- Classify ordinary polarized light and extraordinary polarized light. (L2)

Unit-2:

Lasers and Fiber optics

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser–He-Ne laser– GaAs Laser – Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Attenuation – Optical fiber communication system – Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the basic concepts of LASER light Sources. (L2)
- Apply the concepts to learn the types of lasers. (L3)
- Identifies the Engineering applications of lasers. (L3)
- Explain the working principle of optical fibers. (L2)
- Classify optical fibers based on refractive index profile and mode of propagation. (L2)
- Identify the applications of optical fibers in various fields. (L3)

Unit-3:

Dielectric and Magnetic Materials

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientational polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation-Ferro electricity- Dielectric Loss-Applications.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: (Dia, Para, Ferro Ferri, & Antiferro) - Domain theory of Ferromagnetism (Qualitative), – Hysteresis – Soft and Hard magnetic materials-Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- Summarize various types of polarization of dielectrics. (L2)
- Interpret Lorentz field and Clausius-Mossotti relation in dielectrics. (L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- Explain the applications of dielectric and magnetic materials. (L2)
- Apply the concept of magnetism to magnetic devices. (L3)

Unit-4:

Quantum Mechanics, Free Electron Theory and Band theory of Solids

Quantum Mechanics- Dual nature of matter – de-Broglie hypothesis- Heisenberg uncertainty principle (Qualitative) – Significance of wave function- Schrodinger's time independent and dependent wave equation – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory (Merits and demerits) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Density of States–Fermi- Dirac distribution.

Band theory of Solids- Origin of energy bands- Classification of solids – Bloch's Theorem (Qualitative) – Kronig- Penney model (Qualitative) – E vs k diagram.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of dual nature of matter. (L2)
- Explain the significance of wave function. (L2)
- Interpret the concepts of classical and quantum free electron theories. (L2)
- Explain the importance of K-P model. (L2)
- Classify the materials based on band theory. (L2)

Unit-5:

Semiconductors and Superconductors

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Concept & Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interpret the direct and indirect band gap semiconductors. (L2)
- Identify the type of semiconductor using Hall effect. (L2)
- Identify applications of semiconductors in electronic devices. (L2)
- Explain how electrical resistivity of solids changes with temperature. (L2)
- Classify superconductors based on Meissner's effect. (L2)

Text books:

1. A text book of Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company, 11 Edition, 2019
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning, 2013

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics – K. Thyagarajan, McGraw HillPublishers, 2019
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press, 2010
4. Semiconductor physics and devices- Basic principle - Donald A, Neamen, McGraw Hill, 2011
5. Solid State Physics, A.J. Dekker, Macmillan Education UK, 1969
6. Kittel's Introduction to Solid State Physics, Charles Kittel ,Wiley India Edition Paperback, 2019

Course Outcomes:

CO1. Analyze the intensity variation of light due to Interference, diffraction and polarization.

CO2. Analyze different types of lasers and apply its principles in modern technology.

CO3. "Analyze the concept of dielectric and magnetic materials for potential applications in the emerging micro devices."

CO4. "Apply the fundamentals of quantum mechanics and their applications to study the behaviour of free electrons in solids."

CO5. "Apply the basic concepts of semiconductor and superconductivity in Engineering applications."

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I Sem

L	T	P	C
3	0	0	3

(EG20AHS101) COMMUNICATIVE ENGLISH

(Common to all Branches)

Course Objectives:

- To give inputs to students regarding effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
- To make students aware of reading strategies for comprehension of various academic texts and authentic materials.
- To improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
- To impart effective strategies for good writing and demonstrate the same in summarizing, writing well-organized essays, record and report useful information.
- To offer relevant inputs regarding grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Unit-1:

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing:** Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Parts of Speech, Prepositions, Word formation-I: Introduction to Word formation, Clauses and Sentences.

Learning Outcomes:

At the end of the module, the learners will be able to

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

- Ask and answer general questions on familiar topics and introduce oneself/others
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- Form sentences using proper grammatical structures and correct word forms

Unit-2:

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Articles, Word formation-II: Root words from other languages, Punctuation.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend short talks on general topics.
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers.
- Understand the use of cohesive devices for better reading comprehension.
- Write well-structured paragraphs on specific topics.
- Identify basic errors of grammar/ usage and make necessary corrections in short texts.

Unit-3:

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Paragraph Writing.

Grammar and Vocabulary: Noun-pronoun agreement, Subject-verb agreement, Word formation-III: Prefixes & suffixes from other languages. Principles of Good writing.

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend short talks and summarize the content with clarity and precision.
- Participate in informal discussions and report what is discussed.
- Infer meanings of unfamiliar words using contextual clues.
- Write summaries based on global comprehension of reading/listening texts
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing.

Unit -4:

Lesson: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communication processe or display complicated data.

Writing: Letter writing, Essay writing.

Grammar and Vocabulary: Misplaced Modifiers, Synonyms and Antonyms, Essay writing.

Learning Outcomes:

At the end of the module, the learners will be able to

- Infer and predict content of spoken discourse.
- Understand verbal and non-verbal features of communication and hold formal/informal conversations.
- Interpret graphic elements used in academic texts.
- Produce a coherent paragraph interpreting a figure/graph/chart/table.
- Use appropriate language for description and interpretation of graphical elements.

Unit-5:

Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Summary writing, Note making.

Grammar and Vocabulary: Clichés, Redundancies, Common Abbreviations, Writing a summary.

Learning Outcomes:

At the end of the module, the learners will be able to

- Take notes while listening to a talk/lecture and make use of them to answer questions.
- Make formal oral presentations using effective strategies.
- Comprehend, discuss and respond to academic texts orally and in writing.
- Produce a well-organized essay with adequate support and detail.
- Edit short texts by correcting Common Errors.

Web links

1. www.englishclub.com
2. www.easyworldofenglish.com
3. www.languageguide.org/english
4. www.bbc.co.uk/learningenglish
5. www.eslpod.com/index.html
6. www.myenglishpages.com

Text Books:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black-Swan.

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. Raymond Murphy's English Grammar in Use, Fourth Edition (2012)E-book.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011.
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary Goyal Reprint edition 2011.
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler; 2nd edition 2014.

Course Outcomes:

CO1. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.

CO2. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.

CO3. "Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations. "

CO4. "Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information. "

CO5. "Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing. "

SRI VENKATESWARA COLLEGE OF ENGINEERING
(Autonomous)

B.Tech I/I Sem **L T P C 3 0 0 3**

(EE20AES103) FUNDAMENTALS OF ELECTRICAL CIRCUITS
(Common to ECE & EEE)

Course Objectives:

To make the student learn about

- Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
- The
- Single-Phase AC circuits and concepts of real power, reactive power, complex power, phase angle and phase difference
- Network theorems and their applications
- Network Topology and concepts like Tree, Cut-set, Tie-set, Loop, Co-Tree.
- To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.

Unit- I Introduction to Electrical & Magnetic Circuits

Electrical Circuits: Circuit Concept – Types of elements - Source Transformation-Voltage-Current Relationship for Passive Elements. Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples. Loop and Nodal Methods of Analysis of Networks & Independent Voltage and Current Sources.

Magnetic Circuits: Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations.

Learning Outcomes:

- Know about Kirchhoff's Laws in solving series, parallel, non-series-parallel configurations in DC networks (L2)
- Know about voltage source to current source and vice-versa transformation in their representation (L2)
- Understand Faraday's laws (L1)
- Distinguish analogy between electric and magnetic circuits(L3)
- Understand the analysis of series and parallel magnetic circuits (L1)

Unit- II Single Phase A.C Circuits

R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation- Phasor diagrams - Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Apparent Power, Active and Reactive Power, Examples.

Learning Outcomes: The student will be able to

- Understand fundamental definitions of 1-φAC circuits(L2)
- Distinguish between scalar, vector and phasor quantities(L3)
- Understand voltage, current and power relationships in 1-φAC circuits with basic elements R, L, and C. (L2)
- Understand the basic definitions of complex admittances and complex power (L2)
- Solve 1-φAC circuits with series and parallel combinations of electrical circuit elements R, L and C. (L5)

Unit- III Network Theorems

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millmann's, Tellegen's, and Compensation Theorems for D.C and Sinusoidal Excitations.

Learning Outcomes: The student will be able to

- Understand that the electrical circuits are 'heart' of electrical engineering subjects and network theorems are main part of it. (L1)
- Distinguish between various theorems and inter-relationship between various theorems(L4)
- know about applications of certain theorems to DC circuit analysis (L2)
- Understands about applications of certain theorems to AC network analysis (L1)
- Know about applications of certain theorems to both DC and AC network analysis(L2)

Unit- IV Network Topology

Definitions – Graph – Tree, Basic Cut set and Basic Tie set Matrices for Planar Networks–Duality & Dual Networks. Nodal Analysis, Mesh Analysis.

Learning Outcomes: The student will be able

- To understand basic graph theory definitions which are required for solving electrical circuits(L1)
- To understand about loop current method(L1)
- To understand about nodal analysis methods(L1)
- To understand about principle of duality and dual networks(L1)
- To identify the solution methodology in solving electrical circuits based on the topology(L4)

Unit- V Three Phase A.C. Circuits

Introduction - Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.

Analysis of Three Phase Unbalanced Circuits - Loop Method - Star Delta Transformation Technique – for balanced and unbalanced circuits - Measurement of Active and reactive Power – Advantages of Three Phase System.

Learning Outcomes:

The student will be able to

- To know about advantages of 3-φcircuits over 1-φcircuits (L2)
- To distinguish between balanced and unbalanced circuits (L4)
- To know about phasor relationships of voltage, current, power in star and delta connected balanced and unbalanced loads (L2)
- To know about measurement of active, reactive powers in balanced circuits (L2)
- To understand about analysis of unbalanced circuits and power calculations (L2)

Text Books:

1. Circuit Theory (Analysis & Synthesis) A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.
2. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, McGraw Hill, 5th Edition, 2013.

Reference Books:

1. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition, 2006.
2. Network Analysis M.E Van Valkenberg, Prentice Hall (India), 3rd Edition, 1999.
3. Electrical Engineering Fundamentals V. Del Toro, Prentice Hall International, 2ndEdition, 2019.

4. Electric Circuits- Schaum's Series, Mc Graw Hill, 5th Edition, 2010.
5. Electrical Circuit Theory and Technology John Bird, Routledge, Taylor & Francis, 5thEdition, 2014.

Course Outcomes:

After completing the course, the student should be able to do the following

- CO1. Given a network, able to find equivalent impedance by using network reduction techniques and determine the current through any element and voltage across and power through any element.
- CO2. Given a circuit and the excitation, determine the real power, reactive power, power factor, etc.
- CO3. Apply the network theorems suitably to analyze complex circuits and determine the effective voltages and currents in the circuit.
- CO4. Determine the Dual of the Network, develop the Cut Set and Tie-set Matrices for a given Circuit.
- CO5. Analyze the three-phase balanced and unbalanced circuits and to measure active and reactive powers in three-phase circuits.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/I Sem

L	T	P/D	C
1	0	0/2	2

(ME20AES102) ENGINEERING DRAWING

(Common to all Branches of Engineering)

Engineering drawing being the principal method of communication for engineers

Course Objectives:

To introduce and make the students

- To use drawing instruments and to draw polygons, engineering curves.
- To draw orthographic projections of points, lines & planes.
- To draw the projections of the various types of solids in different positions inclined to one and both the planes.
- To draw the projections of sectional views of various types of right regular solids.
- To draw the development of regular solids.

Unit-1:

Introduction to Engineering Drawing:

Principles of Engineering Drawing and its Significance-Conventions in drawing-lettering – BIS conventions.

a) Conic sections (General Method only) including Rectangular Hyperbola.
b) Cycloid, Epicycloid and Hypocycloid.
c) Involutes.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing. (L2)
- Identify and draw curves obtained in different conic sections. (L3)
- Draw different curves such as cycloids and involutes. (L3)

Unit-2:

Projection of Points, Lines and Planes: Projection of Points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces inclined to one or both the planes.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection and draw the projections of points & lines. (L2)
- Differentiate between projected length and true length and find the true length of the lines. (L2)
- Draw the projection of regular plane surfaces. (L3)

Unit-3:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary view method.

Learning Outcomes: At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solids inclined to one plane. (L3)
- Draw the projection of solids inclined to both the planes. (L3)

Unit-4:

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes: At the end of this unit the student will be able to

- Understand different sectional views of regular solids. (L2)
- Obtain the true shapes of the sections of prism, cylinder, pyramid and cone. (L4)
- Draw the sectional views of prism, cylinder, pyramid and cone. (L3)

Unit-5:

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces. (L2)
- Draw the development of regular solids such as prism, cylinder, pyramid and cone. (L3)
- Obtain the development of sectional parts of regular shapes. (L4)

Text Books:

1. K.L. Narayana & P. Kannaiah, Engineering Drawing, 3/e, SciTech Publishers, Chennai, 2012.
2. N.D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dr K. Prahlada Rao, Dr. S. Krishnaiah, Prof. A.V.S. Prasad, Engineering Graphics, Amaravati publications.
2. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
5. K.C. John, Engineering Graphics, 2/e, PHI, 2013.
6. Basant Agarwal & C.M. Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- CO1. Draw basic geometrical constructions, curves used in engineering practices.
- CO2. Understand the concept of projection and acquire visualization skills, projection of points, Lines and Planes.
- CO3. Illustrate the projections of solids graphically.
- CO4. Draw and explore the sectional views of right regular solids.
- CO5. Draw the development of surfaces of solids.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P/D	C
B.Tech I/I Sem	**0**	**0**	**2**	**1**

(ME20AES103) ENGINEERING GRAPHICS LAB

(Common to all Branches of Engineering)

Course Objectives:

- Instruct the utility of drafting & modelling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modelling.
- Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, fillets, arrays, dimensions.

Exercises:

1. Practice exercise using basic drawing commands (4 No's).
2. Practice exercise using editing commands (4 No's).

Orthographic and Isometric Projections

Orthographic Projections: Systems of projections, conventions and application to orthographic projections.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Exercises:

1. Practice exercises on Orthographic Projections (4 No's).
2. Practice exercises on Isometric Projections (4 No's).

Text Books:

1. K. Venugopal, V. Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Engineering Drawing, ND Bhatt, Charotar Publishing House.
3. Engineering Drawing, K.L Narayana, SciTech Publishers.
4. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, Revised edition, 2010.

Course Outcomes:

After completing the course using CAD package, the student will be able to

- CO1. Draw the basic views related to projections of Lines, Planes
- CO2. Draw the basic views related to projections of Planes
- CO3. Illustrate orthographic views of simple objects
- CO4. Illustrate isometric projections of simple solids
- CO5. Interpret and comprehend with drafting packages for engineering practice.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P	C
B.Tech I/I Sem	**0**	**0**	**3**	**1.5**

(PH20ABS104) APPLIED PHYSICS LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester.

List of Applied Physics Experiments:

1. Determine the thickness of the wire using wedge shape method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber its acceptance angle.
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current–StewartGee's method.
10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
11. To determine the energy gap of a semiconductor by temperature by Four-Probe Method.
12. Determination of thermistor negative temperature coefficient of resistance.

References:

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

2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

Course Outcomes:

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

- CO1. Apply skill to find the wavelength of spectral lines using plane diffraction grating.
- CO2. Analyze the usage of electrical and optical systems for various measurements.
- CO3. Apply the concept of hysteresis curve of a ferromagnetic material to know the strength of magnetic material.
- CO4. Analyze the working principles of semiconducting devices to study the applications of semiconducting technology.
- CO5. Analyze the different types of spectrums using interference and diffraction phenomena.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/I Sem

L	T	P	C
0	**0**	**3**	**1.5**

(EG20AHS102) COMMUNICATIVE ENGLISH LAB

(Common to all Branches)

Course Objectives:

- To expose students to a variety of self-instructional, learner-friendly modes of language learning.
- To give inputs on better pronunciation through stress, intonation and rhythm.
- To make students aware of the impact of mother tongue on their use of English.
- To make students aware of the skills of using effective language in Interviews, Group Discussions and Public speaking.
- To equip students with knowledge of the use of computers in resume preparation, report writing, and format making etc.

Unit-1:

1. Phonetics (sounds symbols, transcription and Received Pronunciation (R.P), stress and intonation).
2. Describing objects/places/persons.

Unit-2:

1. Role Play/ Conversational Practice.
2. JAM.

Unit-3:

1. **Group Discussion**: Types, process, language and body language.
2. **Debate**: Arguing in favor of and against a topic- logical questioning.

Unit-4:

1. **Oral/ Poster Presentations:** Structure, preparation, visual aids and delivery.
2. **Resume Writing:** Definition, formats and practice.

Unit-5:

1. **Interview Skills**: Basics of interviews -kinds of interviews- preparation – and performance.
2. **Film/book review:** Structure, language and practice.

Suggested Software

Orel, Walden InfoTech, Young India Films.

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) Macmillan Educational. 2016**.**
4. Hewings, Martin. Cambridge Academic English (B2). Cambridge University Press, 2012.
5. T. Balasubramaniyan, A Textbook of English Phonetics for Indian Students, 3rd edition; Laxmi publications 2017.

Web Links

1. www.esllab.com
2. www.englishmedialab.com
3. www.englishinteractive.net

Course Outcomes:

After completing the course, the students will be:

CO1. Develop to handle and excel in a variety of self-instructional, learner-friendly modes of language learning.

CO2. Develop to employ better stress and intonation patterns and utter English sounds correctly.

CO3. Develop to avoid the impact of mother tongue in English and neutralize their accent.

CO4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.

CO5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

B.Tech I/I Sem

L	T	P	C
0	0	3	1.5

(EE20AES104) FUNDAMENTALS OF ELECTRICAL CIRCUITS LAB
(ECE & EEE)

Course Objectives:

- Remember, understand and apply various theorems and verify practically.
- Understand and analyze active, reactive power measurements in three phase balanced &unbalanced circuits.

List of Experiments:

1. Verification of KCL and KVL for DC circuits
2. Determination of Self, Mutual Inductances and Coefficient of Coupling
3. Verification of Superposition Theorem for DC Circuits
4. Maximum Power Transfer Theorem for DC and AC circuits
5. Verification of Compensation Theorem for DC circuits
6. Verification of Reciprocity, Millmann's Theorems for DC circuits
7. Measurement of Active Power for Star Connected Balanced Loads
8. Measurement of Reactive Power for Star Connected Balanced Loads
9. Measurement of Active Power for Delta Connected Balanced Loads
10. Measurement of Reactive Power for Delta Connected Balanced Loads
11. Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

Note: Minimum 10 experiments to be performed

Course Outcomes:

At the end of the course, students should be able to

CO1. Distinguish analogy between electric and magnetic circuits and apply the principles to determine circuit parameters. (L5)

CO2. Remember, understand and apply various theorems and verify practically. (L5)

CO3. Understand and analyze active, reactive power measurements in three phase balanced and unbalanced circuit (L5)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/I Sem

L	T	P	C
2	0	0	0

(MA20AMC101) LOGICAL SKILLS FOR PROFESSIONALS-I

(Mandatory Course)

Course Objectives:

- To learn the basic methods to find averages, percentages, Time and Distance and Time and Work concepts extended to problems on trains, Boats and Streams and different shortcut techniques to find the solution in a stipulated time.
- To understand the logic behind the series, coding- decoding, Directions, Problems on ages, Analogy concepts.

Unit-1:

Averages:

- Find the averages on some quantities.
- Find the averages on speed and distance.

Ratio and Proportions:

- Ratio between quantities of the same kind.
- Comparison of two ratios and convert into equal fractions.
- Find the 4^{th}, 3^{rd} terms of proportions and mean proportions.

Profit and Loss:

- Find the Profit or Loss on Selling price, cost price and market price.

Unit-2:

Partnership:

- Ratio of division of gains.
- Working and sleeping partners.

Simple Interest and Compound Interest:

- Find the Principal, Rate of interest and time.
- Find the amount of compound interest when the compound interest is Annually or half-year or quarterly or daily.
- Find the difference between the simple and compound interests

Time and Distance:

- Find the time, speed and distance by using direct formula.
- Find the time, speed and distance by using ratios and averages.

Unit-3:

Time and Work:

- The relation between days taken by individuals to complete a given work independently and to complete while working simultaneously or alternately.
- Teams of men, women, children and time taken by the teams to complete work independently or while working simultaneously.

Problems on Trains:

- Time Taken by Train to Cross any stationary Body or Platform.
- Time Taken by 2 trains to cross each other.
- Distance covered when two trains are moving in the same/opposite directions.

Boats and streams:

- Find the speed of boat in upstream and downstream.
- Find the speed of boat in still water and **average speed of**

boat. Unit-4:

Series:

- Alphabet series
- Number series
- Alpha-Numeric series

Coding and Decoding:

- Letter coding
- Number/symbol coding
- Substitution coding

Blood relation:

- Based dialogue or conversation
- Based on puzzles

Unit-5:

Directions:

- The right and left directional movement
- The directional reference point
- The directions of sun rays and shadow

Problems on ages:

- Find the ages at present
- Find the ages in future
- Find the ages in post

Analogy:

- Alphabet analogy
- Number analogy

Text Books:

1. Quantitative Aptitude, 2012, Dr. R.S. Agarwal, S. Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi

Course Outcomes:

CO1. Analyze Averages and Ratio-Propostions

CO2. Analyze Partnership Interest and Time and Distance

CO3. Apply the values of Time and work Problems on Trains and Boats and Streams

CO4. Apply the values of Series Codind -Decoding and Blood relation

CO5. Analyze the values of Directions Problem on Ages Analogy

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
3	0	0	3

(MA20ABS201) DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All Branches)

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit -1:

Differential equations

Exact, Non-Exact Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients. (L3)
- Solve the linear differential equations with constant coefficients by appropriate method. (L3)
- Classify and interpret the solutions of linear differential equations. (L3)

Unit -2:

Linear differential equations of higher order

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, method of variation of parameters, Cauchy's and Legendre's linear equations. Applications to L-C-R Circuit.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the linear differential equations with variable coefficients by appropriate method. (L3)
- Classify and interpret the solutions of linear differential equations of higher order. (L3)

- Formulate and solve the higher order differential equation by analyzing physical situations. (L3)

Unit 3:

Partial differential equations

Formation of a PDE, Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, rules for finding the complementary function and the particular integral.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs. (L3)
- Outline the basic properties of standard PDEs. (L2)

Unit-4:

Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence, Curl and their related properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply del to Scalar and vector point functions. (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl. (L3)

Unit -5:

Vector integration

Line integral-circulation-work done by force, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

At the end of this unit, the student will be able
to

- Find the work done in moving a particle along the path over a force field. (L4)
- Evaluate the rates of fluid flow along and across curves. (L4)

- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals. (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
6. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
7. N. Bali, M.Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

CO1. Apply differential equations related to solve various engineering field problems

CO2. Solve the linear differential equations of higher order related to various engineering fields

CO3. Analyze partial differential equations related to solve various engineering field problems

CO4. Analyze the physical meaning of different operators such as gradient, curl and divergence

CO5. Apply vector calculs methods to find the work done against a field, circulation and flux

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
3	0	0	3

(CH20ABS103) CHEMISTRY

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- To impart the concept of soft and hard waters, softening methods of hard water.
- To familiarize engineering chemistry and its applications.
- To train the students on the principles and applications of electrochemistry.
- To determine the polymer molecular weights and various applications of polymers.
- To introduce instrumental methods.

Unit 1: Water Technology

Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method, Estimation of Dissolved Oxygen by Winkler's method -Boiler troubles– Priming, foaming, scale and sludge, Caustic embrittlement, Domestic treatment of water, specifications for drinking water, Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, Industrial water treatment, ion-exchange processes - desalination of brackish water, reverse osmosis.

Learning Outcomes:

At the end of this unit, the students will be able to

- List the differences between temporary and permanent hardness of water. (L1)
- Explain the principles of reverse osmosis and electrodialysis. (L2)
- Compare quality of drinking water with BIS and WHO standards. (L2)
- Illustrate problems associated with hard water - scale and sludge. (L2)
- Explain the working principles of different Industrial water treatment processes. (L2)

Unit 2: Modern Engineering materials

Understanding of materials: Crystal field theory – salient features – splitting in octahedral and tetrahedral geometry. Properties of coordination compounds-Oxidation state, coordination, magnetic and colour.

Semiconductor materials, super conductors- basic concept, band diagrams for conductors, semiconductors and insulators, Effect of doping on band structures. Super capacitors: Introduction, Basic Concept-Classification – Applications.

Nano chemistry: Introduction, classification of nanomaterials, properties and applications of Fullerenes, carbon nano tubes and Graphene's nanoparticles.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain splitting in octahedral and tetrahedral geometry of complexes. (L2)
- Discuss the magnetic behavior and colour of coordination compounds. (L3)
- Explain the band theory of solids for conductors, semiconductors and insulators. (L2)
- Demonstrate the application of Fullerenes, carbon nano tubes and Graphines nanoparticles. (L2)

Unit 3: Electrochemistry and Applications

Introduction to Electrochemistry: Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems,

P^H metry, Potentiometry - potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium ion batteries- working of the batteries including cell reactions; Principles and applications of Fuel cells: hydrogen-oxygen, methanol fuel cells

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply Nernst equation for calculating electrode and cell potentials. (L3)
- Differentiate between P^h metry, potentiometric and conductometric titrations. (L2)
- Explain the theory of construction of battery and fuel cells. (L2)
- Solve problems based on cell potential. (L3)

Unit 4: Polymer Chemistry

Introduction to polymers, functionality of monomers, types of polymerization, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation. Calculation of weight average molecular mass of polymers, polydispersity index (PDI).

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers–polyacetylene, polyaniline, polypyrroles–mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- Explain the different types of polymers and their applications. (L2)
- Explain the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres. (L2)
- Describe the mechanism of conduction in conducting polymers. (L2)
- Discuss Buna-S and Buna-N elastomers and their applications. (L2)

Unit 5: Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert’s law. Principle, instrumentation and applications of UV-Visible, IR Spectroscopies.

Learning outcomes:

After completion of Unit IV, students will be able to:

- Explain the different types of spectral series in electromagnetic spectrum. (L2)
- Understand the principles of different analytical instruments. (L2)
- Explain the different applications of analytical instruments. (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins’ Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.

2. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

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

- CO1. Categorize the different problems present in the water and use technology to improve the quality of water.
- CO2. Apply the concept of CFT, semi-conductors, super conductors super capacitors and nano materials in various electronic devices.
- CO3. Apply the basic concepts of batteries,electro analytical techniques that facilitate rapid and reliable measurements.
- CO4. Distinguish polymerization reactions with mechanism and their applications.
- CO5. Use the principle of instrumentation to analyze the chemical and biological components.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- I/II Sem

L	T	P	C
3	0	0	3

(CS20AES101) PROBLEM SOLVING USING C (Common to All Branches of Engineering**)**

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

UNIT-1:

Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, Flowcharts, flowgorithm.

Overview of C: History Of C, C Language Elements, Basic Structure of C Program, C Tokens-Variables and Data Types, Operators, Expressions and Type Conversions.

Learning Outcomes:

The students will be able to

- Develop solution through problem understanding and decomposition (L6).
- Develop basic flowcharts for performing input and output and computations (L3).
- Solve Numerical Problems using Flowgorithm (L3).
- Use C basic concepts to write simple C programs (L3).

UNIT-2:

Control Statements: Selection Statements- if and switch statements.

Iterative Statements: for, while and do-while statements.

Jump Statements: break and continue statements.

Learning Outcomes:

The students will be able to

- Implement C program using Conditional statements (L2).
- Implement C program using Iterative statements (L2).

UNIT-3:

Arrays: Declaration, accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

Learning Outcomes: The students will be able to

- Writing Structured programs using Functions (L5).
- Apply arrays concepts on real time applications (L6).

UNIT-4:

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.

Strings: Introduction to Strings, String handling functions, Preprocessor Directives.

Learning Outcomes: The students will be able to

- Use pointers to write c Programs (L3).
- Understand the concepts of preprocessors (L2).
- Apply Dynamic Memory Allocation concepts on real time applications (L6).

UNIT-5:

Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.

Files in C: Using Files in C, Read data from Files, Writing data to Files, Random access to files, Command-line Arguments

Learning Outcomes:

The students will be able to

- Use the concepts of Structures and Unions to write C programs (L3).
- Apply various operations on Files (L6).

Text Books:

1. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Ellot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++, Eighth Edition

Course Outcomes:

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

CO1. • Understand Core Programming Concepts

CO2. Enhance problem-solving skills through the application of control statements to various programming scenarios.

CO3. Enable students to apply concepts of recursion for solving problems that have repetitive subproblems.

CO4. To enable students to apply dynamic memory allocation and pointers to use memory effictively

CO5. Analyse to use structures and unions effectively to manage and represent complex data in C programming.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
3	0	0	3

(EC20AES201) ELECTRONIC DEVICES AND CIRCUITS

(ECE)

Course Objectives:

- To understand the basic principles of all semiconductor devices.
- To be able to solve problems related to diode circuits, and amplifier circuits.
- To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
- To be able to compare the performance of BJTs and MOSFETs.
- To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Unit 1

Diodes: Review of Semiconductors, the ideal diode- current voltage characteristics, Applications of diodes, Terminal characteristic of junction diodes- forward-bias, Reverse-bias and breakdown regions, Modeling the diode forward characteristics- The exponential model, Graphical analysis and Iterative analysis using the exponential model, The Piecewise-Linear model, Constant-voltage-drop model, Ideal-Diode model and Small signal model.

Learning outcomes:

- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand iterative and graphical analysis of simple diode circuits. (L1)

Unit 2

Other Diodes and Bipolar Junction Transistors (BJTs):

Specifying and Modeling the Zener diode, Use of the Zener as a Shunt regulator, Temperature effects. Rectifier circuits- The Half-wave rectifier, The Full-Wave rectifier, The Bridge Rectifier without and with a Filter capacitor, Voltage doubler, The Schottky- barrier diode, Varactor diode, Photodiodes and Light-Emitting Diodes.

Bipolar Junction Transistors (BJTs): Device Structure and Physical operation- circuit symbol and conventions, Simplified structure and Modes of operation, Operation of NPN transistor in the Active mode, Structure of actual transistor, Ebers-Moll model, Operation in the Saturation mode, The PNP transistor, Graphical representation of transistor characteristics and Early effect.

Learning outcomes:

- Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
- Understand the V-I characteristics of BJT and its different configurations. (L1)
- Analyze various applications of diode and special purpose diodes. (L3)
- Design rectifier and voltage regulator circuits. (L4)

Unit 3

Bipolar Junction Transistors:

BJT circuits at DC, Biasing in BJT amplifier circuits- The classical discrete-circuit bias arrangement, A two power supply version, Biasing using a Collector-to-Base feedback resistor, The Hybrid-π model and T model, Performing small-signal analysis directly on the circuit diagram.

Basic BJT amplifier configurations: Three basic configurations- The Common Emitter amplifier without and with emitter resistance, Common Base amplifier and Common collector amplifier, Comparison of three configurations.

Learning outcomes:

- Solve problems on various biasing circuits using BJT. (L2)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

Unit 4

JFET & MOS Field-Effect Transistors:

Operation of both N-channel and P-channel JFET-Drain characteristics and Transfer characteristics. Device structure and Physical Operation (both N-channel and P- channel MOSFET), Current – Voltage characteristics, MOSFET circuits at DC, Biasing in MOS amplifiers circuits: Biasing by fixing VGS, Biasing by fixing VG and connecting a resistance in the source and Biasing using a drain to gate feedback resistor. **Learning outcomes:**

- Understand the principle of operation of various types of JFET and MOSFET devices (L1)

- Understand the V-I characteristics of JFET and MOSFET devices and their configurations (L1)

Unit 5

MOSFET Small signal operation and Models:

The DC bias point, voltage gain, separating the DC analysis and the signal analysis, small signal equivalent circuit models, the trans conductance and T-equivalent circuit model. Basic MOSFET amplifier configurations-Three basic configurations, Characterizing amplifiers, Common source amplifier without and with source resistance, Common Gate amplifier, and Common Drain amplifier and Comparison of three configurations.

Learning outcomes:

- Solve problems on small signal equivalent of MOSFET devices. (L2)
- Analyze various biasing circuits based on different types of MOSFETs. (L3)
- Design an amplifier using MOSFET based on the given specifications. (L4)

Text Books:

1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits – Theory and Applications", 6th Edition, Oxford Press, 2013.

2. Donald A Neamen, "Electronic Circuits–analysis and design",3rd McGrawHill (India),2019.

References:

1. J.Milliman and CHalkias,"Integrated electronics",2nd Edition, Tata McGrawHill, 1991.

2. Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.

3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.

Course Outcomes:

After the completion of the course, students will able to

CO1. Understand principle of operation, characteristics of semiconductor diode along with their models

CO2. Analyze the characteristics of different types of diodes and their applicatons and compre them

CO3. Illustarate biasing techniques of BJT and perorm small signal analysis on BJT configurations

CO4. Describe the characteristics of JFET/MOSFET along with their biasing methods

CO5. Apply the device models to characterize the performance of MOSFET configurations

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P	C
B.Tech I/II Sem	**0**	**0**	**3**	**1.5**

(ME20AES101) ENGINEERING WORKSHOP
(Common to all Branches)

Course Description:

This course will provide students with a hands-on experience on various basic engineering practices. This course will also provide an opportunity to the students to experience the various steps involved in the industrial product fabrication.

Course Objectives:

- To familiarize students with basic engineering applications in day-to-day life.

Wood Working: (Any 2)

To familiarize with different types of wood and tools used in wood working and make following joints;

1. Planning and Sawing of Wood
2. Half – Lap Joint
3. Mortise and Tenon Joint
4. Dovetail Joint or Bridle Joint

Sheet Metal Working: (Any 2)

To familiarize with different types of tools used in sheet metal working, developments of following sheet metal job from GI sheets;

1) Rectangular tray 2) Conical funnel 3) Open scoop

Fitting: (Any 1)

To familiarize with different types of tools used in fitting and do the following fitting exercises;

1) V-fit 2) Square fit 3) Dovetail fit

Electrical Wiring: (Any 2)

To familiarize with different types of basic electrical circuits and make the following connections;

1) Parallel and series 2) Two-way switch 3) Godown lighting 4) Soldering of wires.

Foundry Practice: (Any 1)

To familiarize with different types of tools used in Foundry and do the following exercises;

1. Preparation of a green sand mould using single piece pattern
2. Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

Welding Practice: (Any 1)

To familiarize with different types of tools used in Welding and do the following exercises;

1. Lap joint, butt joint and T joint using arc welding.
2. Lap joint using resistance spot welding
3. Lap and butt joints using gas welding

Assembling/Disassembling Practice: (Any 1)

To familiarize with different types of tools used in Assembling/Disassembling and do the following exercises;

1. Bicycle
2. Clutch and carburetor
3. Two-wheeler engine parts

Manufacture of a Plastic Component (Any 1)

To familiarize with different types of tools used in Manufacture of a Plastic Component and do the following exercises;

1. Use of injection moulding machine
2. FRP composite preparation using hand layup method
3. Joining of plastic components

Reference Books/Laboratory Manuals:

1. P. Kannaiah and K. L. Narayana, Workshop Manual, SciTech Publishers, 2009.
2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008.
3. V. Ramesh Babu, Engineering Workshop Practice, V R B Publishers Private Limited, 2009.

Additional Learning Resources:

1. R. K. Jain, Production Technology, Khanna Publishers, 17th edition, 2012.
2. Kalpakjain, Serope, Manufacturing Engineering and Technology, Pearson Education, 7th edition, 2014.

Course Outcomes:

After completion of this lab the student will be able to

CO1. Identify tools, work material, measuring instruments useful for domestic applications

CO2. Apply wood working skills in real world applications

CO3. Build different parts with metal sheets in real world applications

CO4. Apply fitting operations in various applications for good strength

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P	C
B.Tech I/II Sem	**0**	**0**	**3**	**1.5**

(CS20AES103) IT Workshop

(Common to All Branches of Engineering**)**

Course Objectives:

- To make the students to know about the internal parts of computer, Generation of Computers
- To make the students to know how to assemble and disassemble a computer from its parts
- To make the students to install Operating system for a computer.
- To provide technical training to the students on productivity tool like Word Processor, Spread Sheets, Presentations and LaTeX
- To learn about networking of computers and use Internet facility for browsing and searching

Task 1:

Learn about Computer Hardware -1: Identifying the internal parts of computer with its peripherals, Block diagram of Computer, Generations of Computers. Write specifications for each part of a computer including peripherals and specifications of a system. Submit it in the form of report.

Task 2:

Learn about Computer Hardware-2: Assemble and disassemble the Personal Computer, Internal and external connections of the computer, Troubleshoot the computer by identifying working and non-working parts. Submit a report about the working and non-working parts in a computer.

Task 3:

Installation of Operating System: Linux, Windows 7/8/10 Installation, install both the operating system in a computer and make the system as Dual boot. Student should record the entire installation process.

Task 4:

Installation of Device drivers: install supported device drivers for the system-printer drivers, audio and video drivers, Graphic card drivers, USB drivers, install new application software and record the process of installations.

Task 5:

Networking: Connecting computers directly using a cable or wireless connectivity and share information, connecting computers using switch/hub or Local Area Network connection and share information, Wide Area Network Connection, crimpling activity, logical configuration. The entire process has to be documented.

Task 6:

Introduction to Web Design: Introduction to Web Design, Introduction to HTML tags, Cascading Style sheets and Applications using HTML and CSS.

Task 7:

Introduction to Virus and Antivirus: Types of Virus, virus engine, Antivirus-download freely available Anti-virus software, install it and use it to check for the threats to the computer being used. Student should submit information about the features of the installation process and antivirus used.

Task 8:

Introduction to Microsoft Office-1: Microsoft word, Operations on text data in word- inserting, deleting, Aligning, header, footer, font style, font type, bulleting and numbering, hyperlinking, inserting images, page setup, inserting images, writing equations, formatting Paragraphs, spell checking etc. Student should submit a user manual of the word processor

Task 9:

Introduction to Microsoft Office-2: Microsoft Excel, Operation on data in Excel-creating, opening, saving the document as per the requirement, inserting, deleting the cell data, format the cell, creation of pivot table, applying the formulas and functions, preparing charts, converting .xls to csv, etc., Student should submit a user manual of the Spreadsheet.

Task 10:

Introduction to Microsoft Office-3: Microsoft PowerPoint Presentation, creating, opening, saving the presentations, inserting and deleting the slides, styles for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slideshow, Setting the timing for slide show. Student should submit a user manual of the PowerPoint presentation.

Task 11:

Introduction to LaTeX: LaTeX and its installation and different IDEs, Creating the document using Latex, content into sections using article and book class of Latex.

Styling Pages: Reviewing and customizing different paper sizes and formats. Formatting text, creating basic table, adding simple and dashed border, merging rows and columns, referencing and indexing. Student should submit a user manual of the LaTeX.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. PC Hardware, Maintenance & Troubleshooting In-Depth, Reddy N.S.
3. MOS study guide for Word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
5. Networking your computers and devices, Rusen, PHI
6. Lamport L. LaTeX: a document preparation system: user’s guide and reference manual. Addison-Wesley: 1994

Course Outcomes:

CO1. Understanding the internal parts of the computer and Assembling and Disassembling Procedure.

CO2. Understanding the process of Installating different types of operating systems and required softwares.

CO3. Access the Internet and browse it for required information and Interconnect two or more computers for information sharing.

CO4. Create a web page using HTML

CO5. "Create the documents using Word Processor, prepare spread sheets for calculations using Excel, and documents for LaTeX."

CO6. Design presentation using the presentation tool.

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(Autonomous)

B.Tech I/II Sem

L	T	P	C
0	0	3	1.5

(CS20AES102) PROBLEM SOLVING USING C LAB

(Common to All Branches of Engineering**)**

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Dynamic Memory Allocation.
- To understand and implement Structures and Unions.
- To familiarize with Files and File Operations.

Week-1: Draw flowcharts for fundamental algorithms.

Week-2: C Programs to demonstrate C-tokens.

Week-3: C Programs on usage of operators.

Week-4: C Programs to demonstrate Decision making and branching (Selection).

Week-5: C Programs to demonstrate different loops.

Week-6: C Programs to demonstrate 1-D arrays.

Week-7: C Programs to demonstrate multi-dimensional arrays.

Week-8: C Programs to demonstrate functions.

Week-9: C Programs on pointers.

Week-10: C Programs to perform operations on Strings with String handling functions and without String handling functions.

Week-11: C Programs on Structures and Unions.

Week-12: C Programs to demonstrate Files.

Text Books:

1. R.G. Dromey, How to Solve it by Computer, 1/e, Pearson Education, 2006.
2. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.

Reference Books:

1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
2. Pradip Dey, Manas Ghosh, Programming in C, Oxford University Press, AICTE Edition,
3. B. Gottfried, Programming with C, 3/e, Schaum's outlines, McGraw Hill (India), 2017.
4. Jeri R. Hanly, Ellot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson.

Course Outcomes:

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

CO1. Build algorithm and flowchart for simple problems.

CO2. Use suitable control structures to solve problems.

CO3. Use suitable iterative statements, arrays ,modular programming,pointers and string handling to solve the problems.

CO4. "Develop code for complex applications using structures, unions and file handling features."

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	T	P	C
0	**0**	**3**	**1.5**

(CH20ABS104) CHEMISTRY LAB

(ECE, EEE, CSE, CSE (AI & ML), IT)

Course Objectives:

- Verify the fundamental concepts with experiments

Note: In the following list, out of 12 experiments, any 10 experiments must be performed in a semester

List of Chemistry Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of Bakelite
8. Verify Lambert-Beer's law.
9. Thin layer chromatography.
10. Identification of simple organic compounds by IR.
11. Preparation of nano material's by precipitation.
12. Estimation of Ferrous Iron by Dichro metry.
13. P^H metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.
3. Chemistry Laboratory Manual, Sri Krishna Hitech Publishing Company Pvt.Ltd,2nd Edition, A Ravi Krishanan, B Tirumalarao, 2020-2021.

Course Outcomes:

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

- CO1. Demonstrate electro-analytical techniques for the chemical analysis.
- CO2. Apply Beer-Lambert Law to know the concentration of unknown samples
- CO3. Analyze the quality and quantity of chemical compounds in given samples
- CO4. Prepare different types of polymers

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech I/II Sem

L	**T**	**P**	**C**
0	**0**	**3**	**1.5**

(EC20AES202) ELECTRONIC DEVICES & CIRCUITS LAB

(ECE)

Course Objectives:

- To verify the theoretical concepts practically from all the experiments.
- To analyse the characteristics of Diodes, BJT and MOSFET
- To design the amplifier circuits from the given specifications.
- To Model the electronic circuits using tools such as PSPICE / Multisim.

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments: (Execute any 8 experiments).

Note: All the experiments shall be implemented using both Hardware and Software.

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic resistances under forward bias and reverse bias of the diode from the graphs obtained.
2. Verification of Volt- Ampere characteristics of a Zener diode and find Breakdown voltage, static and dynamic resistances of the diode from the graphs obtained.
3. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
4. Design a Zener diode-based voltage regulator against variations of supply and load. Verify the same from the experiment.

5. Verification of the input and output characteristics of BJT in Common Emitter configuration experimentally and find required h – parameters from the graphs.
6. Verification of the input and output characteristics of BJT in Common Base configuration experimentally, and determine required h – parameters from the graphs.
7. Verification of the output and transfer characteristics of MOSFET (Enhancement mode) in Common Source Configuration experimentally. Find Threshold voltage V_T, g_m, μ & r_d.
8. Verification of the output and transfer characteristics of MOSFET (Depletion mode) in Common Source Configuration experimentally. Find Threshold voltage V_T, g_m, μ & r_d.
9. Design and analysis of self-bias circuit using BJT.
10. Design and analysis of self-bias circuit using MOSFET.
11. Design a BJT switch.
12. Design a small signal amplifier using BJT (common emitter) for the given Specifications. Draw the frequency response and find the bandwidth.
13. Design a small signal amplifier using MOSFET (common source) for the given specification. Draw the frequency response and find the bandwidth.

Tools/Equipment Required: Software Tools like Multisim/P Spice or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course Outcomes:

After the completion of the course students will able to:

- CO1. Verify the basic characteristics and applications of semiconductor diode and zener diode
- CO2. Design electronic circuit applications using diodes and Zener diode and test for the given specifications.
- CO3. Analyze the V-I characteristics of BJT and MOSFET and their biasing methods
- CO4. Design and test applications of BJT/MOSFET and analyze the performance
- CO5. Explore PSPICE / Multisim tool to test and verify varoious electronic devices and circuits

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

	L	T	P	C
B.Tech I/II Sem	**2**	**0**	**0**	**0**

(CH20AMC201) ENVIRONMENTAL SCIENCE

(Common to All Branches)

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life.
- To save earth from the inventions by the engineers.

UNIT – I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources:

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding the importance of public awareness. (L2)
- Understanding about the various resources. (L2)

UNIT – II

Ecosystems:

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession

– Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem.
c. Desert ecosystem.
d. Aquatic ecosystems. (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation:

Introduction: Definition, genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about various ecosystems and their characteristics. (L2)
- Understanding the biodiversity and its conservation. (L2)

UNIT – III

Environmental Pollution: Definition, Causes, effects and control measures of

a. Air Pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes –Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the various sources of pollution. (L2)
- Understanding about the various sources of solid waste and preventive measures. (L2)
- Understanding about the different types of disasters and their managerial measures. (L2)

UNIT – IV

Social Issues and the Environment:

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act –Issues involved in enforcement of environmental legislation – Public awareness.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the social issues related to environment and their protection acts. (L2)
- Understanding about the various sources of conservation of natural resources. (L2)
- Understanding about the wild life protection and forest conservation acts. (L2)

UNIT – V

Human Population and The Environment:

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/ forest/ grass/ hill/ mountain–Visit to a local polluted site- Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes.

Learning outcomes:

At the end of this unit, the students will be able to

- Understanding about the population explosion and family welfare programmes. (L2)
- To identify the natural assets and related case studies. (L3)

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education.
3. S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company.
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited.
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House.
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

Course Outcomes:

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

CO1. Understand the concepts of environment and natural resourses

CO2. Classify the types of ecosystems and conservation of bio-diversity.

CO3. Identify the causes and problems of pollution in their real life situations .

CO4. Develop awareness on social issues such as global warming, acid rains,ozone layer depletion and sustainalibility.

CO5. Determine the consequences of population exploitation in detail.

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B.Tech II Sem

L	T	P	C
2	0	0	0

(EG20AMC101) SPEECH AND ORAL COMMUNICATION (Mandatory Course)
(Common to All Branches**)**

Course Objectives:

- To improve the language proficiency of the students in English by practicing with his/her peers.
- To impart creative skills for professional development.
- To develop the communication skills of the students in both formal and informal situations.
- To develop extensive speaking skills and comprehension for career growth.

Detailed Syllabus:

Unit-1:

Story Telling (Narrate a story)

1. Biography description (Describe a freedom fighter/politician/athlete/celebrity etc.)
2. Speech sounds
3. Formal Conversation (Enact official Telephone conversation/Telephone interview etc.)
   Verb forms, Subject -Verb agreement, Vocabulary).

Unit-2:

1. Stress in Speech
2. English Puzzle solving (Finding cross words from table)
3. Fun with English (Speech through grammar-changing tense, voice of the sentences)
4. Open Talk with CM (Funny interview with class mates) Voice, Speech.

Unit-3:

1. Intonation
2. If I'm a..... What would I do? (Students enact as… and describe their choices what they would do?)
3. Language Translation (Dialogues/jokes/proverbs/quotations-Regional language to English)

4. Mock Assembly (Students enact as speaker, MLA, CM and opposition leaders in Assembly) Wh- Questions, Question tags.

Unit-4:

1. Tongue twisters / pronounce it…..
2. Humorous Play (Playing jokes/Telling funny dialogues in English)
3. Celebrity Interview (Enact Play), Spotting Errors, Etiquettes

Unit-5:

News Reader (Prepare funny news and read on Dias)

1. Film Review (A critique on regional language films by students)
2. Movie Script Narration (Subject -Verb agreement, Tenses)

Reference books:

1. K.R Lakshmi Narayanan, A Course book on English, SCITECH publications Pvt. Ltd,Hyd, 2009.
2. Sanjay Kumar & Pushp Lata, Communication skills, Oxford university press, New Delhi, 2019.
3. M Ashraf Rizvi, Effective Technical Communication, Tata McGraw- Hill, New Delhi, 2017.

Additional Learning Resources:

1. https://www.bbc.co.uk/skillswise/english
2. https://www.nonstopenglish.com
3. https://www.grammarly.com/blog/

Course Outcomes:

CO1. Achieving neutral accent and be free from mother tongue influence.

CO2. "Hypothesizing small talks on general topics and learn critiquing skills by participating in Conversations. "

CO3. Applying Vocabulary and using it in their day to day life.

CO4. Understanding and mastering in verbal and non-verbal communication.

CO5. Communicate fluently and confidently on a variety of topics, using appropriate vocabulary, grammar, pronunciation, and delivery techniques of communication.

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(Autonomous)

B.Tech -III SEM

L	T	P	C
3	0	0	3

(MA20ABS302) COMPLEX VARIABLES AND TRANSFORMS (EEE & ECE)

Course Objectives:

- To understand the knowledge on functions of complex variables. (L2)
- To evaluate improper integrals of complex functions using Residue theorem. (L5)
- To apply the knowledge on Laplace transforms and its applications in solving ordinary differential equations. (L3)
- To determine Fourier series of given function in a given interval. (L5)
- To analyze the concepts of Z-transforms in solving Difference equations. (L4)

UNIT – I: Functions of complex variables – Differentiation

Introduction to functions of complex variables - concept of limit & continuity- Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate - construction of analytic function by Milne- Thomson method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand functions of complex variable and its properties.(L2)
- Find derivatives of complex functions.(L1)
- Understand the analyticity of complex functions.(L2)

UNIT – II: Functions of complex variables – Integration

Line Integral - Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Cauchy Integral formula for derivatives (All theorems without Proof).

Power Series Expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the integration of complex functions.(L2)

- Apply Cauchy's integral theorem and Cauchy's integral formula to solve complex integrals.(L3)
- Understand singularities of complex functions.(L2)
- Evaluate improper integrals of complex functions using Residue theorem.(L5)

UNIT – III: Laplace Transforms

Definition - Laplace transform of standard functions - existence of Laplace Transform – Inverse transform – First shifting theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.(L2)
- Find the Laplace transforms of general functions using its properties.(L3)
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic).(L2)
- Apply Laplace transforms to solve differential equations.(L3)

UNIT – IV: Fourier series

Fourier coefficients (Euler's formulae) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity - Fourier series of even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand the Fourier series expansion of the given function.(L2)
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function.(L5)
- Determine the Fourier series of given function in Half range interval.(L5)

UNIT – V: Fourier transforms & Z Transforms

Fourier Transforms: Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem – Finite Fourier Sine and Cosine transforms.

Z-transform –Z-transforms, Inverse Z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of Difference equations by Z - transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find Fourier transforms of given functions.(L1)
- Apply properties of Fourier transforms to different functions.(L3)
- Apply Z transforms to solve difference equations.(L3)

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44^{th} edition.
2. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V. Ramana, Higher, "Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.
3. Dr. S. Sreenadh, Dr. V. Ramesh Babu, S Ranganadham, Fourier Series and Transforms, S Chand Publications, 2014

Course Outcomes:

At the end of this Course the student will be able to

CO1. Apply Cauchy-Riemann equations to find the analyticity of complex functions

CO2. Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours improper integrals along contours

CO3. Analyze the concepts of Laplace Transforms to solve ordinary differential equations

CO4. Examine the Fourier series for different functions in half and full range

CO5. Analyze the concepts of Fourier Transforms and Z transforms to solve Difference equations

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B.Tech -III SEM

L	T	P	C
3	0	0	3

(EC20APC301) DIGITAL LOGIC DESIGN

(ECE)

Course Objectives:

- To familiarize with the concepts of different number systems and Boolean algebra.
- To understand the design techniques of combinational, sequential logic circuits.
- To understand and analyze the concepts of FSM and PLD's
- To impart knowledge on operation, characteristics and various configurations of TTL and CMOS logic families.
- To outline procedures for the analysis and design of combinational and sequential logic circuits.
- To introduce programmable logic devices.

Unit I

Number Systems, Boolean algebra and Logic Gates: Number systems - binary numbers, octal, hexadecimal, other binary codes; complements, signed binary numbers, digital logic operations and gates, basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, complements of Boolean functions, two-level NAND and NOR Implementation of Boolean functions.

Learning Outcomes:

- Summarize advantages of using different number systems. (L2)
- Explain usefulness of different coding schemes and functionality of logic gates. (L2)
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)

Unit II

Minimization of Boolean functions and Combinational Logic Circuits: The Karnaugh map method (up to five variables), product of sums simplifications, don't care conditions, Tabular method, Introduction, Combinational circuits, design procedure, adders, subtractors, 4-bit binary adder/ subtractor circuit, BCD adder, carry look- a-head adder, binary multiplier, magnitude comparator, decoders and encoders, multiplexers, demultiplexers.

Learning Outcomes:

- Apply Boolean algebra for describing combinational digital circuits. (L2)
- Compare K- Map and Q-M methods of minimizing logic functions. (L5)

Unit III

Sequential Circuits: Latches, flip-flops, truth tables and excitation tables, timing and triggering consideration, conversion of flip- flops, design of counters, ripple counters, synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter, registers, shift registers, universal shift register.

Learning Outcomes:

- Describe behavior of Flip-Flops and Latches.(L2)
- Design synchronous sequential circuits using flip flops and construct digital systems using components such as registers and counters (L4)

Unit IV

Finite State Machine: Types of FSM, capabilities and limitations of FSM, state assignment, realization of FSM using flip-flops, Mealy to Moore conversion and vice-versa, reduction of state tables using partition technique, Design of sequence detector.

Memory and Programmable Logic: RAM, Types of Memories, Memory decoding, ROM, Types of ROM, Programmable Logic Devices (PLDs): Basic concepts, PROM as PLD, Programmable Array Logic (PAL) and Programmable Logic Array (PLA).

Learning Outcomes:

- Utilize concepts of state and state transition for analysis and design of sequential circuits(L3)
- Compare Moore and Mealy machine models.(L5)
- Define RAM, ROM, PROM, EPROM and PLDs. (L1)
- Describe functional differences between different types of RAM & ROM. (L2)

Unit V

CMOS Logic:

Introduction to logic families, CMOS logic, CMOS logic families; Bipolar Logic and

Interfacing: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74-series and CMOS 40- series-ICs – Specifications.

Learning Outcomes:

- Analyze various logic families like CMOS, TTL, ECL
- familiar with interfacing between CMOS and TTL

Text Books:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI.
2. Charles H.Roth,Jr., "Fundamentals of Logic Design" 5th edition , CENGAGE Learning 2012.

References:

1. ZviKohavi and Niraj K.Jha, "Switching and Finite Automata Theory, 3rd Edition, Cambridge University Press, 2010.
2. D.P. Leach, A.P. Malvino, "Digital Principles and Applications", TMH, 7th Edition.

Course Outcomes:

After completion of the course, student will be able to

CO1. Understand and design digital circuits using number systems, Boolean algebra, and logic gates with standard forms and two-level implementations.

CO2. Apply Boolean function minimization techniques and design combinational logic circuits to solve real-world problems.

CO3. Analyze and design sequential circuits to implement desired functionalities in digital systems.

CO4. Analyze finite state machines and memory-based systems, including FSM conversion, sequence detection, and implementation using programmable logic devices.

CO5. Understand and compare different logic families and apply interfacing techniques for various logic families in digital systems.

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B.Tech -III SEM

L	T	P	C
3	0	0	3

(EC20APC302) ELECTRONIC CIRCUIT ANALYSIS & DESIGN (ECE)

Course Objectives:

- To design and analyze multi-stage amplifiers using BJT at low and high frequencies.
- To analyze the effect of negative feedback on amplifier characteristics.
- To understand the basic principles of oscillators and analyze RC & LC oscillator circuits.
- To understand different types of large signal amplifiers and tuned amplifiers.

Unit I

Multistage Amplifiers and Frequency response: Classification of amplifiers, Methods of coupling, Cascading transistor amplifiers: CE-CC connection, Miller's theorem, CE short circuit current gain obtained with hybrid-pi model, parameter f_T, Cascode transistor configuration, High input resistance transistor circuits, Boot-strapped Darlington circuit andEmitter coupled difference amplifier.

Learning outcomes:

- Understand basic concepts, need of multistage amplifiers, and various inter-stage coupling in multi-stage amplifiers. (L2)
- Analyze low frequency and high frequency models of BJT. (L4)

Unit II

Feedback Amplifiers: Classification of feedback amplifiers, Feedback concept, General characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers using block diagram approach, Performance comparison of feedback amplifiers, Method of Analysis of Feedback Amplifiers.

Learning outcomes:

- Understand concept of different feedback topologies. (L2)
- Determine the effect of feedback on amplifier characteristics.(L2)
- Analyze characteristics of various types of feedback configurations. (L4)

Unit III

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC phase shift and Wein bridge oscillators using BJT with the relevant analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT with relevant analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

Learning outcomes:

- Understand the working principle of oscillator and stability constraints. (L2)
- Analyze different types of RC and LC oscillators, with detailed mathematical analysis and illustrations. (L4)

Unit IV

Power Amplifiers: Classes of power amplifiers, Class A large signal Amplifiers, Transformer Coupled Audio power amplifier, Efficiency of Class A Amplifier, Class B Amplifiers-Push-pull amplifiers and Complementary Symmetry push pull amplifier, Efficiency of Class B Amplifier, Operation of Class AB, Class C and Class D power amplifiers, Thermal stability and Heat sink.

Learning outcomes:

- Understand the operation and characteristics of power amplifiers under different classes of operation. (L2)
- Analyze the efficiency of power amplifiers under different classes of operation. (L4)
- Understand the concept of heat sink.(L2)

Unit V

Tuned Amplifiers: Introduction, Q-Factor, Capacitance Coupled Single tuned amplifiers, Double Tuned Amplifiers, Effect of Cascading tuned amplifiers on Band width, Staggered tuned amplifiers, comparison of single tuned, double tuned and stagger tuned amplifiers.

Learning outcomes:

- Evaluate the resonant frequency of tuned amplifiers. (L5)
- Understand the operation and characteristics of different tuned amplifiers. (L4)

Text Books:

1. J. Millman, C.C.Halkias and S. Jit, “Millman’s Electronic Devices and Circuits”,
   Tata McGraw Hill, 4th edition, 2019.
2. S. Salivahanan and N. Suresh Kumar, “Electronic Devices and Circuits”, McGraw Hill India Pvt. Ltd., 4thEdition, 2020.

References:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson/Prentice Hall, 9th Edition, 2006.
2. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.
3. Donald A. Neaman, "Electronic Circuit Analysis and Design", McGraw Hill Education, 3rd edition.

Course Outcomes:

After the completion of the course, students will able to

- CO1. Analyze the performance of Multistage amplifiers circuits using small signal models
- CO2. Evaluate the various performance parameters of feedback amplifiers.
- CO3. Apply the conditions for oscillations and Analyze the operating frequency of oscillator circuits.
- CO4. Evaluate the efficiency of power amplifiers under different classes of operation.
- CO5. Analyze the operation and characteristics of different tuned amplifiers.

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B.Tech -III SEM

L	T	P	C
3	0	0	3

(EC20APC303) SIGNALS & SYSTEMS
(ECE)

Course Objectives:

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

Unit 1

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error

Fourier Series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.

Learning outcomes:

- Understand different types of signals and systems. (L2)
- State principles of vector spaces and concept of Orthogonality. (L1)
- Analyze the periodic signals by applying Fourier series. (L4)

Unit II

Continuous Time Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform.

Sampling Theory: Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Learning outcomes:

- Identify system properties based on impulse response and Fourier analysis. (L1)
- Analyze the spectral characteristics of signals using Fourier transform. (L3)
- Illustrate signal sampling and its reconstruction. (L4)

Unit III

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

Learning outcomes:

- Understand the limitations of Fourier transform and need for Laplace transform and develop. (L1)
- Evaluate response of linear systems to known inputs by using Laplace transforms. (L2)

Unit IV

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

Learning outcomes:

- Understand the impulse response, transfer characteristics of LTI system and various filters. (L1)
- Analyze filter characteristics and physical realization of LTI system. (L4)
- Apply the relation between bandwidth and rise time & energy and power spectral densities in various applications. (L3)

Unit V

Discrete Time Fourier Transform: Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Z–Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions, Illustrative Problems.

Learning outcomes:

- Apply Discrete Time Fourier transform techniques to analyze discrete-time signals and systems. (L2)
- Analyze the spectral characteristics of signals using Fourier transform. (L4)
- Evaluate the Fourier transform of Discrete-time signals. (L5)
- Apply transform techniques to analyze discrete-time signals and systems using Z transforms. (L2)

Text Books:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009.
2. Kumar, A. Anand. Signals and systems. PHI Learning Pvt. Ltd., 2012.

References:

1. BP Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford University Press, 015.
2. Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.
3. Hwei Hsu, "Schaum's Outline of Signals and Systems", 4th Edition, TMH, 2019

Course Outcomes:

After completion of the course, student will be able to

CO1. Understand different types of signals and systems and Apply the knowledge of linear algebra topics like vector space, basis, dimension, inner product, norm and orthogonal basis to signals.

CO2. Analyse the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.

CO3. Understand and Apply the process of samplingto convert Continuous time signal to Discrete time signal.

CO4. Analyze filter characteristics and physical realization of LTI system

CO5. Apply the Laplace transform and Z- transform to analyze ontinuous-time and discrete-time signals and systems.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech -III SEM

L	T	P	C
3	0	0	3

(BA20AHS301) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (ECE)

Course Objectives:

- To inculcate the basic knowledge of managerial economics and demand analysis.
- To make the students learn input-output relationship for optimizing production and cost analysis.
- To Know the Various types of market structure and pricing methods and strategy.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.

UNIT I

INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

Learning Outcomes:

- Students can understand the basic terms and concepts related to economics and managerial economics.
- It describes decision making process of a firm.
- Students are able to understand the relationship between price and demand.
- Students can understand the techniques involved in forecasting the Demand.

UNIT II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - Cost Analysis: Cost concepts and cost behavior- Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

Learning Outcomes:

- Students can understand the various levels of production function.
- It demonstrates the methods of costing a product.
- Students are able to understand the Breakeven point of an organization.
- It explains the merits and demerits of increase in the scale of production.

UNIT III

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization. GST and Demonetization.

Learning Outcomes:

- Students can understand about different types of Market structures.
- They are able to find what are the determines of different markets.
- Able to get information about various Pricing strategies.
- Students can understand about various business structures in India.

UNIT IV

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal- Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

Learning Outcomes:

- It explains basic concepts of Accounting.

- Students can understand preparation of Final Accounts.
- It describes the cycle of Accounting.
- Students can understand the importance of Ratios in measuring the financial position of a company.

UNIT V : CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes:

- Students are able to understand the procurement of funds and its effective utilisation.
- It describes the Time value of money.
- Students are able to understand the difference between working capital and capital budgeting.
- Students can understand the various types of finance.

TEXT BOOKS:

- Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
- Financial Management, I.M.Pandey, Vikas Publications, 2013.

REFERENCES:

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3. Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham

COURSE OUTCOMES:

CO1. Demonstrate the fundamental concepts of Managerial Economics and Financial Analysis.
CO2. Analyze the principles of production functions and perform cost analysis effectively.
CO3. Classify various types of markets based on the characteristics of the new economic environment.
CO4. Apply financial accounting principles to prepare and interpret a balance sheet with simple adjustments.
CO5. Evaluate the role investment appraisal methods to plan long-term investment decisions.

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B.Tech -III SEM

L	T	P	C
0	0	3	1.5

(EC20APC304) BASIC SIMULATION LAB
(ECE)

Course Objectives:

- To simulate various Signals and Systems through MATLAB
- To apply the concepts of signals to determine their energy, power, PSD etc.
- To teach analyzing signals and sequences using Fourier, Laplace and Z-transforms.
- To enable to write programs for signal processing applications.

List of Experiments:

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightages- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.

9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
11. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
12. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
13. To plot pole-zero diagram in S-plane/Z-plane of given signal/sequence and verify its stability.

NOTE: All Experiments are to be simulated using MATLAB or equivalent software.

Course Outcomes:

After completion of the course, student will be able to

CO1. Analyse various types of signals and sequences and operations on signals and sequences.

CO2. Apply convolution and correlation operations on different signals

CO3. Analyze the Spectrum of a different signals using various transform techniques and stability

CO4. Analyze filter characteristics and physical realization of LTI system

Equipment Required:

1. MATLAB.
2. Personal computer with necessary peripherals.

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B.Tech -III SEM

L	T	P	C
0	0	3	1.5

(EC20APC305) DIGITAL LOGIC DESIGN LAB
(ECE)

Course Objectives:

- To understand various pin configurations of the Digital ICs used in the laboratory
- To conduct the experiments and verify the truth tables of various logic circuits.
- To analyze the logic circuits
- To design sequential and combinational logic circuits and verify their properties.

List of Experiments:

Part A: Combinational Logic Circuits (*any 6 experiments can be performed*)

1. Verification of truth tables of the following Logic gates

   Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) NOT
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Design half adder and full adder circuit and verify its functional table.
4. Design half subtractor and full subtractor circuit and verify its functional table.
5. Implementation and verification of Binary to Gray and Gray to Binary code converters.
6. Implementation and verification of BCD to Excess-3 and Excess-3 to BCD code converters.
7. Implementation and verification of BCD to 7 segment decoder.
8. Implementation of 4x1 Multiplexer using logic gates.

Part B: Sequential Logic Circuits (*any 6 experiments can be performed*)

1. Verification of functional tables of (i) RS Flip–Flop (ii) JK Flip–Flop (iii) D Flip-Flop.
2. Design a four-bit comparator and verify output.
3. Design and implementation of 8-bit odd/even parity checker.

4. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
5. Design and implementation of a decade counter.
6. Design and implementation of a binary counter.
7. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output
8. Design a four bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output

Equipment Required:

1. Digital Trainer kits.

References:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI
2. Online learning resources/virtual labs: https://www.vlab.co.in/

Course Outcomes

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

- CO1. Understand the pin configuration of various digital ICs used in the lab.
- CO2. Conduct the experiment and verify the properties of various logic circuits
- CO3. Design combinational circuit
- CO4. Design sequential circuits

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B.Tech -III SEM

L	T	P	C
0	0	3	1.5

(EC20APC306) ELECTRONIC CIRCUIT ANALYSIS & DESIGN LAB (ECE)

Course Objectives:

- To design and analyze the multistage amplifiers and verify the frequency response.
- To verify the effect of negative feedback on amplifier parameters.
- To understand the application of positive feedback circuits& generation of signals.
- To understand the concept of design and analysis of Power amplifiers and tuned amplifiers

LIST OF EXPERIMENTS:

1. Two stage RC coupled amplifier
2. Darlington pair amplifier
3. Cascade amplifier
4. Voltage series feedback amplifier
5. Current shunt feedback amplifier
6. RC Phase Shift / Wien Bridge oscillator
7. Hartley / Colpitt's oscillator
8. Class A power amplifier
9. Class B power amplifier
10. Single tuned amplifier

NOTE: Design & Simulate any **8** experiments with MULTISIM software and verify the results in hardware lab with discrete components using BJT/JFET/MOSFTET.

Course Outcomes:

After completion of the course, student will be able to

CO1. Evaluate gain and bandwidth of multistage amplifiers from its frequency response.

CO2. Analyze the operation of different feedback amplifiers and oscillators.

CO3. Evaluate the efficiency of power amplifiers and tuned amplifiers..

CO4. Simulate electronic circuits by using appropriate simulation software.

Software:

1. MULTISIM/ PSPICE/Equivalent Licensed simulation software tool
2. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies ,
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters, Decade Résistance Boxes/Rheostats, Decade Capacitance Boxes,
5. Ammeters & Voltmeters (Analog or Digital)
6. Active & Passive Electronic Components
7. Bread Boards, Connecting Wires & CRO Probes etc.

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B.Tech -III SEM

L	T	P	C
1	0	2	2

(IT20ASC301) Application Development using Python

Course Objectives:

The aim of Python Programming Lab is

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python
- To develop the skill of designing Graphics in Python
- To implement various graph using mathematical libraries.

Tasks:

1. Write a program to demonstrate different number datatypes in python
2. Write a program to perform arithmetic operations on numbers
3. Write a program to add two numbers.
4. Write a program to find largest number among three.
5. Write a program to find the given number is even or odd.
6. Write a python program to print a number is positive/negative using if-else.
7. Write a program to find sum of individual digits.
8. Write a program to check the given string is palindrome or not.
9. Write a program to find GCD of two numbers.
10. Use a for loop to print a triangle like the one below. Allow the user to specify how high the triangle should be

```
*
**
***
****
```

11. Write a program takes in the the number of terms and finds the sum of series:

   $1 + x^2/2 + x^3/3 + \ldots x^n/n$.

12. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
13. Write a program to construct the following pattern using nested for loop

```
*
```

**
***
****
*****
*****
****
***
**
*

14. Write a program to print prim numbers less than 20.
15. Write a program to find factorial of a number using recursion.
16. Write a program to define a module to find fibonaaci numbers and import the module to another program.
17. Create a list and perform the following methods

1) insert( ) 2) remove( ) 3) append( ) 4) len( )
5) pop( ) 6)clear( ) meters, or kilometres

18. Write a program to find the cumulative sum of a list where the ith element is the sum of the first i+1 elements from the original list.
19. Create a dictionary and apply the following methods

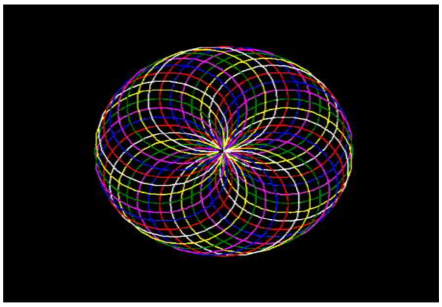
1) Print the dictionary items 2) access items 3) useget()
4)change values 5) use len()

20. Write a program to count the frequency of words appearing in a string using a dictionary
21. Create a tuple and perform the following methods

1) Add items 2) len() 3) check for item in tuple 4)Access iems

22. Write a program to count the number of vowels present in a string using sets
23. Write a program which accepts the radius of circle from user and compute area (use math module).
24. Write a program to count the number of words in a text file.
25. Write a program to read a file and capitalize the first letter of every word in the file.
26. Write a program to find the area of a rectangle using classes.

27. Write a program using NumPy, implement different matrix operations in python.
28. First we import the turtle module. Then create a window, next we create turtle object and using turtle method we can draw in the drawing board.
29. Write program to draw the following image



30. Write a program using MatPlotlib library, plot the graph with all different plot types. (Pie Chart, Area Plot, Scatter Plot, Histogram and Bar Graph)

Course Outcomes:

By the end of this lab, the student is able to

CO1. Understand Conditionals and Loops for Python Programs.

CO2. Construct custom modules and functions to handle different operations.

CO3. Implement Object oriented concepts through real time scenarios and handle errors.

CO4. Design different shapes and objects using turtle graphics.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition,O'Reilly,2016.Or http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

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B.Tech -III SEM

L	T	P	C
2	0	0	0

(CH20AMC301) BIOLOGY FOR ENGINEERS (ECE)

Course Objectives:

- To provide basic understanding about life and life Process. Animal an plant systems.
- To understand what bimolecules, are, their structures are functions. Application of certain bimolecules in Industry. Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes, Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Learning Outcomes:

After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules:

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand what are biomolecules, their role in living cells, structure, function and how they are produced. (L2)
- Analyze the relationship between the structure and function of nucleic acids. (L4)
- Summarize the applications of enzymes in industry. (L2)
- Understand what is fermentation and its applications of fermentation in industry. (L2)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand nutrients are present in our body (L2)
- Understand the mechanism and process of important human functions (L2)

Unit IV:

Introduction to Molecular Biology and recombinant DNA Technology: Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand and Explain about gene structure and replication in prokaryotes and Eukaryotes (L2)
- Understand genetic material is replicated, RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different

fields.(L2)

- Understand the gene cloning. (L2)

Unit V:

Application of Biology: Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes:

After completing this unit, the student will be able to Understand.

- Understand biology is applied for production of useful products for mankind.(L2)
- Understand the biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L2)

Course Outcomes:

After studying the course, the student will be able to:

CO1. Understand about life and life process.

CO2. Understand about biomolecules,their structure,function and their role in the living organisms.

CO3. Understand about the human physiology.

CO4. Understand recombinant DNA technology and its application in different fields.

CO5. Understand about the production of medicines and pharmaceutical molecules through the transgenic microbes,plants and animals.

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications -
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology –2014

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech -III SEM

L	T	P	C
2	0	0	0

(MA20AMC301) LOGICAL SKILLS FOR PROFESSIONALS-II
(Mandatory Course)

Course Objectives:

- To learn the basic methods to find HCF, LCM Factors, Simplification, Pipes, Alligation or Mixture, Table, Bar Graphs and Pie Chart concepts.
- To understand the logic behind the Syllogism, Calender, Clocks and Number Series Analogy concepts.

UNIT I

HCF, LCM Factors:

Find the HCF and LCM of the given numbers by using Factorization method.

Find the HCF and LCM of the given numbers by using Division method.

Simplification:

Using BODAMS rule to find out the value of a given expression.

Using Vernacular rule to find out the value of a given expression.

UNIT II

Pipes

Find the how much time taken to fill the tank by opening one pipe, two pipe and one after another.

Alligation or Mixture

Using Ratio and proportion to solve the mixture problems.

To find quickly calculate the price of a mixture, given that it is a mix of two elements having different prices.

UNIT III

Data Interpretation :

Table, Bar Graphs

Find the Average sales of all branches for the respective years.

Find the ratio of the total sales of respective branches.

Pie Charts

Study the Pie chart and the table answer the questions based on them.

Find the central angle of the components.

UNIT IV: Syllogism

Type-I: Different types of Venn diagrams with their implications.

Type-II: Analyse the figure carefully and then answer certain questions regarding the given data.

UNIT V:

Calendars

Find the day of the week on a given date, Find the ordinary year and Leap year

Clocks

Find the angle between the hour hand and minute hand of a clock, when the hands are at right angles.

Number Series Analogy

Choosing a similarly related pair as the given number pair on the basis of the relation between the numbers in each pair.

Choosing a number similar to a group of numbers on the basis of certain common properties that they possess.

Text Books:

1. Quantitative Aptitude, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, 2012, Dr. R.S. Aggarwal, S. Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, 14/e, 2010, Abhijit Guha, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability & Quantitative Aptitude, 3/e, 2012, Edgar Thorpe, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, 2012, Rajesh Verma, Arihant Publications, Meerut.
4. Reasoning and Aptitude, 2013, Nem Singh, Made Easy Publications, New Delhi.

Course Outcomes:

CO1. Apply Solve the system of linear equations and reduce the quadratic forms to canonical form by applying matrices.

CO2. Apply mean value theorems for different functions with different intervals.

CO3. Analyze the multivariable calculus to find Jacobean, Maximum and Minimum.

CO4. Apply multiple integrals to find the area and volume for different functions.

CO5. Analyze the concepts of Beta and Gamma special functions for different functions.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- III Sem.

L	T	P	C
2	0	0	0

(EG20AMC301)ENHANCING ENGLISH LANGUAGE SKILLS

COURSE OBJECTIVES

To enhance communication skills through listening, speaking, reading, and writing.
To improve language proficiency of the students for career development.
To train students to use language appropriately for interview skills, group discussion and public speaking.
To develop confidence in the students to use English in everyday situations.
To provide training and opportunities to participate in formal and informal communication.

UNIT- I

1. Greetings-Introducing oneself and others
2. Just A Minute (JAM) & Role play
3. Prepositions, Word formation

Learning Outcomes

At the end of the module, the learners will be able to
Respond general questions on familiar topics by introducing one self and others
Comprehend short talks on general topics.
Use grammatical structures effectively and meaningfully.

UNIT- II

1. Oral Presentations – Technical presentations
2. Letter Writing- Formal and Informal, Email Writing
3. Articles, Punctuation.

Learning Outcomes

At the end of the module, the learners will be able to Make formal oral presentations using effective strategies
Write formal letters and e-mail writing appropriately in formal contexts without any mistakes
Use articles and use punctuation contextually.

UNIT – III

1. Communication – Verbal and Non- verbal communication
2. Telephone Etiquettes
3. Tenses,Subject-verb agreement, Prefixes & suffixes

Learning Outcomes

At the end of the module, the learners will be able to

Understand non-verbal features of communication and holdFormal& informal conversations
Use correct tense forms and structures in speech and writing
Use grammatical structures aptly.

UNIT – IV

1. Resume Writing and Technical Report writing
2. Book/Film review
3. Synonyms and Antonyms, Vocabulary building

Learning Outcomes

At the end of the module, the learners will be able to

Write Resume appropriately and ready for an interview.
Review a book/film
Edit short texts by correcting errors

UNIT – V

1. Group Discussions
2. Debate
3. Interview Skills

Learning Outcomes

At the end of the module, the learners will be able to

Participate in formal & informal discussions and speak clearly on a specific topic
Understand how to face interviews effectively.
Comprehend, discuss and respond to academic texts orally and in writing

COURSE OUTCOMES

Use English language, both written and spoken, competently and correctly.
Improve comprehension and fluency of speech.

Hone the communication skills to meet the challenges of their careers successfully.
Gain confidence in using English in verbal situations.
Strengthen communication skills in different contexts like formal and informal.

REFERENCE BOOKS:

1. Krishna Mohan & NP Singh, Speaking English Effectively, 2nd Edition,2011.
2. MAshrafRizvi,EffectiveTechnicalCommunication,TataMcGraw- Hill, New Delhi,2017.
3. Francis Soundararaj,Basics of Communication in English: Soft Skills for Listening, Speaking, Reading and Writing, New Delhi: Macmillan-2012.
4. ChaseR. Tarver&Kristin L. Johannsen, Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Meenakshi Raman, Technical Communication, Oxford University Press,2008
6. Raymond Murphy, English Grammar in Use, Cambridge University Press,4th Edition,2012.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech -IV SEM

L	T	P	C
3	0	0	3

(CS20AES401)DATASTRUCTURES USING C
(ECE, EEE, ME, CE)

Course Objectives:

- To familiarize with basic techniques of algorithm analysis.
- To familiarize Stacks, Queues using Arrays and Linked List.
- To Understand Searching and Sorting techniques.
- To learn the concepts of different types of trees and its operations.
- To familiarize with graph algorithms.

Unit I

Data Structures: Introduction to Data Structures, Time and Space Complexity, Asymptotic Notations. Stack, Stack operations, Implementation using arrays, Applications of stack, Queue, Queue operations, Implementation using arrays, various Queue Structures, Applications of queue.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the given algorithm to find the time and space complexities.(L4)
- Develop the applications of stack and queue using arrays.(L3)

Unit II

Linked lists: Single linked list, double linked list, Circular linked list, operations on linked lists, Applications of Linked List. Implementation of Stack using Pointers, Implementation of Queue using Pointers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Implement Stack and Queues using Pointers.(L3)
- Construct the linked lists for various applications.(L4)

Unit III

Searching Techniques: Linear Search and Binary Search.

Sorting Techniques: Selection Sort, Insertion sort, Merge Sort, Quick Sort, Heap sort.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select sorting technique for a given sorting.(L3)
- Construct Heap and its implementation.(L4)

Unit IV

Trees: Vocabulary and Definitions, Binary Tree, Implementation, Binary Tree Traversal, Binary Search Tree, Implementation, Heap Trees.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of a tree.(L2)
- Compare different tree structures.(L4)
- Apply Trees for indexing.(L3)

Unit V

Graph Theory: Graphs Terminology, Graph Traversals, Shortest Paths, Minimum Spanning Trees- Prims' Algorithm, Kruskal's Algorithm.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize the importance of Graphs in solving real world problems.(L2)
- Apply various graph traversal methods to applications.(L3)
- Design a minimum cost solution for a problem using spanning trees.(L4)

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss,Second Edition, 2002,Pearson.

2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Third Edition, 2010,PHI.

3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

Reference Books:

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis Samantha, Second Edition, 2009,PHI

Course Outcomes:

CO1: Analyze the problems using asymptotic notations.(L4)

CO2: Apply Stack, Queues and linked list to solve different applications.(L3)

CO3: Demonstrate suitable sorting techniques for the real world problem.(L4)

CO4: Implementtreestructuresindifferentpatternsofrepresentationofdata.(L3)

CO5: Analyze the given problem using graph traversal techniques.(L4)

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B.Tech -IV SEM

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(MA20ABS402) PROBABILITY THEORY AND STOCHASTIC PROCESSES (ECE)

Course Objectives:

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations involving more than one random variable and functions of random variables.
- To understand the principles of random signals and random processes.
- To known the Spectral and temporal characteristics of Random Process.
- To be acquainted with systems involving random signals.
- To gain knowledge of standard distributions that can describe real life phenomena.

Unit I

Probability Introduced Through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

Learning Outcomes:

- Understand the fundamental concepts of probability (L1).

Unit II

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Classifications of Random Variable, Distribution and Density functions and its properties, Distribution & Density functions: Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution & Density functions.

Operations on Single Random Variable: Introduction, Expectation of a random variable and its Properties, Moments-moments about the origin, Central moments, Variance and Skewness, Moment generating function, characteristic function, Inequalities- Chebyshev's inequality, Markov's inequality.

Learning Outcomes:

- Understand the fundamental concepts of random variables, and conditional probability. (L1)

- Evaluate the different probability distribution and density functions. (L2)
- Apply the knowledge to the sum of random variables, central limit theorem in communication system (L2).
- Evaluate the single and multiple random variable concepts to expectation, variance and moments (L4).

Unit III

Multiple Random Variables: Vector Random Variables, Joint Distribution Function and its properties, Joint Density Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Central Limit Theorem, (Without Proof)-Unequal & Equal Distributions.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Moment Generating Function, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case.

Learning Outcomes:

- Understand the fundamental concepts of multiple random variables, and conditional probability. (L1)
- Evaluate the Joint probability distribution and Joint density functions. (L2)
- Evaluate the multiple random variable concepts to expectation, variance and moments (L4).

Unit IV

Random Processes-Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, joint Distribution and Joint Density Function, Independent Random Process, Stationary Random Processes, Wide-Sense Stationary, Strict-Sense Stationary.

Time Averages of a Random Process, Ergodic Theorem and Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Learning Outcomes:

- Understand and analyze continuous and discrete-time random processes (L1).
- Analyze the concepts and its properties of auto correlation, cross correlation functions (L3).

Unit V

Random Processes-Spectral Characteristics: The Power Density Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Learning Outcomes:

- Analyze the concepts and its properties power spectral density (L3).

Course Outcomes:

After completion of the course, student will be able to

CO1. Apply the principles of probability in real time scenarios

CO2. Demonstrate the possible operations on a single random variable.

CO3. Explore the possible operations on a multiple random variable.

CO4. Discriminate the Random Processes for Temporal characteristics.

CO5. Analyze the Random Processes for Spectral characteristics

TEXT BOOKS:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH,2002.
2. Probability Theory and Stochastic Processes-Mallikarjuna Reddy,cengage Learning.

REFERENCES:

1. Simon Haykin, "Communication Systems", 3rd Edition, Wiley,2010.

Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI,2002

2. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education,2002.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis," 3rd Edition, Oxford,1999.
4. Dr. A. Singaravelu, Probability and Statistics, Meenakshi Agency, 2017

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(EC20APC401) ANALOG COMMUNICATIONS
(ECE)

Course Objectives

- To introduce various modulation and demodulation techniques of Analog communication system.
- To analyze different parameters of Analog communication techniques.
- Know Noise Figure in AM & FM receiver systems.
- Understand Function of various stages of AM, FM transmitters and Know Characteristics of AM &FM receivers.
- Understand the concepts of information theory.

Unit I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Frequency division multiplexing (FDM).

Learning Outcomes:

- Understand the concepts of Amplitude Modulation and demodulation techniques. (L1)
- Apply the concepts to solve problems in Amplitude modulation Schemes. (L2)
- Analyse frequency spectra of modulated signals used in various amplitude modulation (L3)
- Compare the Performance of different amplitude modulation techniques. (L4)

Unit II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves-Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM Capture Effect.

Learning Outcomes:

- Understand the concepts of Angle modulation and demodulation techniques. (L1)
- Understand importance Pre-emphasis & de-emphasis circuit in FM modulation. (L1)
- Apply the concepts to solve problems in Angle modulation Schemes. (L2)
- Analyse frequency spectra of modulated signals used in various angle modulation (L3)

Unit III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, filtered white noise, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise.

Learning Outcomes:

- Understand different types of noise and sources that effect the performance of the communication system. [L1]
- Analyse performance of Analog communication system in the presence of noise. [L3]
- Compare the performance of communication system by evaluating figure of merit for different schemes of modulation. [L4]

Unit IV

Analog Pulse Modulation Schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, Illustrative Problems.

Radio Receiver: Working principle of Super heterodyne AM and FM Receivers along with suitable block diagrams, Sensitivity, Selectivity and fidelity.

Learning Outcomes:

- Understand the concepts of Analog Pulse Modulation and Demodulation techniques. [L1]
- Understand the concepts of AM and FM receivers. [L1]
- Apply the concepts to solve problems in Analog pulse modulation schemes. [L2]
- Analyse the performance of AM and FM receivers.[L3]
- Compare the Performance of different Analog Pulse Modulation techniques.[L4]

Unit V

Information Theory: Introduction, Information and Entropy, and its properties, source coding Theorem, Huffman coding, Discrete Memoryless channels, Mutual Information, and its properties, Channel capacity, Channel coding Theorem, differential entropy and mutual information, Information capacity theorem, implication of information capacity theorem, Rate Distortion, Illustrative problems.

Learning Outcomes:

- Understand the concepts of information theory and different coding techniques.[L1]
- Analyse Binary symmetric channel. [L3]
- Design the channel performance using information theory. [L4]
- Derive equation for Entropy, Mutual information and channel capacity for all types of channels. [L2]

Course Outcomes

After completion of the course, student will be able to

CO1. Analyze the various modulation and demodulation techniques of Analog communication system.

CO2. Analyze different parameters of Analog communication techniques.

CO3. Analyze Noise Figure in AM & FM receiver systems.

CO4. Understand analog pulse modulation techniques and Analyze Characteristics of AM &FM receivers

CO5. Analyze the concepts of information theory.

TEXT BOOKS:

1. John Wiley & Sons Simon Haykin, "Communication Systems,",3rd Edition, 2010.

2. Dr.Sanjay Sharma, Communication systems, S.K.Katari & Sons 6th Edition, 2013.

REFERENCES:

1. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010
2. J. G. Proakis, M Salehi, Gerhard Bauch, "Modern Communication SystemsUsingMATLAB," CENGAGE, 3rd Edition, 2013.
3. P.Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006

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(EC20APC402)ELECTROMAGNETIC WAVES AND TRANSMISSION LINES (ECE)

Course Objectives:

The main objectives of this course are to understand

- To introduce fundamentals of static and time varying electromagnetic fields.
- To teach problem solving in Electromagnetic fields using vector calculus.
- To demonstrate the concepts of Static and time varying Maxwell equations.
- To demonstrate Wave equations in different media for normal and oblique incidence.
- To introduce various concepts of transmission lines and their practical applications.

Unit I

Electrostatics: Review of Co-ordinate Systems & Vector Calculus , Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric Dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Linear, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

Learning Outcomes:

- Understand basic laws of static electric field. (L1)
- Derive the Maxwell's equations for electrostatic fields. (L3)
- Solve problems applying laws of electrostatics. (L3)

Unit II

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

Learning Outcomes:

- Understand basic laws of static magnetic field. (L1)
- Derive the Maxwell's equations for magnetic fields. (L3)
- Solve problems applying laws of magneto statics. (L3)

Unit III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer E.M.F, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's equations for time varying fields, Maxwell's Equations in Different Final Forms and Word Statements, Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Learning Outcomes:

- Derive the Maxwell's equations for electromagnetic fields. (L3)
- Apply the boundary conditions of electromagnetic fields at the interface of different media. (L2).

Unit IV

EM Wave Characteristics: Waves – Definition, Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane, All Relation between E & H Sinusoidal variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem.

Learning Outcomes:

- Understand concept of wave propagation through the Maxwell's equations. (L1)
- Derive wave equations for different media (L3)
- Understand principles of reflections and refraction for different incidences. (L1)
- State concept of power flow using Poynting vector. (L2)

Unit V

Transmission Lines: Types, Transmission line parameters, Transmission line equivalent circuit, Transmission line equations, input impedance, standing wave ratio, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Transmission of finite length - half wave, quarter wave transmission line, Smith chart, graphical analysis of transmission lines using Smith chart, Illustrative Problems.

Learning Outcomes:

- Understand the principles of transmission lines and concept of smith chart.(L1)
- Derive the input impedance of transmission line.(L3)
- Finding the line parameters through problem solving.(L4)
- Study the applications of different lengths of transmission lines.(L2)

Course Outcomes:

At the end of this course the student can able to

CO1. Understand the priniples of electrostatics to analize and problems related to static eletric fields.

CO2. Analyze and apply the fundamental concepts of magnetostatics to solve problems related to static magnetic fields.

CO3. Derive and solve Maxwell's equations in both differential and integral forms for different boundary conditions and materials.

CO4. Evaluate the behaviour of electromagnetic waves in different media including wave propagation, polarization & reflection/refraction at boundaries.

CO5. Analyze transmission lines, their parameters, and equations and use the Smith chart to solve practical engineering problems.

TEXT BOOKS:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th edition. Oxford Univ. Press,2008.
2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd
3. Edition, PHI, 2000

REFERENCES:

1. John D. Krauss, "Electromagnetics", 4th Edition,McGraw- Hill publication1999.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics", 7th edition.,TMH, 2006.
3. Electromagnetics, Schaum's outline series, 2nd Edition, Tata McGraw-Hill publications,2006.

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(EC20APC403) LINEAR & DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS (ECE)

Course Objectives:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of PLL.
- To introduce the concepts of waveform generation and introduce some special function ICs.
- Exposure to digital IC's
- To create combinational circuits &sequential circuits using HDLs.

Unit I

OPERATIONAL AMPLIFIER: Introduction, Classification of IC's, basic information and features of Op-Amp IC741, the ideal Operational amplifier, Op-Amp internal circuit, characteristics - DC and AC.

LINEAR APPLICATIONS OF OP-AMP: Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator.

Learning Outcomes:

- Understand the basic building blocks of Op-Amps & specialized ICs. (L2)
- Understand the DC and AC performance characteristics of Op-Amps. (L2)
- Apply knowledge on linear applications of Op-Amps. (L3)

Unit II

NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators, Oscillators

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), applications of PLL.

Learning Outcomes:

- Understand the specialized ICs such as VCO and PLL. (L2)
- Apply knowledge on non-linear applications of Op-Amps. (L3)
- Analyze and create various circuits using Op-Amps and 555 timer. (L5)

UNIT III

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A & A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

Learning Outcomes:

- Apply the specialized ICs of Voltage Regulator. (L3)
- Analyze the operation & characteristics of data converters. (L4)

Unit IV

HARDWARE DESCRIPTION LANGUAGE: Introduction to Verilog - structural Specification of logic circuits, behavioural specification of logic circuits, hierarchical Verilog Code, Verilog for combinational circuits - conditional operator, if-else statement, case statement, for loop; using storage elements with CAD tools-using Verilog constructs for storage elements, flip-flop with clear capability, using Verilog constructs for registers and counters.

Learning Outcomes:

- Understand the concepts of Verilog Language. (L1)
- Understand and analyze the syntax of HDL. (L3)

Unit V

COMBINATIONAL LOGIC CIRCUITS: Logic gates using 74XX ICs, Adders, Subtractors, Four-bit parallel adder, Comparator, Encoder, Priority Encoder, Decoder, BCD-to-7- segment decoder, Multiplexer, Demultiplexer. Verilog/VHDL models for the above standard building block ICs.

SEQUNTIAL CIRCUITS USING ICs: Latches, Flip Flops, Review of design of State machines; Standard building block ICs for Shift registers, parallel / serial conversion, shift register counters, Ring counters; Johnson counters, LFSR counter; Verilog/VHDL models for the above standard building block ICs.

Learning Outcomes:

- Design of Combinational logic circuits using Verilog. (L4)
- Design of Sequential logic circuits using Verilog. (L4)

Course Outcomes:

CO1. Understand the fundamental concepts of operational amplifier and its linear applications

CO2. Analyze and design circuits using the 555 timer and waveform generators

CO3. Illustrate the concepts and working principles of data converters and voltage regulators

CO4. Describe the language constructs and programming fundamentals of Verilog HDL

CO5. Design and implement combinational and sequential circuits using Verilog HDL

TEXT BOOKS:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuit", 4thedition (2012), New Age International Pvt.Ltd., New Delhi, India.
2. Ramakant A. Gayakwad, "OP-AMP and Linear Integrated Circuits", 4thedition (2012), Prentice Hall / Pearson Education, New Delhi.
3. John F.Wakerly," Digital Design Principles and Practices" 4thedition, Pearson Education., 2009.

REFERENCE BOOKS:

1. Sergio Franco (1997), Design with operational amplifiers and analog integrated circuits, McGraw Hill, New Delhi.
2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi.
3. M.Morris Mano and Michael D. Cilleti., "Digital Logic Design" 4th edition Pearson Education., 2013
4. J. Bhasker, "A VHDL PRIMER" 3rd edition Eastern Economy Edition, PHI Learning, 2010.

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(EC20APC404) ANALOG COMMUNICATIONS LABORATORY (ECE)

Course Objectives:

- To familiarize the students with basic analog communication systems. Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- Understand all types of analog modulation / demodulation principles.
- Substantiate pulse modulation techniques.
- To design and implement different modulation and demodulation techniques.

LIST OF EXPERIMENTS (All experiments are to be conducted)

1. Amplitude Modulation and Demodulation
2. Frequency Modulation and Demodulation
3. (a).Characteristics of Mixer

(b).Pre-emphasis & De-emphasis.

4. Pulse Amplitude Modulation & Demodulation.
5. Pulse Width Modulation &Demodulation.
6. Pulse Position Modulation & Demodulation
7. Measurement of Half power Beam width and gain of half wave dipole antenna.
8. Simulate AM and FM signals and find power spectrum of each signal. Plot the graphs.
9. Simulate PAM and PWM signals and find power spectrum of each signal. Plot the graphs.
10. Generate a complex Gaussian noise (with zero mean unit variance). And pass through an LTI system. Find the power spectrum density of the noise signal available at the output of LTI system.
11. Make use of AM signal from experiment no. 9 add Gaussian noise (with zero mean and unity variance) to the signal. Extract the information bearing signal using suitable system.
12. Simulate Huffman coding.

Course Outcomes:

After the completion of the course students able to

CO1. Implement and Simulate different amplitude,frequency modulation and demodulation techniques, charactersistics of mixer

CO2. Simulate and Analyze the different analog pulse modulation methods

CO3. Evaluate the characteristics of Radio Receiver Measurements

CO4. Evaluate metrics related to generate Gaussian Noise and AM Signal.

CO5. Simulate Huffman Coding.

Equipment & Software Required:

1. Computer Systems with latest specifications
2. Connected in LAN (Optional)
3. Operating system (Windows XP)
4. Simulations software (MATLAB)

Equipment:

1. Regulated Power Supply (0-30) V.
2. CROs (0-20) MHz.
3. Function Generators (0-3) MHz.
4. RF Signal Generators (0-1000) MHz.
5. Multimeters.
6. Required Electronic components (active and passive) for the design of experiments from 1 -7.
7. RF power meter frequency range 0 – 1000MHz
8. Spectrum Analyzer.

Note: Conduct experiments (8-12) using **MATLAB** software.

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(CS20AES402) DATA STRUCTURES USING C LAB
(ECE, EEE, ME, CE)

Course Objectives:

- To strengthen the ability to identify and apply the suitable data structure for the given real-world problem.

Tasks:

1. Demonstrate recursive algorithms with examples.
2. Develop a program to perform operations of a Stack and Queue using arrays.
3. Implement and perform different operations on Single, Double and Circular Linked Lists.
4. Develop a program to perform operations of Stack and Queue using Linked Lists.
5. Develop a program to implement Stack applications.
6. Implement Circular Queues.
7. Implement various Searching techniques.
8. Develop programs for different Sorting techniques.
9. Develop a program to represent a Tree Data Structure.
10. Develop a program to demonstrate operations on Binary Search Tree.
11. Demonstrate Graph Traversal Techniques.

Text Books:

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002,Pearson.
2. IntroductiontoAlgorithms, ThomasH.Cormen, CharlesE.Leiserson, RonaldL. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

Course Outcomes:

CO1: Demonstrate the concept of Recursion for solving a problem.(L4)

CO2: Choose and implement linear data structure to solve problems.(L3)

CO3: Develop programs for searching and sorting algorithms.(L3)

CO4: Select and implement suitable non linear data structure for solving a problem. (L3)

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(EC20APC405) LINEAR & DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS LAB (ECE)

Course Objectives:

- The objective of the course is to learn design, testing and characterizing of circuit behavior with digital and analog ICs.

List of Experiments:

Part A: Hardware

Linear IC Experiments: (Students has to perform atleast *6 experiments.*)

1. OP AMP Applications – Adder, Subtractor, Comparators.
2. Integrator and Differentiator Circuits using IC 741.
3. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
4. IC 555 Timer – Monostable and Astable Multivibrator Circuits.
5. Data converters
   i. DAC circuits – R-2R and ladder type.
   ii. Successive approximation type ADC.
6. Schmitt Trigger Circuits – using IC 741
7. IC 565 – PLL Applications.
8. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.

PART B: Software

Digital IC Applications: (Students has to perform atleast *6 experiments.*)

1. 3-8 line decoder.
2. 4-bit comparator.
3. 8x1 Multiplexer and 2 to 4 Demultiplexer.
4. BCD to 7-segment decoder.
5. D Flip Flop, JK Flip Flops.
6. Decade counter.
7. Up/Down Counter.
8. Universal shift registers.

Equipment required for Laboratory:

Software:

1. Xilinx ISE
2. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes

Course Outcomes:

CO1. Design and analyze operational amplifier circuits for basic signal processing applications

CO2. Design and implement timing circuits using IC 555 and waveform generation techniques

CO3. Design and analyze data conversion circuits and voltage regulators

CO4. Design and simulate combinational and sequential digital circuits using Verilog HDL

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(EG20ASC301) SOFT SKILLS
(ECE)

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To develop leadership skills and organizational skills through group activities
- To function effectively with heterogeneous teams

UNIT I

Communication Skills:

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intra-personal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

Learning Outcomes

At the end of the module, the learners will be able to

- Acquire attributes regarding communication skills
- Enhance their intrapersonal and interpersonal skills
- Improve LSRW Skills

UNIT II

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –facing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

Learning Outcomes

At the end of the module, the learners will be able to

- Enhance their LSRW skills
- Be able to get innovative and creative skills
- Acquire logical and analytical thinking capability
- Develop their cognitive level

UNIT III

Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Facing problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

Learning Outcomes

At the end of the module, the learners will be able to

- Solve the problems logically
- Make decisions effectively
- Face the problems positively with confidence

UNIT IV

Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – SWOC analysis – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

Learning Outcomes

At the end of the module, the learners will be able to

Control their emotions and stress levels

Be emotionally balanced

Respond instead of reacting in their professional and academic life

UNIT – V

Leadership Skills

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

Learning Outcomes

At the end of the module, the learners will be able to

- Learn the aspects of team building
- Understand the characteristics of effective leadership skills
- Improve spontaneous communication

Course Outcomes:

By the end of the program students should be able to

CO1: Memorize various elements of effective communicative skills

CO2: Interpret people at the emotional level through emotional intelligence

CO3: Apply critical thinking skills in problem solving

CO4: Analyze the needs of an organization for team building

CO5: Judge the situation and take necessary decisions as a leader

CO6: Develop social and work-life skills as well as personal and emotional well being

Textbooks:

1. Barun Mitra, Personality Development and Soft Skills, English,Oxford University Press,2012

2. Dr Shikha Kapoor,Personality Development and Soft Skills: Preparing for Tomorrow,International Publishing House; 0 edition (February 28, 2018)

Reference Books:

1. Prashant Sharma ,Soft skills: Personality Development for Life Success, BPB publications, 2018.
2. DR.K.Alex ,Soft Skills, S.Chand Publications.
3. Gajendra Singh Chauhan &Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality, Published by Wiley
4. Avni. Sharma ,Communication Skills and Soft Skills Hardcover, ,Publisher: Yking books
5. Renu Shorey,SOFT SKILLS for a BIG IMPACT, Publisher: Notion Press
6. Dr. Rajiv Kumar Jain & Dr. UshaLife Skills(a guide to steer life),Publisher: Vayu Education of India
7. Raymond.L.Gorden,Basic Interviewing Skills, Waveland publications

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech -IV SEM

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(BA20AMC201/ BA20AHS201) UNIVERSAL HUMAN VALUES

Course Objectives:

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Unit I:

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I.
- Self-Exploration–what is it? Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario.
- Methods to fulfil 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!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.

- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- 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

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.
- Understanding the meaning of Trust; Difference between intention and competence.
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. 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 Co-existence

- Understanding the harmony in the Nature.
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all pervasive Space.
- 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

Natural acceptance of human values.

- Definitiveness of Ethical Human Conduct.
- Basis for Humanistic Education, Humanistic Constitution and Humanistic universal order
- 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.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
  - At the level of individual: as socially and ecologically responsible engineers, technologists and managers.
  - At the level of society: as mutually enriching institutions and organizations
- Sum up: Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions
  E.g., To discuss the conduct as an engineer or scientist etc.

Text Books:

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi,2019. ISBN 978-93-87034-53-2.

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. FSchumacher. "Small is Beautiful".
6. Slow is Beautiful –Cecile Andrews.
7. J C Kumarappa "Economy of Permanence".
8. Pandit Sunderlal "Bharat Mein Angreji Raj".
9. Dharampal, "Rediscovering India".
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule".
11. India Wins Freedom - Maulana Abdul Kalam Azad.
12. Vivekananda - Romain Rolland (English).
13. Gandhi - Romain Rolland (English).

Course Outcomes:

By the end of the course,

- CO1. Understanding the value of education to become more aware of themselves, and their surroundings (Family, Society and Nature)
- CO2. Utilize the concept of human being harmony in myself become more responsible in life and in handling problems with sustainable solutions, while keeping human realtionships and human nature in mind.
- CO3. Understanding the concepts of society - harmony in human for better critical ability.
- CO4. Understanding the human values, human relationships and human society to become sensitive to their commitment.
- CO5. Apply what they have learnt to their own self in different day -to- day settings in real life, atleast beginning would be made in this direction.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

Karakambadi Road, TIRUPATI – 517507

B.Tech- IV SEM

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(MA20AMC401)ENGINEERING MATHEMATICS

(Common to All Branches of LE Students)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various realworld problems and their applications.

UNIT -1

Matrices

Solving system of homogeneous and non homogeneous linear equations. Eigen values and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics (L3).

UNIT -2

Mean Value Theorems

Rolle’s Theorem, Lagrange’s mean value theorem, Cauchy’s mean value theorem, Taylor’s andMaclaurin theorems with remainders (without proof) related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor’s and Maclaurin’s with remainders (L3)

Analyze the behaviour of functions by using mean value theorems (L3)

UNIT 3

Linear differential equations of higher order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters, Applications to L-C-R Circuit problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

UNIT 4

Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT -5

Vector Calculus

Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence, Curl and their related properties.

Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find the work done in moving a particle along the path over a force field (L4)

- Evaluate the rates of fluid flow along and across curves (L4)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education
5. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
6. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Course Outcomes:

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Solve the differential equations related to various engineering fields (L6)
- Apply multiple integrals to find the area and volumes for different functions. (L3)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem	**L**	**T**	**P**	**C**
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(EC20APC501) ANTENNAS AND WAVE PROPAGATION

Course Objectives:

1. To introduce radiation mechanism and basic characteristics of antennas.
2. To discuss various antennas which are operated in VHF & UHF frequency range
3. To introduce design concepts of various types of antennas including micro-strip antenna & Lens antenna.
4. To explain the concept of antenna arrays and measurement of antenna parameters.
5. To demonstrate various modes of EM wave propagation.

UNIT-I

Antenna Basics, Monopole & Dipole antennas: Definition of antenna , Radiation mechanism- single wire, two wire, dipole, Basic antenna parameters- patterns, Main lobe and Side lobes, Beam widths, Beam area, Radiation Intensity, Beam Efficiency, Directivity, Gain & Resolution, Antenna Apertures, Effective height & length, Antenna impedance, Front–to-back ratio, Antenna theorems, Radiation from Monopole, Small Electric Dipole, Half wave Dipole Antennas – Current Distributions, Field Components, Radiated power, Radiation Resistance, Illustrative problems.

Learning Outcomes:

- Understand radiation mechanism and basic antenna characteristics. (L1)
- Compute radiation intensity, gain and directivity of antennas. (L2)

UNIT-II

VHF, UHF and Microwave Antennas - I: Loop Antennas - Introduction, Radiation Resistances and Directives of small and large loops, Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas- Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

Learning Outcomes:

- Derive expressions for radiation resistance, directivity of Loop antennas(L3)
- Obtain radiation pattern of various array antennas. (L2)

UNIT-III

VHF, UHF and Microwave Antennas - II: Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications, Illustrative Problems.

Learning Outcomes:

- Understand basic principles of Micro strip Antennas (L2)
- Describe feeding methods for micro-strip antennas. (L2)

UNIT-IV

Antenna Arrays: Arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End-fire Arrays, General considerations and Binomial Arrays, Illustrative problems.

Antenna Measurements: Introduction, Near and Far Fields, Pattern Measurement, Directivity Measurement, Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

Learning Outcomes:

- Compare radiation pattern and other antenna parameters of broad side and end fire array antennas. (L5)
- Describe the different types of Antenna Measurement (2)

UNIT-V

Wave Propagation-I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation ,Ray/Mode Concepts ,Ground-Wave Propagation- Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space-Wave Propagation- Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Wave Propagation - II: Sky-Wave Propagation -Introduction, Structure of Ionosphere, Refraction and Reflection of Sky-Waves by Ionosphere, Ray-Path, Critical-Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation, illustrative problems.

Learning Outcomes:

- Understand effects of earth's magnetic field on wave propagation (L2)
- Apply the concepts to solve problems related to wave propagation (L3)

TEXT BOOKS:

1. John D. Kraus, Ronald J. Marhefka, Ahmad S. Khan, "Antennas and Wave Propagation",4th Edition, TMH, 2010.
2. Jordan E.C. and Balmain. K.G., "Electromagnetic Waves and Radiating Systems", Prentice-Hall Publications.

REFERENCES:

1. Constantine A. Balanis, "Antenna Theory-Analysis and Design", Wiley Publication,2016.
2. K.D. Prasad, "Antenna & Wave Propagation", Satya Prakash Publications, 2009.
3. Matthew N.O. Sadiku, "Principle of Electromagnetics", 4th edition, Oxford (International), 2012.

Course Outcomes:

CO1. Understand the operation of basic antennas, field components of various dipole antennas and antenna parameters.

CO2. Demonstrate the basic principles of antennas operating in the VHF-UHF frequency range.

CO3. Analyze the antennas that are operated in Microwave frequency and various feeding mechanisms.

CO4. Evaluate the radiation pattern of different antenna arrays and antenna parameters.

CO5. Illustrate wave characteristics in different frequency ranges of propagations and problems on different propagations

SRI VENKATESWARA COLLEGE OF ENGINEERING
(Autonomous)

B. Tech- V Sem

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(EC20APC502) DIGITAL COMMUNICATIONS

Course Objectives:

1. To understand the key modules of digital communication systems with emphasis on digital modulation techniques.
2. To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.
3. To prepare mathematical background for communication signal analysis.
4. To study signal flow in a digital communication system.
5. To analyze error performance of a digital communication system in presence of noise and other interferences.

UNIT- I:

Pulse Digital Modulation: Introduction, sampling process, quantization, quantization noise, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM)- Granular noise Slope over distortion, Differential PCM (DPCM), Processing gain, Comparison of the above systems.

Learning Outcomes:

- Understand source coding techniques & pulse modulation techniques. (L1)
- Describe and determine the performance of line codes. (L2)

UNIT- II:

Baseband Pulse Transmission: Introduction, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signalling schemes, Partial response signalling, Baseband M-ary PAM transmission, Eye diagrams.

Learning Outcomes:

- Analyze the performance of baseband pulse transmission system. (L3)
- Describe the generation & detection of pass band modulated signals. (L2)

UNIT- III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Coherent detection of signals in noise - maximum likelihood decoder, Probability of error, Correlation receiver.

Learning Outcomes:

- Understand the concepts of signal space analysis. (L1)
- Examine the characteristics of maximum likelihood decoder. (L2)

UNIT- IV:

Passband Data Transmission: Introduction, Passband transmission model, Coherent modulation schemes- Generation and detection of binary phase shift keying (BPSK), Quadrature shift keying (QPSK), and Binary Frequency shift keying (BFSK). Analysis of probability of error for BPSK, QPSK, BFSK, M-ary PSK, Non-coherent orthogonal modulation schemes - Generation and detection of non-coherent BFSK, DPSK ,Comparison of power bandwidth requirements for all the above schemes, Illustrative Problems.

Learning Outcomes:

- Analyse the different digital modulation techniques, generation and detection, power spectra and their probability of error performance. (L3)
- Compare the power bandwidth, bit error probability for various modulation scheme. (L5)

UNIT- V

Channel Coding: Linear Block Codes, Syndrome decoding, minimum distance considerations, Cyclic codes- generator polynomial, parity check polynomial, encoder for cyclic code, calculation of syndrome, Convolutional Codes – generator polynomials, problems.

Learning Outcomes:

- Understand various error control encoding and decoding techniques. (L1)
- Apply information theory and linear algebra in source coding and channel coding. (L2)

Text Books:

1. Simon Haykin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. B. P. Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006.

References:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. Dr. Sanjay Sharma, Communication systems, S.K.Katari & Sons 6th Edition, 2013.

Course Outcomes:

CO1. Understand source coding, pulse modulation techniques, and analyze line code performance

CO2. Analyze baseband pulse transmission performance and describe passband signal generation and detection

CO3. Understand signal space representation and analyze digital signals using orthogonal basis functions.

CO4. Analyze digital modulation techniques, their generation, detection, power spectra, and error performance

CO5. Understand error control encoding and decoding techniques and apply information theory to coding

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem

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(EC20APC503) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

1. To study the architecture, pin diagram, memory organization, interrupt structure of 8086 Microprocessor.
2. To study Instruction Formats and Assembler Directives, macros and procedure, string instructions of 8086 microprocessor based ALP.
3. To study to interface 8086 with 8255, 8253, 8251, 8237, 8259 and RAM, ROM Memories.
4. To study the architecture, pin diagram, memory organization, interrupt structure, Instruction formats and addressing modes of 8051 Microcontroller.
5. To study to hardware features of timers, interrupts and serial port and also interface 8051 with Push button switches , LED, seven segment display, stepper motor & LCD.

Unit I

8086 Microprocessor- Features, Architecture, Register Organization, Flag Register, Pin Diagram, Maximum and minimum mode configuration, Memory organization, Memory Segmentation and memory banks accessing, Accessing memory locations. Interrupt structure of 8086 and Interrupt Vector Table.

Unit II

8086 Microprocessor - Instruction Formats, Addressing Modes, Instruction Set of 8086, Assembler Directives, Procedures and macros. Simple ALPs.

Unit III

8086 Microprocessor Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Intel timer IC 8253, Intel 8251 USART architecture and interfacing, Intel 8237 DMA controller, 8259 programmable interrupt controllers.

Unit IV

Intel 8051 Microcontroller - Architecture, Memory organization, internal RAM structure, Special Function Registers (SFRs). Addressing modes and instruction set of 8051. 8051 Assembly language programming.

Unit V

Hardware features of 8051- timers, interrupts and serial ports. 8051 Interfacing - Push button switches and LEDs, interfacing seven segment display. Interfacing stepper motor and LCD with 8051.

Text Books:

1. Microprocessors and Interfacing N. Senthil kumar, M. Saravanan S.Jeevananthan, S.K. Shah, Oxford University Press.
2. K M Bhurchandi, A K Ray, Advanced Microprocessors and Peripherals, 3rd edition, McGraw Hill Education, 2017.

References:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition,1994.
2. Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.
3. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd edition, Pearson, 2012.

Course Outcomes:

- CO1. Understand and describe the architecture of the 8086 Microprocessor
- CO2. Apply the 8086 Microprocessor instruction set, addressing modes, and assembler directives to develop simple assembly language programs.
- CO3. Demonstrate the ability to design and implement interfacing systems using the 8086 Microprocessor
- CO4. Understand the architecture and memory organization of the 8051 Microcontroller
- CO5. Analyze and implement the hardware features of the 8051 Microcontroller

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B.Tech- V Sem	**L**	**T**	**P**	**C**
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(CE20AOE502)Principles of Waste Management

Course Objectives:

- Understanding of problems posed by various types of solid waste
- Categorize various solid and hazardous waste
- Obtain knowledge about various techniques adopted in field to treat solid and hazardous waste
- Become aware of various methods of disposal of solid and hazardous waste
- Understand engineering, financial and technical options for waste management.

UNIT –I

Introduction to Solid Waste

Waste-Types and classification, Waste sources and generation rates, Traditional methods of waste collection and disposal, Factors influencing waste generation and health hazards, Waste composition, Waste collection and Characterization of wastes.

Learning Outcomes:

After completion of this unit, students should

- Learn sampling and characterization of solid waste
- Analysis of hazardous waste constituents including QA/QC issues
- Understand traditional methods of waste collection and disposal

UNIT – II

Waste Processing

Waste processing: Size and volume reduction, Waste minimization, waste hierarchy and waste audit, Recycling of solid wastes,

Hazardous Waste

Definition, sources, classification, collection and segregation, Hazardous waste characterization, treatment and disposal, Radioactive waste

Learning Outcomes:

After completion of this unit, students should

- Learn waste processing techniques
- Determine the ways to reduce waste production

- Learn recycling of solid waste in their homes.
- Understand characteristics of hazardous waste and its treatment, final disposal

UNIT – III

Biomedical waste

e-waste and Plastic waste, Biomedical waste and Biomedical waste management rules, 2016

Composting

Definition- Vermi composting and Biogas production from solid waste

Learning Outcomes:

After completion of this unit, students should

- Learn composting and its types
- Determine the ways to produce more biogas from solid waste
- Understand the ways to dispose e-waste and plastic waste

UNIT –IV

Thermal treatment and Solid waste disposal

Thermal treatment of solid waste – Incineration, Thermal treatment of solid waste – Pyrolysis and gasification, Solid waste disposal – Sanitary landfilling, Landfill leachate and gas management, Landfill bioreactors, Fly ash- Generation and management

Learning Outcomes:

After completion of this unit, students should

- Design a sanitary landfill for a community
- Determine the ways to protect ground water from leachate contamination
- Learn about thermal treatment of solid waste.

UNIT – V

Solid waste management rules and Swachh Bharat Abhiyan

Fly ash management Solid waste management rules, 2016, Hazardous and other waste amendment rules, 2016, Plastic waste management rules, 2016, e-waste management rules, 2016, Swachh Bharat Abhiyan and Recent advances in solid waste management

Learning Outcomes:

After completion of this unit, students should

- Know the rules and regulatory bodies details.
- Use latest standards and techniques to manage the solid waste and hazardous waste
- Adopt the recent advancements in solid waste management

CourseOutcomes (CO):

After studying this course, students will be able to:

- Understand various types of solid waste, sources and their collection methods.

- Identify various waste processing techniques and characteristics of hazardous waste
- Understand the process of management of biomedical waste and composting
- Apply various solid waste disposal techniques according to situation
- Obtain awareness on various solid waste management rules and Swachh Bharat Abhiyan

Textbooks:

1. ArcadioSincero and GregoriaSincero"Environmental Engineering", Second Edition, Prentice -Hall India
2. George Tchobanoglous"Intigrated Solid Waste Management : Engineering Principles and Management", McGraw-Hill Publication 1993
3. M LaGrega and others "Hazardous Waste Management", McGraw-Hill Publication2010
4. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993.
5. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002.

Reference Books:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002

B.Tech- V Sem

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(ME20AOE501) INDUSTRIAL AUTOMATION

Pre-Requisite: Operation Research, Production & Operation Management

Course Objectives:

Course Objectives:
- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I: Introduction to Automation Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:
- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II: Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital- intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc.

Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:
- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts

• To distinguish between mechanization and automation of systems
• To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:

• To know design of various pneumatic and hydraulic components
• To understand about synthesis and design of Pneumatic circuits
• To understand about electro pneumatic circuits
• To design using various solenoid valves with and without grouping

UNIT -IV: Sensors & Actuators Sensors Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:

• To know about selection of sensors and actuators based on dynamic characteristics
• To understand about necessity of interfacing sensors with Microcontroller
• To understand principle and selection of actuators
• To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:

• To know about Robots, classification, selection and specifications
• To understand the use of robotics in industrial applications
• To know about various feedback controls of Robot

• To understand how adaptive control strategies can be used in Robots

TEXT BOOKS:

1. Stamatios Manesis and George Nikolakopoulos, "Introduction to Industrial Automation", CRC Press, 2018. 2. Frank Lamb, "Industrial Automation", Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

1. Richerd L. Shell and Ernest L. Hall, "Hand Book of Industrial Automation", CRC Press, 2000.

- Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an Organization.
- Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout.
- Determine work measurement techniques for time study.
- Recognize the importance of Inventory control to ensure their availability with minimum capital lock up.
- Understand the concepts of TQM, ISO, BIS etc.

Course Outcomes:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech- V Sem

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(EE20AOE502) PROGRAMMABLE LOGIC CONTROLLERS

Course Objectives:

The student will be able to:

- Understand the basic functions and types of PLCs, Easy Veep software, its applications
- Understand Classification of PLCs and applications
- Design PLC Programming for various applications
- Analyze PLC Troubleshooting aspects

UNIT I INTRODUCTION TO PLCs

Introduction:Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen-Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

UNIT II PLC COMPUTATIONAL TOOL

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

UNIT III PLC DEVELOPMENT

PLC software and applications, Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

UNIT IV PLC PROGRAMMING

Programming instructions: Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions - Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring.

UNIT V APPLICATIONS

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO_2), plastic wrapping machines etc.

Course Outcomes:

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

CO1:Understand different types of PLCs, Its classification and the usage of Easy Veep software
CO2: Analyze the Computation tool.
CO3: Illustrate the Boolean logic & basic PLC
CO4:Design PLC Programming for various applications
CO5:Apply PLC programming concepts in different fields of Science and Technology

Reference Books:

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers, 2002.

2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.

3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

Online Learning Resources:

1. https://nptel.ac.in/courses/108105088

SRI VENKATESWARA COLLEGE OF ENGINEERING

(AUTONOMOUS)

B. Tech V Sem **L T P C**

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(AM20A0E501) Introduction to Operating Systems

Course Objectives:

- Understand basic concepts and functions of operating systems.
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques.
- Expose the students with different techniques of handling deadlocks.
- Explore the concept of file-system and its implementation issues.
- Implement various schemes for achieving system protection and security.
- Familiarize with the basics of Windows and Linux operating systems.

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open-Source Operating Systems.

Operating System Structure: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify major components of operating systems and understand the types of computing environments.(L1)
- Explore several open source operating systems.(L2)
- Recognize operating system services to users, processes and other systems.(L2)
- Understand the importance, features of a process and methods of communication between processes.(L2)

UNIT II

Multithreaded Programming: Overview, Multi-core Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues, Examples.

CPU Scheduling: Basic concepts, Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosopher's problem, Readers and writers problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Improving CPU utilization through multi programming and multithreaded programming. (L3)
- Examine several classical synchronization problems.(L2)
- Understand various process scheduling algorithms.(L2)
- Understand the importance, features of a process and methods of communication between processes.(L2)

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory, Examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine the various techniques of allocating memory to processes. (L2)
- Summarize how segmentation and paging works in contemporary computer systems. (L2)
- Understanding the benefits of virtual memory systems. (L2)

UNIT IV

Deadlocks: System Model, deadlock characterization, Ostrich algorithm, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

File Systems: Files, Directories, File system implementation, management and optimization, Directory Implementation, Allocation Methods, Free-Space management.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling,

RAID structure, Stable storage implementation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Investigate methods for preventing/avoiding deadlocks.(L3)
- Examine file systems and its interface in various operating systems.(L2)
- Analyze different disk scheduling algorithms.(L4)
- Understand the Stable-storage implementation and Free-Space management.(L2)

UNIT V

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Case Studies: Linux, Microsoft Windows.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various schemes available for achieving system protection.(L2)
- Acquiring knowledge about various countermeasures to security attacks.(L2)
- Outline protection and security in Linux and Microsoft Windows. (L2)

Course Outcomes:

- Understand theOS design structures, its services and basics of a Process. (L2)

- Analyze various scheduling algorithms and examine concurrency mechanisms in Operating Systems. (L4)
- Apply memory management techniques in the design of operating systems. (L3)
- Compare and contrast various structures and organization of the file system and secondary storage structure. (L4)
- Apply different concepts of Protection and Security services in OS. (L3)

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Ninth Edition,2012, Wiley.
2. Modern Operating Systems, Andrew S Tanenbaum, Third Edition, Pearson Education, 2008

Reference Books:

1. Operating systems by A K Sharma, Universities Press.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.
3. Operating Systems, S. Haldar, A.A. Aravind, Pearson Education.
4. Operating Systems, A.S. Godbole, Second Edition, TMH.

Online Learning Resources:

- https://nptel.ac.in/courses/106/106/106106144/

http://peterindia.net/OperatingSystems.html

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- V Sem **L T P C**
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(CS20AOE502) COMPUTER ARCHITECTURE & ORGANIZATION

(ECE)

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.

UNIT I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture. Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT II

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.
Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer,
Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory,
Cache Memory.

UNIT V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor. Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Course Outcomes:

CO1. Understand the basics of instructions sets and their impact on processor design.

CO2. Demonstrate an understanding of the design of the functional units of a digital computer system.

CO3. Recognize and manipulate representations of numbers stored in digital computers.

CO4. Evaluate cost performance and design trade-offs in designing and Constructing a computer processor including memory.

CO5. Design a pipeline for consistent execution of instructions with minimum hazards

Textbook:

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

References:

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, V th Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech – V Sem

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(CH20AOE501) CHEMISTRY OF POLYMERS AND ITS APPLICATIONS

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

Unit – I : Polymers-Basics and Characterization

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition, radical chain, ionic and coordination and copolymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

Learning Outcomes:

At the end of this unit, the students will be able to

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations (L2)
- Describe measurement of molecular weight of polymer (L2)

Unit – II : Synthetic Polymers

Addition and condensation polymerization processes - Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, XRD.

Learning Outcomes:

At the end of this unit, the students will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization (L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers (L3)
- Characterize the properties of polymers by IR, NMR, XRD etc.,

Unit – III : Natural Polymers & Modified cellulosics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEAK.

Learning Outcomes:
At the end of this unit, the students will be able to

- Describe the properties and applications of polymers (L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex etc., (L2)
- Discuss the special plastics of PES, PAES, PEEK etc., (L3)
- Explain modified cellulosics (L2)

Unit-IV: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels**, Applications** of hydrogels in drug delivery.

Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

At the end of this unit, the students will be able to

- Identify types of polymer networks (L3)
- Describe methods involve in hydrogel preparation (L2)
- Explain applications of hydrogels in drug delivery (L2)
- Demonstrate the advanced drug delivery systems and controlled release (L2)

Unit – V : Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Learning Outcomes:

At the end of this unit, the students will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, miselles, reverse micelles etc., (L2)
- Explain photoelectron spectroscopy (L2)
- Discuss ESCA and Auger spectroscopy to the study of surfaces (L3)
- Differentiate micelles and reverse micelles (L2)

Course Outcomes

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

- Understand the state of art synthesis of Polymeric materials
- Understand the hydro gels preparation, properties and applications in drug delivery system.
- Characterize polymers materials using IR, NMR, XRD.
- Analyze surface phenomenon fo micelles and characterise using photoelectron spectroscopy, ESCA and Auger spectroscopy.

References :

1. A Text book of Polymer science, Billmayer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry – G.S.Mishra
5. Polymer Chemistry – Gowarikar
6. Physical Chemistry –Galston
7. Drug Delivery- Ashim K. Misra

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B.Tech- V Sem

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(EE20APE502) CONTROL SYSTEM ENGINEERING

Course Objectives:

To make the students learn about:

- The effect of feedback, the use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response and time domain specifications
- The concept of stability by Routh's stability criterion and Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modeling of Control system and the concept of controllability and observability.

UNIT – I

CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Classification of control systems, Feedback characteristics, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula.

Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

Learning Outcomes:

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

- Write the differential equations for mechanical and electrical systems(L3)
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs (L4)

UNIT-II

TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Basics of P, PI, PID Controllers.

Learning Outcomes:

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

- Analyze the time domain specifications(L4)
- Calculate the steady state errors(L4)
- Understand about Proportional, Integral and Derivative controllers along with combinations(L2)

UNIT– III

STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

Learning Outcomes:

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

- Analyze the concept of stability in time domain(L4)
- Apply the concept of Routh's stability and Root locus in time domain (L5)

UNIT– IV

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Basics of Compensation techniques – Lag, Lead, Lag-Lead Compensator in frequency Domain.

Learning Outcomes:

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

- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots (L5)
- Design Compensators for various systems (L5)
- Deducing transfer functions from Bode Plots(L4)
- Understand difference between Phase and Gain margins (L2)

UNIT– V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties, The concepts of controllability and observability.

Learning Outcomes:

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

- Understand the concept of state space, controllability and observability (L2)
- Obtain the transfer function from sate space and vice versa (L4)
- Understand the state transition method of solving time invariant state equations (L2)

Text Books:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.

2. J. Nagrath and M. Gopal, “Control Systems Engineering” 5th edition, New Age International (P) Limited Publishers, 2007.

Reference Books:

1. M. Gopal, “Control Systems Principles & Design” 4th Edition, McGraw Hill Education, 2012.
2. B. C. Kuo and FaridGolnaraghi, “Automatic Control Systems” 8th edition, John wiley and sons, 2003.
3. Joseph J Distefano III, “Feedback and Control Systems”, Allen R Stubberud& Ivan J Williams, 2nd Edition, Schaum's outlines, McGraw Hill Education, 2013.
4. Graham C. Goodwin, “Control System Design” Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, “Feedback Control of Dynamic Systems”, J.D. Powell and Abbas Emami- Naeini, 6th Edition, Pearson, 2010.

Course Outcomes:

After completing the course, the student should be able to:

CO1. Understand the concepts of control systems classification, feedback effect, mathematical modelling, and state space analysis. Apply the concepts of Block diagram reduction, Signal flow graph.

CO2. Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.

CO3. Apply the concepts of RH and Root locus for stability calculations.

CO4. Analyze system behavior in the frequency domain. Frequency response characteristics, Design and develop different compensators. Bode, Nyquist, Polar plots for stability calculations.

CO5. Analyze system behavior based on the state space analysis of that system. Controllability and observability.

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech- V Sem

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(EC20APE501) MECHATRONICS

Course Objectives:

1. Learn about the operating principle of various sensors and its importance in real time measurement applications.
2. Acquire the knowledge to model Electrical system and Mechanical system building blocks.
3. Calculate the transfer function of both First–order and Second-order systems.
4. Learn about the interfacing procedure of Peripherals with Programmable Logic Controllers.
5. Study some of the recent Real-time Mechatronics system Design and Modelling solutions.

Unit I

Sensors and Transducers:

What is Mechatronics, Performance terminology, Microprocessor-based controllers, The Mechatronics approach, Performance terminology, Displacement, Position and Proximity, Velocity and Motion, Force, Fluid pressure, Liquid flow and level, Temperature and Light sensors, Selection of sensors and Inputting data by switches.

Unit II

Electrical Actuation Systems and System Models:

Electrical Systems, Mechanical switches, Solid-state switches, Solenoids, DC Motors, AC Motors and Stepper Motors, Mathematical models, Mechanical system building blocks, Electrical system building blocks, Fluid system building blocks and Thermal system building blocks.

Unit III

Dynamic Response and Transfer functions:

Modelling dynamic systems, First–order and Second-order systems, Performance measures for second-order systems, The transfer function, First–order and Second-order systems, Systems in series, Systems with feedback loops and Effect of Pole location on transient response.

Unit IV

Programmable Logic Controllers:

Introduction, Basic structure, Input/output processing, Programming, Mnemonics, Timers, Internal relays and Counters, Shift registers, Master and Jump controls, Data Handling, Analogue input/output and Selection of PLC.

Unit V

Mechatronic Systems:

Traditional and Mechatronics designs, Possible Mechatronics design solutions and Case studies of Mechatronic Systems.

Text Books:

3. W.Bolton, "Mechatronics-Electronic Control systems in Mechanical and Electrical Engineering", Third Edition, Pearson Education Limited, 2018.
4. Nitaigour Premchand Mahalik, "Mechatronics Principles, Concepts and Applications", McGraw Hill Education, New Delhi, 2017.

References:

3. Davis G. Alciatore and Michael B. Histand, "Introduction to Mechatronics and Measurement systems", Second edition, McGraw Hill Education, New Delhi, 2019.
4. Devdas Shetty and Richard A. Kolk, "Mechatronics System Design", Second edition, Cengage learning India Pvt. Ltd., 2012.

Course Outcomes:

CO1: Decide the appropriate sensor for a given application of interest.

CO2: Develop a simulation model for simple physical systems and explain mechatronics design process.

CO3: Summarize the effects of Pole location on system transient response.

CO4: Interface Peripheral devices with Programmable Logic Controllers.

CO5: Analyze possible solutions in the design of Mechatronic systems.

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(Autonomous)

B. Tech- V Sem

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(EC20APE502) NANOELECTRONICS

Course Objectives:

1. To understand the evolution and basics of Nanoelectronics.
2. To understand various fabrication methods in nanotechnology (top down & bottom up).
3. To analyze and discuss various characterization methods in nanotechnology (optical, electrical, AFM, SEM, TEM, and nanoindentation).
4. To understand nano electronic systems and building blocks such as: low-dimensional semiconductors, hetero structures, carbon nano tubes, quantum dots, nano wires etc.
5. To familiarize students with the present research front in Nanoelectronics and to be able to critically assess future trends.

Unit I

Fundamentals of Nanoelectronics:

Moore's Law, Wave functions, wave packets, Schrodinger's wave equation, potential barriers and tunneling, Fermi-Dirac statistics, Density of states, Limitations of conventional FET in nanoscales, Quantum Well, Quantum wire, Quantum dot, current flow in two terminal Quantum dots, ballistic transport, Single Electron Transistor

Unit II

Introduction to methods of fabrication of Nano-Layers: Physical vapour deposition- evaporation & Sputtering, Chemical vapour deposition, Molecular Beam Epitaxy, Ion Implantation, Formation of Silicon Dioxide- dry and wet oxidation methods.

Fabrication of nanoparticles: grinding with iron balls, laser ablation, reduction methods, sol gel, self-assembly, precipitation of quantum dots.

Unit III

Introduction to characterization of nanostructures: Principle of operation of Scanning Tunneling Microscope, Atomic Force Microscope, Scanning Electron microscope - specimen interaction, X-Ray Diffraction analysis

Unit IV

Basic quantum structures: Quantum wells, quantum wires and quantum dots, Single electron devices charge quantization, energy quantization, Coulomb blockade, Coulomb staircase, Bloch oscillations.

Unit V

Nano electronic Devices: Carbon nanotubes based devices CNFET, characteristics; Spin-based devices spin FET, characteristics, Applications of MOSFET, CNFET and Spin FET devices.

Text Books:

1. George W Hanson, "Fundamentals of Nanoelectronics", Prentice Hall, 2008.
2. Karl Goser, "Nanoelectronics and Nano systems: From Transistors to Molecular and Quantum Devices", Springer, First edition, 2005.

References:

1. Rainer Waser (Ed), "Nanoelectronics and Information Technology", Second Edition, Wiley VCH, 2003.
2. Mary Eshaghian- Wilner, "Bio inspired and Nano Scale Integrated Computing", Wiley, 2009.

Course Outcomes:

CO1: Get an insight of quantum mechanical effects associated with low dimensional semiconductors.

CO2: Explain the different processes involved in the fabrication of nanoparticles and nanolayers.

CO3: Explain the different techniques for characterizing nanolayers and nanoparticles

CO4: Integrate and model the device with basic quantum structures.

CO5: Correlating device structures with type of materials, which are commonly used for fabrication, defend the tunneling devices with several parameters of hetero structures; compare characteristics study for the MOS/FET devices.

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(Autonomous)

B. Tech- V Sem

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(EC20APC504)DIGITAL COMMUNICATIONS LAB

Course Objectives:

1. To Develops skills for performance analysis of practical digital communication systems.
2. To understand the fundamental concepts on TDM, Pulse modulations& digital modulation techniques.
3. To evaluate the performance of PCM, DPCM and DM in a digital communication system.
4. To learns how to use MATLAB software and hardware effectively and creatively to synthesis digital communication systems.

LIST OF EXPERIMENTS

Minimum of Twelve experiments to be conducted

Part –A Hardware Experiment (All experiments)

1. Time Division Multiplexing
2. Pulse Code Modulation
3. Differential Pulse code Modulation
4. Delta Modulation
5. Frequency Shift Keying
6. Differential Phase Shift Keying
7. Verification of Sampling Theorem

Part –B Software Experiment (Any Seven experiments)

1. Sampling Theorem-Verification
2. Time Division Multiplexing
3. Delta Modulation
4. Pulse Code Modulation
5. Differential Pulse code Modulation
6. Amplitude Shift Keying
7. Frequency Shift Keying
8. Phase Shift Keying
9. Differential Phase shift Keying

10. QPSK Modulation and Demodulation

Course Outcomes:

CO1. Analyze differenct Source Coding techniques using hardware implementation.

CO2. Analyze Source Coding techniques using MATLAB

CO3. Analyze the different Passband data transmission techniques using hardware implementation.

CO4. Analyze passband data transmission using MATLAB

Equipment:

1. Regulated Power Supply (0-30) V .
2. CROs (0-20)MHz.
3. Function Generators (0-3)MHz
4. RF Signal Generators (0-1000)MHz
5. Multimeters.
6. Required Electronic components (active and passive) for the conduction of experiments from 1-7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range (0 – 1000)MHz
9. Spectrum Analyzer

Software Required:

1. Computer Systems with latest specifications
2. Connected in LAN (Optional)
3. Operating system (Windows XP)
4. Simulations software (MATLAB).

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B. Tech- V Sem

L	T	P	C
3	**0**	**0**	**1.5**

(EC20APC505)MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives:

1. To study programming based on 8086 microprocessor and 8051 microcontrollers.
2. To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
3. To study modular and Dos/Bios programming using 8086 microprocessor.
4. To study to interface 8086 with I/O and other devices.
5. To study and interface 8051 micro controller with I/O and other devices.

Part- A

8086 Microprocessor Programs using MASM/TASM/8086 kit.

(Any Six Experiments)

1. Introduction to MASM/TASM Programming
2. Arithmetic operations.
3. Multiplication and Division.
4. Logical operations.
5. String operations and Instruction prefix: Move Block, Reverse string, Sorting, String comparison.
6. Code conversion.
7. Multi byte arithmetic operations.
8. DOS/BIOS Programming, reading keyboard -Display characters

Part-B

8086 Interfacing:

(Any Two Experiments)

9. 8259 – Interrupt Controller and its interfacing programs
10. 8255 – PPI and its interfacing programs (A /D, D/A,)
11. 8255 – PPI and its interfacing programs (stepper motor,)
12. 7-Segment Display.

<u>Part-C:</u>

Microcontroller 8051 Trainer kit:

(Any Four Experiments)

1. Addition and Subtraction– Signed and unsigned Arithmetic operation.
2. Multiplication and Division – Signed and unsigned Arithmetic operation.
3. Logic operations – Shift and rotate.
4. Sorting- Ascending and descending order.
5. Timer/Counter in 8051
6. Interrupt handling in 8051

Course Outcomes:

CO1. Understanding of the MASM/TASM assembler environment and its usage for low-level programming

CO2. Develop an assembly-level programming for 8086 Microprocessor and 8051 Microcontroller

CO3. Demonstrate proficiency in handling real-world data processing tasks through advanced operations

CO4. Apply the concepts of hardware interfacing to the 8086 microprocessor & 8051 microcontroller to integrate and control external devices

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B. Tech- V Sem

L	T	P	C
1	0	2	2

(EC20ASC501) PCB DESIGN AND PROTOTYPE DEVELOPMENT

Course Objectives:

• To know the various component and symbols in basic electronic circuit

• To understand the PCB in detail

• To analyze the PCB design using KICAD tools

UNIT I

Fundamental of basic electronics:

Fundamental of basic electronics: Component identification, Component symbols & their footprints, basic electronic circuits, understand schematic, Introduction PCB, Difference between PWB and PCB, Types of PCBs: Single Layer, Multi-Layer, Surface Mount, PCB Materials, Electronic Component packaging.

Learning Outcomes:

- Identification basic electronic circuit symbols and their footprints
- Understand the different types of PCB

UNIT II

Making Printed Circuit Boards: Layout Design, Copper Clad Preparation, Etching the PCB, drilling and soldering the PCB, Introduction to Electronic Design Automation (EDA): History of EDA, Different EDA Tools, Creating new PCB, Browsing footprints libraries, sets up the PCB layers, Design rule checking, Track width selection, Component selection, Routing and completion of the design. Design Issues: Transmission line, Cross talk and Thermal management.

Learning Outcomes:

- Understand the EDA Tools
- Analyze Design Issues: Transmission line, Cross talk and Thermal management.

UNIT III

Introduction to Development Tools: Introduction to PCB Design using KiCad tools.

PCB Design Process: PCB Design Flow, Placement and routing, Steps involved in layout design, General design factors for digital and analogue circuits, Layout and Artwork making for Single-side, double-side and Multilayer Boards, Design for manufacturability, Design-specification standards.

Learning Outcomes:

- Implement digital and analog circuits using PCB design
- Understand the Artwork making of Single-side, double-side and Multilayer Boards

Practice Exercises: **Any Ten experiments are to be done** **(13th Experiment is Mandatory)**

1. Practice following PCB Design steps

   - Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, and Netlist generation.
   - Layout Design: Familiarization of Footprint Editor, Mapping of components, Creation of PCB layout Schematic.
   - Create new schematic components.
   - Create new component footprints.

2. Regulator circuit using 7805.

3. Inverting amplifier using op-amp.

4. Full-wave rectifier .

5. Astable multivibrator using IC555.

6. RC phase shift oscillator using BJT.

7. Full adder circuit.

8. RS flip flop with logic circuit.

9. Four-bit comparator.

10. LED Flashing / Blinking Circuit using 555 Timer IC.

11. Automatic street light controller using LDR & Transistor.

12. Two way traffic light controller using 555 timers.

13. Fabricate a Single sided PCB, Mount the components and assemble them in a cabinet for anyone of the circuits mentioned in the above listed.

References:

1. Jon Varteresian, Fabricating Printed Circuit Boards, Newnes, 2002
2. R. Tummala, Fundamentals of Microsystems Packaging, McGraw-Hill 2001

3. C. Robertson. PCB Designer´s Reference. Prentice Hall, 2003
4. Open-source EDA Tool KiCad Tutorial: http://kicad-pcb.org/help/tutorials
http://www.wikihow.com/Create-Printed-Circuit-Boards
http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/
http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself
5. Open-source EDA Tool Eagle Tutorial: https://en.freedownloadmanager.org/users choice/Eagle_Pcb_Design_For_32bit_Windows_7.html
6. Open-source EDA Tool proteus Tutorial: https://softfamous.com/proteus

Course Outcomes:

- CO1. Understand and Identify different components required in PCB Design
- CO2. Learn how to design schematic and layout using PCB
- CO3. Design and implement experiments using PCB.ode
- CO4. Test and analyze the working of PCB,Aware of PCB Making Process

Software Required:

1. Computer Systems with latest specifications
2. Connected in LAN
3. Operating system (Windows10)
4. Simulations software (Eagle, kicad).

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B. Tech – V Sem

L	T	P	C
2	0	0	0

(BA20AMC501) 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.
- Tounderstandthecentral-staterelationinfinancialandadministrativecontrol

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.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union-Federalism -Centre-State relationship–President's Role, power and position-PM and Council of ministers - Cabinet and Central Secretariat–LokSabha–RajyaSabha - The Supreme Court and High Court-Powers

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of Supreme Court and High court

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers –State Secretariat-Organization Structure and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration-District's Administration Head-Role and Importance-Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO, Zilla Parishath –Block level Organizational Hierarchy-(Different departments)-Village level –Role of Elected and Appointed officials-Importance of grass root democracy

Learning Outcomes:-

After completion of this unit student will

- UnderstandthelocalAdministration
- Compareandcontrastdistrictadministration'sroleandimportance
- AnalyzetheroleofMayor andelectedrepresentativesofMunicipalities
- LearnabouttheroleofZillaParishathblocklevelorganization

UNIT-V

Election Commission-Election Commission-Roleof Chief Election Commissioner and Election Commissionerate -State Election Commission -Functions of Commissions for thewelfare ofSC/ST/OBC andWomen

Learning Outcomes:-

After completion of this unit student will

- KnowtheroleofElectionCommission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyzetheroleofstateelectioncommission
- EvaluatevariouscommissionsvizSC/ST/OBCandwomen

Course Outcomes:-

CO1. Understand historical background of the constitution making and its importance for Building a democratic India

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

CO3. Understand the value of the fundamental rights and duties for becoming good citizen of India.

CO4. Analyze the decentralization of power between central, state and local self-government

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

Textbooks:

- J.A. Siwach,"DynamicsofIndianGovernment&Politics".
- H.M.Sreevai,"ConstitutionalLawofIndia",4theditionin3volumes(UniversalLawPublication)
- J.C.Johari, "IndianGovernment andPolitics", HansIndia
- M.V.Pylee, "IndianConstitution", DurgaDasBasu, HumanRightsinConstitutionalLaw,Prentice–Hallof India Pvt. Ltd. NewDelhi

References:

- J.A. Siwach,"DynamicsofIndianGovernment&Politics".
- H.M.Sreevai,"ConstitutionalLawofIndia",4theditionin3volumes(UniversalLawPublication)
- J.C.Johari, "IndianGovernment andPolitics",HansIndia
- M.V.Pylee, "IndianConstitution", DurgaDasBasu, HumanRightsinConstitutionalLaw,Prentice–Hallof India Pvt. Ltd. NewDelhi

E-RESOURCES:

- nptel.ac.in/courses/109104074/8
- nptel.ac.in/courses/109104045/
- nptel.ac.in/courses/101104065/
- www.hss.iitb.ac.in/en/lecture-details

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

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	L	T	P	C
B.Tech-V Sem	2	0	0	0

(IT20AMC501) PROBLEM SOLVING AND PROGRAMMING

(Lateral Entry Students Only)

Course Objectives:

- To learn how to solve a given problem.
- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiar with Dynamic memory allocation concepts.
- To apply concepts of structures and files to solve real word problems.

UNIT-1:

Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, Flowcharts, flowgorithm.

Overview of C: History Of C, C Language Elements, Basic Structure of C Program, C Tokens-Variables and Data Types, Operators, Expressions and Type Conversions.

Learning Outcomes:

The students will be able to

- Develop solution through problem understanding and decomposition (L6).
- Develop basic flowcharts for performing input and output and computations(L3).
- Solve Numerical Problems using Flowgorithm (L3).
- Use C basic concepts to write simple C programs (L3).

UNIT-2:

Control Statements: Selection Statements- if and switch statements.

Iterative Statements: for, while and do-while statements.

Jump Statements: break and continue statements.

Learning Outcomes:

The students will be able to

- Implement C program using Conditional statements (L2).
- Implement C program using Iterative statements (L2).

UNIT-3:

Arrays: Declaration, accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

Learning Outcomes: The students will be able to

- Writing Structured programs using Functions (L5).
- Apply arrays concepts on real time applications (L6).

UNIT-4:

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.

Strings: Introduction to Strings, String handling functions, Preprocessor Directives.

Learning Outcomes: The students will be able to

- Use pointers to write c Programs (L3).
- Understand the concepts of preprocessors (L2).
- Apply Dynamic Memory Allocation concepts on real time applications (L6).

UNIT-5:

Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.

Files in C: Using Files in C, Read data from Files, Writing data to Files, Randomaccess to files, Command-line Arguments

Learning Outcomes:

The students will be able to

- Use the concepts of Structures and Unions to write C programs (L3).
- Apply various operations on Files (L6).

Text Books:

1. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition,2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Ellot B. Koffman, Problem Solving and Program Design in C, 5/e,Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language,Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++,Eighth Edition

Course Outcomes:

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

- Solve computational problems (L3).
- Select the features of C language appropriate for solving a problem (L4)
- Design computer programs for real world problems (L6)
- Organize the data which is more appropriated for solving a problem (L6).

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B. Tech- VI Sem

L	T	P	C
3	0	0	3

(EC20APC601)DIGITAL SIGNAL PROCESSING

Course Objectives:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain.
2. To learn properties of DFT and its application to linear filtering.
3. To understand the designs of IIR and FIR filters.
4. To outline need of Multi-rate DSP.
5. To introduce the concepts of DSP architecture and its applications.

UNIT- I

Frequency analysis of Signals and Systems:

Review of Discrete time signals and systems, Discrete Fourier transform, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering based on the DFT- Filtering of long data sequences - overlap save and overlap add method.

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms, Inverse FFT.

UNIT- II

Infinite Impulse Response Filters:

Design of IIR filters from Analog filters –Approximation of derivatives, Impulse invariance method, and bilinear transformation. Frequency transformation in the analog domain, Illustrative Problems.

Realization of IIR Filter: Structures for IIR system- Direct-Form-I, Direct-Form-II, Transposed form, Cascade-Form, and Parallel-Form Structures.

UNIT- III

Finite Impulse Response Filters:

Design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems.

Realization of FIR Filter: Structures for FIR system–Direct-Form, Cascade-Form and Linear Phase Structure.

Unit -IV

Multi-rate Digital Signal Processing:

Introduction, Decimation, and interpolation, sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multi-stage implementation of sampling rate conversion, sampling rate conversion of band-pass signals, Applications of multi-rate signal processing.

UNIT- V

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP computation Building Blocks, Bus Architectures and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues.

Text Books:

1. John G. Proakis & Dimitris G.Manolakis, Digital Signal Processing – Principles, Algorithms & Applications, 4^{th} Edition, Pearson Education / Prentice Hall, 2007.
2. A.V. Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8^{th} Indian Reprint, Pearson, 2004.

References:

1. Emmanuel C. Ifeachor & Barrie. W. Jervis, Digital Signal Processing, 2^{nd} Edition, Pearson Education / Prentice Hall, 2002.
2. P.Ramesh Babu, Digital Signal Processing, SCITECH, 7^{th} Edition, 2019.
3. Sanjit K. Mitra, Digital Signal Processing – A Computer Based Approach, Tata Mc Graw Hill, 2007.

Course Outcomes:

CO1: Analyze DFT computation using fast algorithms.

CO2: Design & Implementation of IIR filters using different techniques.

CO3: Design of FIR filters based on windowing methods.

CO4: Analyse multi-rate signal processing techniques.

CO5: Understanding the architecture details and instruction sets of fixed and Floating point DSP's.

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(Autonomous)

B. Tech- VI Sem

L	T	P	C
3	0	0	3

(EC20APC602) MICROWAVE ENGINEERING AND OPTICAL COMMUNICATIONS

Course Objectives:

1. To develop the knowledge on transmission lines for microwaves, cavity resonators and waveguide components and applications.
2. To understand the scattering matrix parameters and its use.
3. To differentiate Linear beam tubes and crossed field tubes in terms of operation and performance.
4. To remember various types of fibers, modes, configurations and signal degradations.
5. To analyze signal degradation in optical fibers and compare the performance of various optical sources and detectors.

Unit I

Introduction: Introduction to Microwaves, Microwave spectrum and bands, applications of Microwaves.

Rectangular Waveguides- Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Characteristic equation and cutoff frequencies, filter characteristics, dominant and degenerate modes.

Circular Waveguides- Introduction, Expression for cut off frequencies

Learning Outcomes:

- Know the importance of waveguides (L1).
- Derive field expressions for different modes of propagation in the waveguides(L3).

Unit II

WAVEGUIDE COMPONENTS AND APPLICATIONS: Introduction to scattering parameters and their properties, Terminations, Attenuators, Phase shifters, Hybrid Tees (H-plane, E-plane, Magic Tees), Hybrid ring, Directional Couplers – Bethe hole and Two hole Couplers, Microwave propagation in Ferrites, Microwave devices employing Faraday rotation – Isolator, Circulator, Deriving Scattering matrix for Microwave passive devices.

Learning Outcomes:

- Understand principle of operation of all passive microwave devices (L1).
- Know the importance of Scattering parameters and their properties (L1)

Unit III

MICROWAVE TUBES

Linear Beam Tubes – Two cavity Klystron amplifier -velocity modulation, bunching process, output power, Reflex Klystron oscillator, power output and efficiency, Travelling Wave Tube (TWT) – Bunching process and amplification process.

Crossed Field Tubes – Magnetron oscillator, pi-mode operation, power output and efficiency, Hartree Condition, Mode jumping in Magnetron, Principle of operation of Cross Field Amplifier (CFA).

Learning Outcomes:

- Understand principle of operation of Microwave Tubes and semiconductor devices (L1).
- Derive the expressions power output and efficiency of all microwave devices (L3).

Unit IV

OPTICAL COMMUNICATIONS:

Overview of Optical Fiber Communications, optical fibers – Structures, Optical fiber modes and configurations, Signal degradation in optical fibers – Signal attenuation, absorption, scattering losses, Bending Losses, Core and Cladding losses, Signal distortion in optical waveguides, Information capacity determination, Group delay, waveguide dispersion, Inter model dispersion.

Learning Outcomes:

- Remember the optical fiber types, modes, configurations, and signal degradation types (L1).
- Analyze the signal degradation in optical fibers (L4).

Unit V

OPTICAL SOURCES AND DETECTORS: Introduction, LEDs – structure – Light source, Quantum efficiency, Modulation of an LED, LASER diodes, Source to Fiber power launching, LASER diode to fiber coupling, LED coupling to single mode fibers, Fiber, Splicing, Optical Fiber connectors, Photo diodes – Principle of Photo diodes, Avalanche Photodiodes, Photo detector noise, detector response time, Comparison of Photo diodes.

Learning Outcomes:

- Understand the working principle of optical sources, detectors and power coupling (L2)
- Compare the performance of various optical source and detectors (L4)

Text Books:

1. Samuel Y. Liao, "Microwave Devices and Circuits", PHI publications, Third Edition, 1997. (For Units 1,2 and 3)
2. Gerd Keiser, "Optical Fiber Communications", McGraw Hill, Third Edition, 2000. (For Units 4, and 5)

References:

1. Om. P. Gandhi, "Microwave: Engineering and Applications", Kai Fa Book Company, 1981.
2. R. E. Collin, "Foundations for Microwave Engineering", Wiley Student Edition, Second Edition, 2009.
3. F E Terman, "Electronic and Radio Engineering", McGraw Hill, 4th Edition,1984.

Course Outcomes:

CO1. Analyze the microwave spectrum, applications and mode analysis of rectangular waveguide and cutoff frequencies,filter characteristics.

CO2. Understand various microwave components and derive the Scattering Matrix for various microwave passive devices.

CO3. Examine the principles and mode characteristics of microwave tubes like Klystrons,TWT and Magnetrons.

CO4. Analyze various types of fibers, modes, configurations and signal degradations

CO5. Apply signal degradation in optical fibers and compare the performance of various optical sources and detectors.

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B. Tech- VI Sem

L	T	P	C
3	0	0	3

(EC20APC603) VLSI DESIGN

Course Objectives:

6. Learn about the various processing steps involved in the fabrication of a nMOS, pMOS and CMOS transistors.
7. Learn about the various Design rules and Layout of MOS transistors.
8. Enable the students to learn about the Scaling Models and Scaling factors of MOS transistors.
9. Study the various examples of structured design.
10. Learn about the Testing concepts in VLSI Chip design.

Unit I

Review of Microelectronics and Introduction to MOS technology:

The IC era, Basic MOS transistors- Enhancement mode and Depletion mode transistor action, nMOS fabrication, CMOS fabrication-P-Well, N-Well and Twin-tub process, Thermal Aspects of processing and Bi-CMOS. Drain-to-Source current versus Voltage V_{DS} relationships, MOS transconductance, output conductance and Figure of Merit.

Unit II

MOS and Bi-CMOS circuits and Design process:

The Pass transistor, nMOS inverter, Pull-up to Pull-down ratio of different cases, CMOS inverter and Latch-up in CMOS circuits. MOS layers, Stick diagrams-nMOS and CMOS design styles, Design rules and Layout- Lambda-based design rules, Contact cuts, Double Metal MOS process rules and CMOS Lambda-based design rules, 2µm Double Metal, Double Poly. CMOS/BiCMOS rules and Layout diagrams.

Unit III

Circuit Concepts and Scaling of MOS circuits:

Sheet resistance concept, Area Capacitance of layers and calculations, The Delay unit, Inverter delay, Driving large capacitance loads, Propagation delays and Wiring capacitances, Scaling Models and Scaling factors, Scaling factors for various device parameters and its summary.

Unit IV

Subsystem Design and Layout:

Architectural issues, Switch logic, Gate restoring logic-The inverter, Two-input nMOS, CMOS and BiCMOS NAND and NOR gates, Other forms of CMOS logic, Examples of Structured design- Parity generator, Multiplexers, Four-Line Gray code to Binary code converter, Clocked Sequential circuits-Two-phase clocking and Charge storage, System considerations- Bipolar drivers for Bus lines, Basic arrangements for Bus lines and Precharged bus concept.

Unit V

Test and Testability:

System partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic and Sequential Logic, Practical Design for Test guidelines, Scan Design Techniques and Built-In-Self-Test (BIST).

Text Books:

1 K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.

2 W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1 Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison –Wesley, USA, 1980.

2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

CO1. Demonstrate and Outline the concepts of processing steps in the fabrication of a nMOS, pMOS and CMOS structure.

CO2. Analyze and Apply the Layout procedure of simple MOS circuit using Lambda based design rules.

CO3. Analyze and summarize the scaling effects of various key parameters of MOSFET devices..

CO4. Design various MOS based logic circuits.

CO5. "Analyze algorithms for automatic test generation for combinational and sequential circuits."

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B. Tech- VI Sem **L T P C**
3 0 0 3

(EC20APE601) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objectives:

1. To understand various measurement metrics for performance analysis and basic principles of various measurements like voltage, current, Resistance.
2. To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes.
3. To explain principles of operation and working of different electronic instruments like signal generators, wave analyzers etc.
4. Understand the basic principle of various DC/AC bridges for the measurement of unknown passive elements like R, L and C.
5. To provide exposure to working principles of different sensors and transducers.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define different terms used for characterizing the performance of an instrument/measurement system (L1).
- Understand the principle of operation of various meters (L1).

UNIT-II

Oscilloscopes: Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, dual trace/beam CRO, Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic blocks of analog and digital CROs (L1)
- Measure amplitude and frequency utilizing oscilloscopes (L2)

UNIT-III

Signal generators & Analyzers: Specifications & principles of working (Block diagram approach) Signal generators-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principle of various signal generators and analyzers (L1).
- Describe characteristics of signal generators and analyzers (L2).

UNIT-IV

Review of DC Bridges: Wheatstone bridge, Kelvin Bridge, errors and precautions in using bridges.

AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Schering Bridge. Measurement of frequency- Wein Bridge, Q-meter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of measurements associated with different DC/AC bridges(L2)
- Ability to derive balance condition of various bridges to find unknown values (L2)

UNIT-V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain basic principle of the different types of sensors and Transducers (L2)
- Select the appropriate sensor/transducer for the measurement of physical parameters (L5)

TEXT BOOKS:

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

REFERENCES:

1. Robert A. Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.
3. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education,2009.

Course Outcomes:

CO1. Analyze the performance characteristics of different types of measuring instruments

CO2. Understand&Analyze the operations functioning & principle operations of analog &Digital storage oscilloscopes

CO3. Understand the working principle of signal generators and analyzers

CO4. Design and measure the R,L & C Parameters of AC&DC Bridges

CO5. Apply the concepts of sensors and transducers to measure the physical quantities in the field of science and engineering in various parameters using transducers

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B. Tech- VI Sem

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(EC20APE602) INFORMATION THEORY AND CODING

Course Objectives:

1. To teach basic parameters of Information, concepts of source coding techniques, and error control coding techniques.
2. To transmit knowledge on Information theory and error control coding techniques for solving problems.
3. To Introduce various source coding and channel coding techniques for error detection and error correction in the information-bearing signals.
4. To dissimilate block to variable length coding and variable to block length coding techniques for merits and demerits.
5. To describe various systems for linear block codes and convolutional codes.

Unit I

Information Theory:

Introduction, Definition of Entropy, Conditional Entropy, Relative Entropy, Basic Properties of Entropy, Mutual Information, Information Inequalities, Kraft Inequality, optimal codes, bounds on optimal Code length, Shanon-Fano Coding, Huffman Coding, Related Problems.

Unit II

Asymptotic Equipartition Property: Introduction, Block to Block Coding of DMS: Consequences of Asymptotic Equipartition Property, Problem-solving.

Universal Source Coding: Lempel-Ziv Algorithm, LZ -77 Encoding, and Decoding, Lempel- Ziv Welch (LZW) Algorithm, LZW Encoding, and Decoding**.**

Unit III

Error Control Coding:

Introduction to Error Control Codes, Error Probability with Repetition in the Binary Symmetric Channel, Parity Check Bit Coding for Error Detection, Block Coding for Error Detection and Correction, The Hamming Distance,

Unit IV

Linear Block Codes:

Introduction to Linear Block Codes, Syndrome and Error Detection, Encoding Block Codes, Decoding of Block Codes, Single Parity Check bit Code, Repeated Codes, Hadamard Code, Hamming Code, Cyclic Codes, Generator and Parity-Check Matrices of Cyclic Codes, Encoding and Decoding of Cyclic Codes, BCH codes.

Unit V

Convolutional Coding:

Convolutional Coding, Code Generation, Decoding Convolutional Code, the Code Tree, Decoding in the presence of Noise, State and Trellis Diagrams, The Viterbi Algorithm.

Textbooks:

1. Thomas M.Cover, Joy A. Thomas, Elements of Information Theory, John Wiley & Sons,2nd Edition, 2006.
2. Shu Lin, Daniel J. Costello Jr., Error Control Coding, Pearson, Second Edition, 2013.

References:

1. Herbert Taub, Donald L Shilling, Goutam Saha, Principles of Communication Systems, 4th Edition, McGraw Hill, 2017.
2. Simon Haykin, Communication Systems, John Wiley, 4th Edition, 2010.

Course Outcomes:

CO1: Describe basic parameters of Information, the concepts of source coding techniques, and Error Control coding techniques.

CO2: Apply knowledge of Information theory and error control coding techniques to solve problems.

CO3: Analyze various source coding and channel coding techniques for error detection and error correction in the information-bearing signals.

CO4: Compare various block to variable length coding and variable to block length coding techniques for merits and demerits.

CO5: Design various systems for linear block codes and convolutional codes

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B. Tech- VI Sem

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(EC20APE603)INTRODUCTION TO DIGITAL SIGNAL PROCESSING

(EEE)

Course Objectives:

1. To summarize and analyze the concepts of signals, systems in time and frequency domain.
2. To learn properties of DFT and its application to linear filtering.
3. To understand the designs of FIR filters.
4. To understand the design of IIR filters.
5. To outline need of Multi-rate DSP.

UNIT- I

Frequency analysis of Signals and Systems:

Review of Discrete time signals and systems, Discrete Fourier transform, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering based on the DFT- Filtering of long data sequences - overlap save and overlap add method.

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms, Inverse FFT.

UNIT- II

Infinite Impulse Response Filters:

Design of IIR filters from Analog filters –Approximation of derivatives, Impulse invariance method, and bilinear transformation. Frequency transformation in the analog domain, Illustrative Problems.

Realization of IIR Filter: Structures for IIR system- Direct-Form-I, Direct-Form-II, Transposed form, Cascade-Form, and Parallel-Form Structures.

UNIT- III

Finite Impulse Response Filters:

Design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems.

Realization of FIR Filter: Structures for FIR system–Direct-Form, Cascade-Form and Linear Phase Structure.

Unit -IV

Multi-rate Digital Signal Processing:

Introduction, Decimation, and interpolation, sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multi-stage implementation of sampling rate conversion, sampling rate conversion of band-pass signals, Applications of multi-rate signal processing.

UNIT- V

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP computation Building Blocks, Bus Architectures and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues.

Text Books:

1. John G. Proakis & Dimitris G.Manolakis, Digital Signal Processing – Principles, Algorithms & Applications, 4^{th} Edition, Pearson Education / Prentice Hall, 2007.
2. A.V. Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8^{th} Indian Reprint, Pearson, 2004.

References:

1. Emmanuel C. Ifeachor & Barrie. W. Jervis, Digital Signal Processing, 2^{nd} Edition, Pearson Education / Prentice Hall, 2002.
2. P.Ramesh Babu, Digital Signal Processing, SCITECH, 7^{th} Edition, 2019.
3. Sanjit K. Mitra, Digital Signal Processing – A Computer Based Approach, Tata Mc Graw Hill, 2007.

Course Outcomes:

CO1: Analyze DFT computation using fast algorithms.

CO2: Design & Implementation of IIR filters using different techniques.

CO3: Design of FIR filters based on windowing methods.

CO4: Analyse multi-rate signal processing techniques.

CO5: Understanding the architecture details and instruction sets of fixed and Floating point DSP's.

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(EC20APE604)RADAR SYSTEMS

Course Objectives:

1. Make student to acquire the knowledge on types of Radars, working principles, applications.
2. Make student to acquire the knowledge on tracking a target and understand phased array antennas, navigational aids.

Unit I

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.

Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

Unit II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

Unit III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, and Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

Unit IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking

Radar – Amplitude Comparison Mono pulse (one- and two-coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

Detection of Radar Signals in Noise: Introduction, Noise Figure and Noise Temperature, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver.

Unit V

Phased Array Antennas and Navigational Aids: Introduction to Phased Array Antennas - Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes. Navigational Aids: Direction Finder, VOR, ILS and Loran.

Text Books:

1. Merrill I. Skolnik, "Introduction to Radar Systems", 2nd Edition, TMH Special Indian Edition, 2007.
2. Byron Edde, "Radar Principals, Technology, Applications", Pearson Education, 1992.

Reference Books:

1. F.E. Terman, "Radio Engineering", Mc Graw Hill Book Co. (for Chapter 7 only), Fourth Edition 1955
2. Simon Kingsley & Shaun Quegan, "Understanding RADAR Systems", McGraw Hill Book Co., 1993.

Course Outcomes:

CO1. Learn the basic working principle of Radar and target detection procedure.

CO2. Know the working and applications of CW and Frequency Modulated Radar.

CO3. Gain the knowledge of MTI and Pulse Doppler Radar.

CO4. Understand different methods of tracking a target and analyze the effect of noise at the receiver.

CO5. Learn about the phased array antennas and different navigational aids.

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(CE20AOE601) Disaster Management

CourseObjectives:

The objective of this course is to:

- Give the basic knowledge of Natural Hazards and disasters.
- Develop an awareness of the chronological phases of natural disaster response and rescue relief operations.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Understand the tools of post-disaster management.

UNIT –I

Introduction:

Hazards, Disasters, Disaster Management, Disaster Management cycle – Five priorities for action.

Natural Hazards and Disaster Management:

Floods, droughts, Earthquakes, global warming, cyclones & Tsunamis, landslides, Post Tsunami hazards along the Indian coast, landslides.

Learning outcomes:

At the end of unit, students will be able to

- Gain the basic knowledge about hazards and disasters.
- Know about the natural hazards and its management.
- Understand about the global warming, cyclones and tsunamis

UNIT II

Man-Made Disaster and Management:

Case study methods of the following: Fire hazards, transport hazards, biological hazards, waste management, post disaster, bio terrorism -threat in mega cities.

Learning outcomes:

At the end of unit, students will be able to

- Know about the fire hazards and solid waste management.
- Gain knowledge about transport and biological hazards.

UNIT – III

Risk and Vulnerability:

Building codes and land use planning, social vulnerability, environmental vulnerability, and sustainable development, climate change risk rendition, financial management of disaster – related losses.

Learning outcomes:

At the end of unit, students will be able to

- Know about the regulations of building codes and land use planning related to risk and vulnerability.
- Understand about the financial management of disaster and related losses

UNIT – IV

Role of Technology in Disaster Managements:

Disaster management for infra structures, taxonomy of infra-structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –multimedia technology in disaster risk management and knowledge in disaster reduction.

Learning outcomes:

At the end of unit, students will be able to

- Know about the technological aspects of disaster management.
- Understand the multimedia technology in disaster risk management.
- Get knowledge about the factors for disaster reduction.

UNIT –V

Emerging approaches in Disaster Management

- Pre- disaster stage (preparedness)
- Emergency Stage
- Post Disaster stage-Rehabilitation.

Learning outcomes:

At the end of unit, students will be able to

- Gets knowledge about three planning strategies useful in mitigation?
- Understand about preparedness and rehabilitation stage.

CourseOutcomes (CO):

On completion of the course the students will able to

- Know the different types of disasters and their effects on environment.
- Have the knowledge about Causes of disasters.
- Gain knowledge about disaster management through engineering applications.
- Explain the process of risk management
- Distinguish between the different approaches needed to manage pre- during and post disaster periods

Textbooks:

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill EducationPvt. Ltd., New Delhi.
3. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),

Reference Books:

1. Harsh. K .Gupta "Disaster Management edited", Universities press, 2003
2. Donald Hyndman & David Hyndman "Natural Hazards & Disasters" – Cengage Learning

B.Tech - VI Sem **L T P C**
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(ME20AOE601) FUNDAMENTALS OF ADDITIVE MANUFACTURING

Pre-requisite: Manufacturing Processes

Course Objectives:

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering techniques.
- Explain different processes available in additive manufacturing.
- Bring awareness on mechanical properties of materials and geometric issues related to additive manufacturing applications.

UNIT – 1:

Introduction to Additive Manufacturing (AM) Systems :

History and Development of AM, Need of AM, Difference between AM and CNC, Classification of AM Processes: Based on Layering Techniques, Raw Materials and Energy Sources, AM Process Chain, Benefits and Applications of AM, Representation of 3D model in STL format.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the importance of AM process and development process cycle of AM.
- Distinguish the difference between CNC and AM.
- Identify the role of AM in the industrial applications.
- Understand the different formats to represent the 3D Model.

UNIT – 2:

CAD & Reverse Engineering:

Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology. Reverse Engineering (RE) –Meaning, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the different process steps of Additive Manufacturing.
- Understand the role of software tools for Additive Manufacturing Technology
- Build the CAD model and generate support forrequired 3D printing Component.

UNIT – 3:

Solid & Liquid Based AM Systems

Stereolithography (SLA) and Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations and Applications.Fusion Deposition Modeling (FDM). Laminated Object Manufacturing (LOM).

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the Additive Manufacturing process of Stereolithography (SLA) and Solid Ground Curing (SGC)
- Distinguish the differences between FDM and SLA processes.
- Analyze the limitations and the opportunities of current AM processes to develop the future AM technologies.

UNIT – 4:

Powder Based AM Systems:

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the Additive Manufacturing process of SLS, LENS, EBM.
- Distinguish the differences between SLS and EBM processes.
- Analyze the limitations and the opportunities of SLS, EBM, LENS AM processes to develop the future AM technologies.
- Distinguish the various AM processes and use them for specific problem-based applications.

UNIT – 5:

Other Additive Manufacturing Systems:

Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM). Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

- Learn the Additive Manufacturing process of BPM, SDM.
- Understand the differences between BPM and SDM processes.
- Analyze the limitations and the opportunities of BPM, SDM processes to develop the future AM technologies.

Textbooks:

1. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1/e Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e World Scientific Publishers, 2003.

Reference Books:

1. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling, Springer, London 2001.
3. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.
5. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Online Learning Resources:

- NPTEL Course on Rapid Manufacturing https://nptel.ac.in/courses/112/104/112104265/
- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
- https://lecturenotes.in/subject/197

- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4

Course Outcomes:

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

- **Apply** the fundamentals concepts of additive manufacturing to develop of effective process steps.
- **Analyse** the various fabrication techniques and apply them to manufacture a 3D printed part.
- **Develop** a 3D model in standard tessellation language format.
- **Build** the feasible designs of support structure to the 3D printing models.

Analyse the limitations of various additive manufacturing techniques for the selective applications.

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B.Tech- VI Sem

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(EE20AOE603) OPTIMIZATION TECHNIQUES THROUGH MATLAB

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hook and Jeeves method, interior penalty function with

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Course Outcomes:

After completion of this course the student can be able to

CO1: Use optimization terminology and concepts, and understand how to classify an optimization problem.

CO2: Apply optimization methods to engineering problems.

CO3: Implement optimization algorithms.

CO4: Compare different genetic algorithms.

CO5: Solve multivariable optimization problems.

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: "An Introduction with Applications", Anshan, 2010.

2. Achille Messac, "Optimization in practice with MATLAB", Cambridge University Press, 2015.

3. Jasbir S Arora, "Introduction to optimum design", 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, "MATLAB Optimization Techniques", Academic press, Springer publications, 2014.

2. Steven C.Chapra, "Applied Numerical Methods with MATLAB for Engineers and scientists": 4th edition, McGraw-Hill Education, 2018.

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B. Tech- VI SEM **L T P C**

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(CS20A0E602) JAVA Programming

Course Objectives:

- To understand object-oriented concepts and problem-solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrencymechanism.
- To design the GUIs using applets and swing controls.

UNIT - I

Introduction to OOP: OOP principles, Java Buzzwords, Implementing Java program, JVM, Data Types, Variables, Type conversions and Casting, Operators, Control statements, Arrays. Classes, Objects, Methods, Constructors, this keyword, static keyword, Overloading Methods and Constructors, Argument passing, Exploring String class.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the syntax, semantics and features of Java Programming Language (L1).
- Learn object-oriented features and understanding type conversion and casting (L2).
- Understand different types of string handling functions and its usage (L1).

UNIT – II

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

Packages: Basics, finding packages and CLASSPATH, Access Protection, Importing packages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Implement types of Inheritance and developing new classes based on existing classes(L3)
- Demonstrate features of interfaces to implement multiple inheritances (L2).
- Distinguish between system packages and user defined packages (L2).

UNIT – III

Exception handling - Fundamentals, Exception types, uncaught exceptions, using try and catch,Multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions,creating own exception sub classes.

I/O and Other Topics: – I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading and writing files, Automatically closing a file, enumerations, type wrappers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn what exceptions are and how they are handled (L1).
- Learn when to use exception handling and how to create user defined exceptions(L3)
- Learn the difference between various files and streams (L1).

UNIT - IV

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Inter thread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Hash table, Properties, Stack, Vector, String Tokenizer, Date, Calendar, Random, Scanner.

Applets- Definition, Life Cycle and Execution.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concurrency, parallelism and multithreading(L1).
- Learn the importance of collections and use prebuilt generic data structures from Framework (L1).
- Develop applets for web applications(L5)

UNIT – V

Event Handling-Delegation Event Model, Event Sources, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter classes.

AWT AND Swings: AWT: AWT Hierarchy, AWT controls, Layout Managers: FlowLayout, BorderLayout, GridLayout, CardLayout, and Limitations of AWT. SWINGS: JFrame, JPanel, JComponent- JLabel and ImageIcon, JTextField,JTabbedPane , Swing Buttons, JScrollPane, JComboBox, JTable.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the GUI programming (L1).

Course Outcomes:

After completion of the course the student will be able

CO1. Understand OOP techniques,syntax, semantics and features of Java Programming Language and Solve real world problems using those techniques.
CO2. Apply code reusability through inheritance, packages and interfaces.
CO3. Apply the Exception handling and I/O classes to effectively solve problems.
CO4. Develop applications by using collection frame work and parallel streams for better performance.
CO5. Build GUIs and handle events generated by user interactions.

Text Books:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. T. Budd "Understanding Object-Oriented Programming with Java", updated edition, Pearson Education.

2. Cay S. Horstmann "Core Java Volume – 1 Fundamentals",Pearson Education.

3. Sagayaraj, Dennis, Karthik and Gajalakshmi "Java Programming for core and advanced learners, University Press.

4. Y. Daniel Liang, "Introduction to Java programming", Pearson Education.

5. P. Radha Krishna "Object Oriented Programming through Java", University Press.

6. S. Malhotra, S. Chudhary, "Programming in Java", 2nd edition, Oxford Univ. Press.

7. R.A. Johnson, "Java Programming and Object-oriented Application Development", Cengage Learning.

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B.Tech - VI Sem **L T P C**

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(AM20A0E502) Web Technologies

Course Objectives:

- Giving the students the insights of the Internet programming and how to design andimplementcomplete applications over the web.
- It covers the notions of Web servers and Web Application Servers, DesignMethodologieswithconcentrationonObject-Orientedconcepts, Client-Side
- Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic Content to web applications, Programming Common Gateway Interfaces, Programming the User Interface for theweb applications

UNITI:

Web Basics and Overview: Introduction to Internet, World Wide Web, Web Browsers, URL,MIME,HTTP, Web Programmers Tool box.HTML Common tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) &its Types. Introduction to Java Script, Declaring variables, functions, Event handlers (on click, on submit, etc.,) and Form Validation.

Learning Outcomes:

At the end of the unit students will be able to:

- Create standard tags of HTML tags and Knowing the features of designing static web pages.(L6)
- List different types of CSS to design web page attractively.(L1)
- UtilizedifferenttoolslikeAdobeDreamweaverandMicrosoftFrontpage.(L3)

UNITII:

Introduction to XML: Document type definition, XML Schemas, Presenting XML, Introduction to XHTML, Using XML Processors: DOM and SAX. PHP: Declaring Variables, Data types, Operators, Control structures, Functions.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explaindifferenttypesofclientsidescripting.(L2)
- ConstructdynamicwebpagesusingDHTML.(L6)
- Illustratevalidationforwebpages.(L2)

UNIT III:

Web Servers and Servlets: Introduction to Servlets, Life cycle of a Servlet, JSDK, Deploying Servlet, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax. Servlet HTTP package, Handling Http Request & Responses, Cookies and Session Tracking.

LearningOutcomes:

Attheendofthe unit,students will be able to:

- AnalyzetheimportanceofServersidescripting.(L4)
- Demonstratedeploymentof theapplicationusingTomcatServer.(L2)
- ExperimentwithStoringandRetrievingdatafromJDBC.(L3)

UNIT IV:

Database Access: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.*package, Connecting todatabase inPHP,Execute Simple Queries,Accessinga Databasefroma Servlet.Introductionto struts frameworks.

LearningOutcomes:

Attheendofthe unit,students will be able to:

- Understand how XML interacts with different applications.(L1)
- Develop PHP Programs using WAMP and XAMPP Server.(L3)
- Examine background applications using XSL and XSLT.(L4)

UNIT V:

JSP Application Development: The Anatomy of a JSP Page, JSP Processing. JSP Application Design and JSP Environment, JSPD eclarations, Directives, Expressions, Scripting Elements, implicit objects.

JavaBeans: Introduction to Beans, Deploying java Beans in a JSP page.

LearningOutcomes:

- ExplaintheimportanceofAJAXArchitecture.
- Integrateandtestweb services.

CourseOutcomes:

- Analyze aweb pageandidentifyits elementsand attributes.
- CreatewebpagesusingXHTMLandCascadingStyles sheets.
- Installationandusageof Server software‘s.
- DatabaseConnectivityto web applications
- BuildwebapplicationsusingServletand JSP

TEXTBOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEYDreamtech(UNITs 1,2)
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIESByMartyHall andLarryBrown Pearson (UNITs3, 4,5)

REFERENCEBOOKS:

1. Programmingworldwideweb-Sebesta,PearsonEducation,2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ PearsonEducation Asia

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B.Tech– VI SEM **L T P C**
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(EG20AOE601) TECHNICAL COMMUNICATION AND PRESENTATION SKILLS

Course Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

SYLLABUS

UNIT -1:

Basics of Technical Communication – Introduction - Objectives & Characteristics of Technical Communication - Importance and need for Technical communication - LSRW Skills - Barriers to effective communication

Learning Outcomes:
At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II

Informal and Formal Conversation - Verbal and Non-verbal communication -Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:
At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

UNIT -III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:

At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

Learning Outcomes:

At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

Course Outcomes

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

TEXT BOOKS:

1. Ashrif Rizvi, "Effective Technical Communication", TataMcGrahill, 2011
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication", 3rd Edition, O U Press 2015

REFERENCES:

1. Pushpalatha & Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
2. Barron's/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press. 2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., "Management Shapers Series", Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations" Oxford.
6. Edgar Thorpe and Showick Thorpe, "Winning at Interviews" Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hil

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(EC20APC604)DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

1. Ability to apply knowledge of mathematics, science and engineering Construction of tools for visualizing the basic concepts of discrete signal representation such as Fourier Transforms, discrete time representations.
2. Students will learn numerous programming tools for design and Implementations of filtering algorithms.
3. Understand the concept of Multi-rate signal processing and sample rate Conversion.
4. Develop and Implement DSP algorithms in software using CCS with DSP Floating Point Processor.

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

List of Experiments:

1. Find energy and power of any given signal.
2. Generate random signals and plot its PSD.
3. Generate sum of two sinusoidal signals and find the frequency response (magnitude and phase).
4. Find frequency response of a system given by difference equation form.
5. Compute and implement the N-point DTFT of a given sequence and compute the power density spectrum of the sequence.
6. Compute and implement the N-point DFT of a given sequence and compute the power density spectrum of the sequence.
7. Implement and verify N-point FFT of a given sequence and find the frequency response (magnitude and phase).
8. Design IIR Butterworth filter and compare their performances with different orders (Low Pass Filter /High Pass Filter)
9. Design IIR Chebyshev filter and compare their performances with different orders (Low Pass Filter /High Pass Filter).
10. Design and implementation of IIR filter using bilinear transformation & Impulse invariant method.

11. Design FIR filter (Low Pass Filter /High Pass Filter) using windowing technique.
    i. Using rectangular window
    ii. Using hamming window
    iii. Using Kaiser window
12. Design and verify Filter IIR frequency response by using Filter design and Analysis Tool.
13. Design and verify Filter FIR frequency response by using Filter design and Analysis Tool.
14. Compute the Decimation and Interpolation for the given signal.

Note: Any TWELVE of the experiments are to be conducted.

References:

1. Matlab Simulink For Digital Signal Processing by Won,Y.Yang, Tbh/Yes Dee, 2014, Paperback
2. Fundamentals of Digital Signal Processing Using MATLAB 1st Edition (English, Paperback, Schilling Robert J.)

Course Outcomes:

- CO1. Implement various filters and DSP Algorithms using Hardware.
- CO2. Simulate various signals and DSP Algorithms using Matlab.
- CO3. Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.
- CO4. Analyze and observe magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.

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(EC20APC605) MICROWAVE AND OPTICAL COMMUNICATIONS LAB

Course Objectives:

1. To Understand microwave waveguides, passive & active devices, tubes and network analysis.
2. To design microwave matching networks.
3. To Understand the S-matrix of Tee Junctions
4. To perform microwave measurements.

LIST OF EXPERIMENTS

Minimum of Ten experiments to be conducted (Any seven from Part-A)

Part –A (Microwave Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength Measurement using slotted line section.
8. Scattering parameters of Magic Tee.
9. Scattering parameters of Isolator.
10. Scattering Parameters of Circulator.

Part –B (Optical Experiments)

1. Measurement of Numerical Aperture of the given fiber.
2. Measurement of Data rate for Digital Optical link.
3. Measurement of losses for Analog Optical link.
4. Characterization of LED.
5. Characterization of Laser Diode.

Course Outcomes:

- CO1. Analyze the mode characteristics of Reflex Klystron oscillator , measurement of VSWR, Attenuation,Directional Coupler and negative resistance characteristics of Gunn Oscillator.
- CO2. Analyze the Scattering matrix of given passive device experimentally and verify the same theoretically.
- CO3. Analyze numerical aperture and bending losses of a given optical fiber.
- CO4. Analyse optical link between transmitter and receiver experimentally to find attenuation and signal strength of the received signal.

<u>Equipment's Required:</u>

1. Regulated Klystron Power Supply	:	6 Nos
2. VSWR Meter	:	6Nos
3. Milli/Micro Ammeters	:	10Nos
4. Multimeters	:	10Nos
5. CROs	:	8Nos
6. GUNN power supply &		
PIN modulator	:	4Nos
7. Relevant Microwave Components	:	---
8. Fiber Optic Analog Trainer Based LED	:	3Nos
9. Fiber Optic Analog Trainer Based Laser	:	2Nos
10. Fiber Optic Digital Trainer	:	1No
11. Fiber Cables	:	(Plastic, Glass)

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(EC20APC606)VLSI DESIGN LAB

Course Objectives:

1. To understand and develop HDL source code for the given problem/experiment
2. To analyze the obtained results of the given experiment/problem
3. To simulate the given circuit with suitable simulator and verify the results
4. To understand how to use FPGA/CPLD hardware tools in the lab
5. To design and implement the experiments using FPGA/CPLD hardware tools

List of Experiments:

PART (A): FPGA Level Implementation (Any Seven Experiments)

Note 1: The students need to develop VHDL/ Verilog Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

Note 2: All the experiments need to be implemented on the latest FPGA/CPLD Hardware in the Laboratory.

Design and Implementation of the following

1. Implementation of Universal logic gates
2. 4-bit Parallel Adder/Subtractor circuit
3. 4-bit Carry Look Ahead Adder circuit
4. (2X2) Multiplexer
5. (16:1) Multiplexer through (4:1) Multiplexer
6. 8:3 Priority Encoder
7. 8-bit parity generator and checker
8. Ring Counter
9. Binary counter

EDA Tools/Hardware Required:

1. EDA Tool that supports FPGA Programming including Xilinx Vivado / Altera (Intel) / Cypress / Equivalent Industry Standard tool along with corresponding FPGA Hardware.
2. Desktop Computer with appropriate Operating system that supports the EDA tools.

PART (B): Back-end Level Design and Implementation (Any Three Experiments)

Note: The students need to design the following experiments at schematic level using CMOS logic and verify the functionality. Further students need to draw the corresponding layout and verify the functionality including parasitics. Available state of the art technology libraries can be used while simulating the design using Industry standard EDA Tools.

Design and Implementation of the following

1. Universal Gates
2. CMOS Inverter
3. Full Adder
4. Decoder
5. D-Flip-Flop

EDA Tools/Hardware Required:

1. Mentor Graphics Software / Cadence/Synopsys/Tanner or Equivalent Industry Standard Software/CAD Tool.
2. Desktop Computer with appropriate Operating system that supports the EDA tools.

Course Outcomes:

CO1. Understand and Analyze FPGA/CPLD hardware tools in the lab for combinational and sequential circuits.

CO2. Develop HDL source code for combinational circuits and simulate the given with suitable simulator and verify the results.

CO3. Develop HDL source code for sequential circuits and simulate the given with suitable simulator and verify the results.

CO4. Analyze combinational and sequential circuits using Xilinx Synthesis tool.

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(EC20ASC601)GRAPHICAL SYSTEM DESIGN USING Lab VIEW

Course Objectives:

1. To acquire familiarity with the LabVIEW Programming language and to know what is meant by 'Graphical Programming Language'.
2. To be able to write LabVIEW programs incorporating pre-written and new code.
3. To build graphical user interfaces (GUIs) for laboratory instrumentation.

Unit I

NAVIGATING LabVIEW:

Introducing LabVIEW environment, Comparison with Text Based Programming, Creating and using LabVIEW projects, Parts of VI-Front Panel-Block Diagram-Icon And Connector Panel-Controls Pallete-Functions Pallete.

LabVIEW ENVIRONMENT:

Indicators-Controls- wiring the controls and indicators- building VIs- run modes data, Types in labVIEW- development of GUIs- labVIEW help. Searching controls, VIs and functions-implementing a VI- basic arithmetics in LabVIEW, Understanding the dataflow programming model of LabVIEW, Recognizing different data types.

Unit II

LabVIEW FOUNDATION:

Arithmetic functions- Expression node- Formula node-Compound arithmetic-Comparison pallet, Boolean pallete, Arrays -Various functions of arrays-strings- various functions of strings-clusters -various functions of clusters.

Unit III

PROGRAMMING EXECUTION WITH STRUCTURES:

Case structure, For Loop - The While Loop - Placing Objects inside Objects - Counting the Loops - Shift Registers, Introduction to MyDAQ.

Practice Exercises: Any ten experiments are to be done

1. Verification of basic arithmetic operations.
2. Perform Boolean operations.
3. Verify even or odd of a given numbers.

4. Verify application using expression node, formula node.
5. Construct array maximum and minimum.
6. Verify applications of string functions.
7. Find the sum of 'n' numbers using loop.
8. Find the factorial of a give number using loop.
9. Verify applications of shift register.
10. Design traffic light control using case structure.
11. Design water level indicator (Nested loop).
12. Data acquisition using MyDAQ.

References:

1. https://www.ni.com/pdf/training/us/core-1-sample-course-manual
2. https://ptolemy.berkeley.edu/eecs20/labs/LabVIEW_Labs/Lab01/Lab01.pdf

Course Outcomes:

- CO1. Develop and Modify functional block diagrams and front panels.
- CO2. Analyze composite data in the form of Arrays and Clusters.
- CO3. Implement program control structures such as 'For-While'loops and 'Case Structures'.
- CO4. Configure LabVIEW programming environment by utilising features to modify physical and software layouts.

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(BA20AMC502) INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Course Objectives:

This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws,Cyber Laws, Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations

UNIT-I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics –Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory –Overuse or Misuse of Intellectual Property Rights–Compliance and Liability Issues.

UNIT-II

Introduction to Copyrights–Principles of Copyright–Subject Matters of Copy right–Rights Afforded by Copyright Law –Copyright Ownership– Transfer and Duration – Right to Prepare Derivative Works–Rights of Distribution–Rights of performers–Copy right Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

UNIT-III

Introduction to Patent Law–Rights and Limitations–Rights under Patent Law–Patent Requirements– Ownership and Transfer– Patent Application Process and Granting of Patent–Patent Infringement and Litigation–International Patent Law–Double Patenting–Patent Searching–Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

UNIT-IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation –International Trade Mark Law.

UNIT-V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation–Breach of Contract–Applying State Law. Introduction to Cyber Law–Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality –Privacy–International aspects of Computer and Online Crime.

Course Outcomes:

CO1. Illustrate research problem formulation

CO2. Analyze reasearch related information and research ethics

CO3. Summarize the present day scenario controlled and monitored by Computer and Information technology,where the future world will be ruled by dynamic ideas , concept, creativity and innovation

CO4. Analyze how IPR would take such important place in growth of individuals & nation , summarize the need of information about intellectual property Right to be promoted among student community in general and engineering in particular

CO5. Related that IPR protection provides an incentive to inventors for further research work and investment in R& D, which leads to creation of new and beter products and in turn brings about economic growth and social benefits.

Textbooks:

- DeborahE.Bouchoux:"IntellectualProperty".Cengagelearning,NewDelhi
- KompalBansal&ParishitBansal"FundamentalsofIPRforEngineers",BSPublications(Press)
- CyberLaw. Texts &Cases, South-Western's Special Topics Collections

References:

- PrabhuddhaGanguli:'IntellectualPropertyRights"TataMcGraw–Hill,NewDelhi
- Richard Stim:"Intellectual Property", Cengage Learning, NewDelhi.
- R.RadhaKrishnan,S.Balasubramanian:"IntellectualPropertyRights",ExcelBook.NewDelhi.
- M.AshokKumar and Mohd. IqbalAli: "Intellectual Property Right" Serials Pub.

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(AM20AMC601) AI TOOLS TECHNIQUES & APPLICATIONS

Course Outcomes:

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

CO1: Demonstrate various AI applications, languages and Intelligent Agents.

CO2: Solve problems using search strategies and understand the basic process of Machine Learning. CO3: Apply classification and regression algorithms on real world data.

CO4: Develop an expert system.

CO5: Comprehend the structure of an artificial neural network and identify the building blocks of a convolutional neural network.

UNIT-I:

ARTIFICIAL INTELLIGENCE: Introduction, Definition of AI, Goals of AI, Turing Test, Applications of AI, AI Programming Languages; Introduction, Intelligent Systems, the Concept of rationality, types of Agents, Environments and its properties, PEAS.

Learning Outcomes:

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

1. classify various AI Applications. (L2)
2. list the AI Languages. (L1)
3. explain various types of Agents. (L2)

UNIT-II:

SEARCH STRATEGIES: Introduction, Brute Force or Blind Search, Breadth-First Search, Depth-First Search, Hill Climbing, Best-First Search.

MACHINE LEARNING: Introduction, Machine Learning Process, Feature Engineering-Feature Extraction, Feature Selection, Feature Engineering Methods, Feature Engineering, Data

VisualizationLine Chart, Bar Chart, Pie Chart, Histograms, Scatter Plot, Seaborn-Distplot, joint plot.

Learning Outcomes:

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

1. apply informed search techniques to problems. (L3)

2. interpret the features using feature engineering. (L2)

3. analyse the data using different visualization techniques. (L4)

UNIT-III:

REGRESSION: Simple Regression, Multiple Regression, Model Assessment-Training Error, Generalized Error, Testing Error, Bias-Variance Tradeoff

CLASSIFICATION: Linear Classification, Logistic Regression, Decision Trees

Learning Outcomes:

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

1. analyse different classification models and make recommendations towards learning. (L4)
2. solve real world data using classification techniques. (L3)
3. understand different regression models and about its problems. (L2)

UNIT-IV:

CLUSTERING: K-Means Clustering. EXPERT SYSTEMS: Introduction, Need and Justification of ES, Knowledge Representation, Knowledge Acquisition and Variation, Utilisation and Functionality, Basics of Prolog.

Learning Outcomes:

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

1. Understand the concept of clustering over classification. (L2)
2. Distinguish between expert systems and traditional systems. (L2)
3. Identify different applications of expert systems. (L3)

UNIT-V:

ARTIFICIAL NEURAL NETWORKS (ANNs): Biological Neuron, Types of ANN, Optimization Techniques, Vanishing Gradient Problem, Exploding Gradient Problem, Weight Initialization.

CONVOLUTION NEURAL NETWORKS(CNNs): Introduction, Components of CNN Architecture Convolution Layer(with example), Pooling/Down sampling Layer, Flattening Layer, Fully Connected Layer; Rectified Linear Unit Layer, Exponential Linear Unit, Unique Properties of CNN, Architectures of CNNs, Applications of CNN.

Learning Outcomes:

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

1. Understand the architecture of an artificial neuron. (L2)

2. Illustrate different artificial neural network architecture. (L2)

3. Analyse the effect of different activation functions of a CNN unit. (L4)

TEXT BOOKS:

1. Dr.Nilakshi Jain, Artificial Intelligence, As per AICTE: Making a System Intelligent, Wiley Publications, 1st Edition,2019.

2. Vijayvargia, Abhishek, Machine Learning with Python: An Approach to Applied Machine Learning, BPB Publications; 1st edition,2018.

3. Dr.S.Lovelyn Rose, Dr. L.Ashok Kumar, Dr.D.Karthika Renuka, Deep Learning using Python, Wiley India Pvt. Ltd 2019.

REFERENCES:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Publications, 4th Edition, 2020.

2. Saroj Kaushik, Artificial Intelligence, Cengage Learning India, 2011.

WEB REFERENCES: 1. https://keras.io/ 2. https://ai.google/ 3. https://www.coursera.org/learn/neural-networks-deep-learning#syllabus 4. https://swayam.gov.in/nd1_noc19_me71/preview

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(EC20APE701) ANALOG & DIGITAL IC DESIGN

Course Objectives:

1. Learn the operation of MOS transistor in Triode, Saturation and Cut-off regions.
2. Learn about the use of Current mirror circuits as resistive loads in the implementation of CMOS amplifier circuits.
3. Study the importance of Compensation circuits in the design of CMOS operational amplifiers.
4. Learn about the working principle of two, three and four input CMOS logic circuits.
5. Study the working cycles of DRAM and SRAM cells.

Unit I

MOS transistor and its Modelling:

Basic Operation, Large-Signal Modelling, Body Effect, p-Channel Transistors, Low-Frequency and High-Frequency Small-Signal Modelling in the Active Region, Small-Signal Modelling in the Triode and Cutoff Regions, Analog Figures of Merit and Trade-offs, MOS transistor equations and Advanced MOS Modelling concepts.

Unit II

Current Mirrors and Single-Stage Amplifiers:

Simple CMOS Current Mirror, Common-Source Amplifier, Source-Follower or Common-Drain Amplifier, Common-Gate Amplifier, Source-Degenerated Current Mirrors, Cascode Current Mirrors and Cascode Gain Stage.

Unit III

Operational Amplifier (OPAMP)Design and Compensation:

Two-Stage CMOS Opamp, Opamp Gain, Frequency Response, Slew Rate, n-Channel or p-Channel Input Stage, Systematic Offset Voltage, Opamp Compensation-Dominant-Pole Compensation and Lead Compensation, Compensating the Two-Stage Opamp, Making Compensation Independent of Process and Temperature.

Unit IV

Combinational and Sequential MOS Logic Circuits:

MOS logic circuits with Depletion nMOS loads, CMOS logic circuits, Complex logic circuits, Behavior of Bistable elements, SR Latch circuit, Clocked latch and Flip-Flop circuits, CMOS D-Latch and Edge–Triggered Flip-Flop.

Unit V

Semiconductor Memories:

Overview of Semiconductor memories, RAM array organization, DRAM-Cell types, Operation of Three-Transistor DRAM cell and One-Transistor DRAM cell, Leakage currents and Refresh operation, SRAM- Various configurations, Full CMOS SRAM cell, Memory structure of SRAM Cell array and Leakage currents.

Text Books:

1. T.C.Carusone, D.A.Johns & K.W.Martin, "Analog Integrated Circuit Design", Second Edition, John Wiley & Sons, Inc., 2019.
2. S.M.Kang & Y.Leblebici,"CMOS Digital Integrated Circuits-Analysis and Design" Third edition, McGraw Hill Education (India) Pvt. Ltd., 2020.

References:

1. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.
2. Kiat Seng Yeo and Kaushik Roy, "Low- Voltage, Low-Power VLSI Subsystems", McGraw Hill Professional Engineering Education, 2018.

Course Outcomes:

CO1: Interpret the various Modelling effects encountered in a MOSFET

CO2: Evaluate the various parameters of CG, CD and CS amplifier circuits.

CO3: Summarize the various steps in the design of a Compensated CMOS Operational amplifier circuit.

CO4: Design two, three and four input CMOS logic circuits.

CO5: Illustrate the working cycles of DRAM and SRAM cells.

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(EC20APE702)FPGA DESIGN

Course Objectives:

1. Introduce digital design concepts through various Programmable Logic Devices
2. Understand the FPGA architectures in detail
3. Analyze the physical design cycle in FPGA
4. Know the various applications of FPGAs

Unit I

Introduction to Programmable Logic Devices: Programmable logic devices (PLD)- Programmable Read Only Memory, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Digital design using PLDs. Complex Programmable Logic Devices - Features and applications of complex programmable logic devices, Altera Max - 7000 series and Altera FLEX logic- 10K series CPLD.

Unit II

Field Programmable Gate Arrays: Features and applications of FPGAs, advantages and disadvantages of FPGA, architecture of FPGA, recent technology trends, programming technologies, commercially available FPGAs.

Unit III

SRAM Field Programmable Gate Arrays: SRAM Programming Technology, SRAM Programmable FPGAs: Xilinx XC4000, Spartan-3 FPGA Architectures.

Unit IV

Anti-Fuse Programmed FPGAs: Anti-fuse Programming technology, The Actel ACT1, ACT2 and ACT3 architectures.

Unit V

Physical Design Implementation on FPGAs: FPGA Design flow, Physical Design cycle for FPGAs, Partitioning, Routing-non-segmented, segmented and staggered models.

Design Applications: General design issues, Counter design using FPGA, Designing Adders with the ACT Architecture.

Text Books:

1. Field Programmable Gate Array Technology, Stephen M. Trimberger, Springer International Edition, 1994.
2. Field-Programmable Gate Arrays, Stephen D. Brown, Springer, 1992
3. Fundamentals of digital logic with verilog design, Stephen Brown and Zvonko Vranesic, McGraw-Hill, 2002.

References:

1. Algorithms for VLSI Physical Design Automation, Naveed Sherwani, 3rd Edition, Springer International Edition, 2005
2. Fundamentals of Logic Design, Charles H. Roth Jr, 5th Edition, Cengage Learning, 2004.

Course Outcomes:

CO1: Design digital applications using PLDs.

CO2: Analyze the architectural features of FPGAs.

CO3: Analyze the SRAM programming technology of FPGAs.

CO4: Analyze the Anti-Fuse Programmed FPGA.

CO5: Analyze Physical Design cycle for FPGA and implement various applications using FPGA.

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(EC20APE703)LOW POWER VLSI CIRCUITS AND SYSTEMS

Course Objectives:

1. Learn the operation of MOS transistor in Triode, Saturation and Cut-off regions.
2. Learn about the implementation of MOS dynamic circuits.
3. Learn the various types of power dissipations in a MOS transistor.
4. Enable the students to learn about the Scaling Models and Scaling factors.
5. Study in detail about the various approaches for minimizing leakage power MOS transistor circuits.

Unit I

MOS Transistors:

Introduction, Historical background, why low power, sources of power dissipations, low-power design methodologies, Structure of MOS Transistor, the Fluid model, Modes of operation of MOS Transistor and Electrical characteristics of MOS Transistors, MOS Transistors as a switch.

Unit II

MOS Inverters: Introduction, inverter and its characteristics, configurations, inverter ratio in different situations, switching characteristics.

MOS Combinational Circuits: introduction, Pass-Transistor logic, Gate logic, MOS Dynamic Circuits: Single-phase, Two-phase and CMOS dynamic circuits, Domino CMOS circuits and NORA logic.

Unit III

Sources of Power Dissipation:

Introduction, Short-circuit power dissipation, Switching power dissipation, Glitching power dissipation and Leakage power dissipation.

Unit IV

Supply voltage scaling for low power:

Introduction, device features size scaling, architecture-level approaches, voltage scaling, multilevel voltage scaling, challenges, dynamic voltage and frequency scaling and adaptive voltage scaling.

Unit V

Leakage Power Minimization:

Introduction, fabrication of multiple threshold voltages, approaches for minimizing leakage power, VTCMOS approach, Transistor stacking, MTCMOS approach, Adiabatic Logic Circuits-Adiabatic Charging, Adiabatic Amplification and Adiabatic logic gates.

Text Books:

1. Ajit Pal, "Low Power VLSI Circuits and Systems", Springer New Delhi, 2019.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

CO1. Interpret the structure and various electrical characteristics of MOS transistor.

CO2. Compare Voltage–Current and transfer characteristics of inverters of different configurations

CO3. Evaluate the Power dissipation both at circuit level and system level.

CO4. Summarize the scaling effects of various key parameters of MOSFET devices..

CO5. Distinguish between standby and run-time leakage power dissipation.

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(EC20APE704)DIGITAL IMAGE PROCESSING

Course Objectives:

1. To introduce fundamentals of Image Processing.
2. To expose various transforms in frequency domains.
3. To descript various intensity transformations in spatial and frequency domains.
4. To dissimilate various segmentation and compression techniques for image processing.
5. To discuss various color models and to introduce the concepts of color image processing.

Unit I

Digital Image Fundamentals:

A simple image model, Fundamental Steps in Digital Image Processing, Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity and distance measures

Unit II

Image Transforms:

Two dimensional Discrete Fourier transform, Walsh Transform, Discrete Cosine Transform, Hadamard transform, Haar transform, Slant transform, Wavelet Transforms – Introduction, continuous vs Discrete wavelet Transform, Discrete wavelet transform – Haar wavelet Transform.

Unit III

Image Enhancement and Filtering:

Gray level transformations, Histogram Processing, Histogram equalization and Specifications, Spatial Filtering, Smoothing filters, Sharpening filters, Enhancement in Frequency domain - Low-pass, High-pass and Homomorphic filtering.

Unit IV

Image Segmentation:

Point, Line and Edge Detection, Canny Edge Detection, Laplacian of Gaussian Edge Detection, Thresholding, Region Growing, Region Splitting and Merging

Image Compression:

Fundamentals of Compression, Image compression model, Types of Redundancy – Coding, Inter pixel and Psycho visual, Lossless compression – Huffman coding, Shannon-Fano coding, Lossy Compression - Transform coding.

Unit V

Color Image Processing:

Color Fundamentals, Color Models - RGB, YUV, HIS, Pseudo Color, Full Color image processing, Color transformations – formulation, Color complements, Color slicing, tone and Color corrections. Color image smoothing and Sharpening.

Text Books:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. K.P Soman, "Insight Into Wavelets : from Theory to Practice", PHI Learning Pvt. Ltd., 2010

References:

1. Milan Sonka, Vaclav Hlavac, Roger Boule, Image Processing, Analysis, and Machine Vision, Third Edition, Cengage Learning, 2016.
2. S Jayaraman, S Esakkirajan, T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

Course Outcomes:

- CO1. Understand fundamentals of digital image processing and Apply engineering mathematics in processing of digital image.
- CO2. Analyze 2D transforms in frequency domains with respect to digital image processing
- CO3. Analyze different image enhancement techniques in spatial and frequency domains
- CO4. Analyze various techniques in image segmentation and Apply various algorithms to perform image compression.
- CO5. Analyze various color models and Apply color models in image processing.

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(EC20APE705) ELECTRONIC DEFENSE SYSTEMS

Course Objectives:

1. Study about the need for Weapon systems.
2. Learn about various Artillery Systems and its performance parameters.
3. Learn about the operation of Radar Warning Receivers.
4. Study about the various Electronic Countermeasures in Defense systems.
5. Know about the Antistealth Techniques and State of the Art and its Perspectives.

Unit I

Electronic Defense:

Introduction, Systems in use in the Armed Forces, The main weapon systems, Objectives of Electronic Defense-Organization of Electronic Defense, Electronic Defense Systems and their Operational Objective, Information Operation (IO), Information Warfare (IW) and Need for the Study of Weapon Systems.

Unit II

Sensors:

Infrared Sensors: Review of Radiant Energy, Infrared Radiation Produced by Targets of Interest, IR Range Equation, Suppression of Background Effects and IR Systems

Weapon Systems:

Introduction, Artillery Systems-Firing Accuracy, Susceptibility to Jamming of an Artillery System, Missile Systems-Command Missiles, Beam-Riding Missiles, Semiactive Homing Missiles, Active Homing Missiles, Track-Via-Missile (TVM) Systems, Passive IR-Guided Missiles, Sea-Skimming Missiles and Passive Antiradiation Missiles

Unit III

Electronic Intercept Systems:

Introduction, Equation of a Passive System, Radar Warning Receivers-RWR Sensitivity, Electronic Support Measures-Omnidirectional Antennas, Antennas for Direction Finding and Frequency Measurement Receiver, Electronic Intelligence (ELINT) Systems- ELINT Sensors, Surveillance Network and ELINT Processing Center (EWAC), Infrared Intercept Systems- Missile Launch Warner/Missile Approach Warner, Forward-Looking Infrared Systems, Communications ESM and Communication Intelligence- Communications ESM and COMINT.

Unit IV

Electronic Countermeasures Systems:

Introduction, Operational Jamming Modes: SPJ, SOJ, and EJ, Onboard ECM Systems-Passive Systems, Active Systems, The Jammer Equations, The DRFM, Transmitters, ECM Antennas, The Pod, ECM Techniques-Spot Noise, Barrage Noise, Swept Noise/CW and Gated Noise, High-Resolution Radar Jamming, Infrared Countermeasures(IRCM)-Modulated Sources, Laser IRCM, Off-Board ECM Systems-Passive Systems, Active Systems and Communications Countermeasures

Unit V

New Electronic Defense Techniques and Technologies:

Introduction, New Electronic Defense Architectures, ED Basic Technology Advances, Shared Apertures, HPM Weapons, Anti-Antiradiation Missile Techniques, Antistealth Techniques and State of the Art and Perspectives.

Text Books:

1. Filippo Neri, "Introduction to Electronic Defense Systems", Second Edition, Artech House, Boston,2017.
2. Ray Tricker, "Defence Electronics" Second edition, Butterworth-Heinemann, 2015.

References:

1. Warren J. Boord and John B. Hoffman, "Air and Missile Defense Systems Engineering", First Edition, CRC Press, Taylor and Francis Group, 2018.
2. William P. Delaney, "Perspectives on Defense Systems Analysis", MIT Lincoln Laboratory Series, 2019.

Course Outcomes:

CO1: Summarize the objectives of Electronic Defense Systems.

CO2: Interpret the operating principles of various Artillery Systems.

CO3: Analyze Radar warning receivers, Electronic support systems and Electronic intelligence systems.

CO4: Illustrate the working principle of various jamming techniques in different operational modes.

CO5: Discuss newly designed systems to counter the recent threat embodied in stealth aircrafts.

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(EC20APE706) SMART SENSOR NETWORKS

Course Objectives:

1. Study about the Sensor systems and its various characteristics.
2. Learn about Transduction Mechanisms and its Application range in Biosensors.
3. Learn about the parameters of interest related to Chemical sensors, Capacitive and Inductive Sensors for use in real-time applications.
4. Study the working principle and applications of Temperature and Nanotechnology-Enabled Sensors.
5. Understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.

Unit I

Sensor Fundamentals:

Introduction, Sensor Systems, Sensor Characteristics, System Characteristics, Instrument Selection, Data Acquisition and Readout, Installation and Conditioning Bridge Circuits

Unit II

Sensors-I:

Introduction, Technology Fundamentals, Selecting and Specifying Accelerometers, Applicable Standards, Interfacing and Designs.

Biosensors: What is a Biosensor, Applications of Biosensors, Origin of Biosensors, Bioreceptor Molecules, Transduction Mechanisms in Biosensors, Application Range of Biosensors and Future prospects.

Unit III

Sensors-II:

Chemical Sensors: Technology Fundamentals and Applications.

Capacitive and Inductive Displacement Sensors: Introduction, Capacitive Sensors, Inductive Sensors, Capacitive and Inductive Sensor Types, Selecting and Specifying Capacitance and Inductive Sensors, Comparing Capacitive and Inductive Sensors, Applications, Latest Developments.

Unit IV : Sensors-III

Temperature Sensors: Sensor Types and Technologies, Selecting and Specifying Temperature Sensors.

Nanotechnology-Enabled Sensors: Possibilities, Realities and Applications.

Unit V

Introduction to Wireless Sensor Networks: Challenges for Wireless Sensor Networks, Applications for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, Single Node Architecture-Hardware Components, Energy Consumption of Sensor Nodes.(Only Operation Stats With Different Power Consumption of Sensor and Actuators is Included), Deployment Environments Sensor Network Architecture-Sensor network scenarios, Optimization Goals and Figures of Merit, Design Principles of WSN, Service Interfaces of WSNs and Gateway-Concepts.

Text Books:

1. John S. Wilson, "Sensor Technology Handbook", Elsevier Inc., 2012.
2. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", Third Edition, John Wiley & Sons, Ltd., 2016.

References:

1. Alan S Morris, "Measurement and Instrumentation Principles", Third Edition, Butterworth-Heinemann, 2016.
2. John R.Taylor, "Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements", Second Edition, University Science Books, California, 2014.

Course Outcomes:

CO1: Discuss the various characteristics of Sensors and Systems.

CO2: Interpret the various Transduction Mechanisms in Biosensors.

CO3: Decide the appropriate sensor for a given application of interest.

CO4: Outline the Possibilities and Realities of Nanotechnology-Enabled Sensors.

CO5: Explore the Physical layer, Transceiver design considerations and Assignment of MAC addresses.

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(EC20APE707) DATA COMMUNICATION AND NETWORKING

Course Objectives:

1. Provide a solid conceptual understanding of the fundamentals of data communication.
2. Explore the various layers of TCP/IP and OSI network models and protocols.
3. Explore the various protocols used in data communication networks.
4. Make students to understand related to computer networks.

Unit I

Data Communication: Advantages and applications of Computer Networks, Components, Networks, Protocols and Standards, ISO-OSI and TCP/IP Network Models.

Physical Layer: Transmission media-guided and Unguided, Switching systems - Circuit switching, Packet switching - Datagram switching & Virtual circuit switching.

Unit II

Data link layer: Framing, Flow and Error control, Protocols - Stop-and-wait Protocol, Stop-and-wait ARQ, Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point to Point Protocol.

Unit III

Medium Access Sub layer: Multiple access techniques - random access and controlled access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, Connecting Devices - repeaters, hubs, bridges, switches, routers, Gateway, Backbone networks, Virtual LANs.

Unit IV

Network Layer: Addressing types - Physical, Logical & port address, Internetworking, IP addressing (Class full & Classless), Network layer protocols - ARP, RARP, BOOTP, DHCP, IPV4, ICMP, IPV6, ICMPV6, IGMP, Unicast and Multicast Routing protocols.

Unit V

Transport Layer: Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service.

Application Layer: Application layer protocols – DNS, WWW and HTTP, FTP, SMTP. Introduction to streaming Audio/Video.

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill, 4th Edition.
2. S. Tannenbum, D. Wetherall, "Computer Networks", Prentice Hall, Pearson, 5th Edition.

Reference Books:

1. Fred Halsall, "Computer Networks", Addison – Wesley Pub. Co. 1996.
2. Larry L, Peterson and Bruce S. Davie, "Computer Networks: A system Approach", Elsevier, 4th Edition.
3. Tomasi, "Introduction To Data Communications & Networking", Pearson 7th impression, 2011
4. William Stallings, "Data and Computer Communications", Prentice Hall, Imprint of Pearson, 9th Edition.

Course Outcomes:

CO1. Choose the appropriate technology for data transmission based on the requirement by analysing various computer networks.

CO2. Analyze different flow and error control protocols.

CO3. Analyze different multiple access protocols and network standards, connecting devices.

CO4. Configure simple networks and assign IP addresses to hosts.

CO5. Apply the concept of different application layer protocols and provide congestion free quality service.

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(EC20APE708) SATELLITE COMMUNICATIONS

OBJECTIVES

1. To enable the student to become familiar with satellites and satellite services.
2. Study the satellite orbits and launching.
3. Study the earth segment and space segment components
4. Study the satellite access by various users.

UNIT I

SATELLITE ORBITS

Kepler's Laws, Newton's Law, Orbital Parameters, Orbital Perturbations, Station Keeping, Geo Stationary and Non Geo-Stationary Orbits, Look Angle Determination, Limits of Visibility, Eclipse, Sub Satellite Point, Sun Transit Outage, Launching Procedures Launch Vehicles and Propulsion.

UNIT II

SPACE SEGMENT

Spacecraft Technology, Structure, Primary Power, Attitude and Orbit Control, Thermal Control and Propulsion, Communication Payload and Supporting Subsystems, Telemetry, Tracking and Command, Transponders, The Antenna Subsystem.

UNIT III

SATELLITE LINK DESIGN

Basic Link Analysis, Interference Analysis, Rain Induced Attenuation and Interference, Ionospheric Characteristics, Link Design with and without Frequency Reuse.

UNIT IV

SATELLITE ACCESS AND CODING METHODS

Modulation and Multiplexing: Voice, Data, Video, and Analog, Digital Transmission System, Digital Video Broadcast, And Multiple Accesses: FDMA, TDMA, CDMA, DAMA Assignment Methods, Compression, Encryption, Coding Schemes.

UNIT V

SATELLITE APPLICATIONS

INTELSAT Series, INSAT, VSAT, Mobile Satellite Services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).

TEXT BOOKS

1.Dennis Roddy, "Satellite Communication", 4^{th} Edition, Mc Graw Hill International, 2006.

2. Timothy, Pratt, Charles, W.Bostain, Jeremy E. Allnutt,"Satellite Communication", 2^{nd} Edition, Wiley Publications, 2002.

REFERENCES

1. Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.
2. N.Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986.
3. Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Bostan London, 1997.

COURSEOUTCOMES

CO1. Identify orbital mechanics and launch methodologies

CO2. Understand satellite subsystems

CO3. Design link power budget for satellites

CO4. Compare competitive satellite services

CO5. Analyse satellite access techniques and DTH and compression standards

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(EC20APE709)WIRELESS SENSOR NETWORKS

COURSE OBJECTIVES

1. To make students understand the basics of Wireless sensor Networks.
2. To familiarize with learning of the Architecture of WSN.
3. To understand the concepts of Networking and Networking in WSN.
4. To study the design consideration of topology control and solution to the various problems.
5. To introduce the hardware and software platforms and tool in WSN.

UNIT I

OVERVIEW OF WIRELESS SENSOR NETWORKS

Single Node Architecture- Hardware Components- Network Characteristics- unique constraints and challenges, Enabling Technologies for Wireless Sensor Networks-Types of wireless sensor networks

UNIT II

ARCHITECTURES

Network Architecture - Sensor Networks Scenarios - Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments - introduction to Tiny OS and nesC - Internet to WSN Communication.

UNIT III

NETWORKING SENSORS

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts-SMAC, B-MAC Protocol, IEEE 802.15.4 standard and Zigbee, the Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols Energy Efficient Routing, Geographic Routing.

UNIT IV

INFRASTRUCTURE ESTABLISHMENT

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V

SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware-Berkeley Motes, Programming Challenges, Node level software platforms, Node- level Simulators, State centric programming

BOOKS:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks - Technology, Protocols, and Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

COURSE OUTCOMES

CO1: Understand challenges and technologies for wireless networks.

CO2: Understand architecture and sensors.

CO3: Describe the communication, energy efficiency, computing, storage and transmission.

CO4: Establishing infrastructure and simulations.

CO5: Explain the concept of programming the in WSN environment.

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(CE20AOE701) Air Pollution and Quality Control

CourseObjectives:

After studying this course, students will be able to:

- The objectives of the course are to understand the Air pollution Concepts
- Identify the source of air pollution
- To know about Air pollution Control devices and distinguish the Air quality monitoring devices

UNIT –I

Introduction to Air Pollution

Introduction: Sources, effects on ecosystems, classification and characterization of air pollutants, Air Pollution Episodes of environmental importance. Indoor air pollution –sources, Effects.

Learning outcomes:

- Understanding the basic Air pollution concepts
- Identifying the source of air pollution
- To understand the character of atmospheric pollutants and their effects

UNIT II

Effects of Air Pollution

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

Learning outcomes:

- To know effects of air pollution on man
- To know effects of air pollution on material and vegetation

UNIT – III

Plume Behavior

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagram.

Learning outcomes:

- Understand the composition and structure of atmosphere
- To Understand the wind rose diagram

UNIT – IV

Control Techniques

Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP.

Learning outcomes:

- Learning about air pollution control techniques
- Study on latest devices and advancements in existing devices
- Choose and design control techniques for particulate and gaseous emissions.

UNIT –V

Noise Pollution

Noise pollution–Sources, Measurements, effects and control, noise standards. Environmental issues, global episodes, laws, acts, protocols.

Learning outcomes:

- Learning about noise pollution.
- Understand the laws, acts and protocols related to noise pollution &control

Course Outcomes (CO):

After studying this course, students will be able to:

- Identify the major sources of air pollution
- Understand their effects on health and environment.
- Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
- Choose and design control techniques for particulate and gaseous emissions.
- Understand the noise pollution and control methods.

Textbooks:

1. Noel De Nevers, “Air Pollution Control Engineering” , Waveland PrInc 2016
2. Anjaneyulu Y, “Text book of Air Pollution and Control Technologies”, Allied Publishers
3. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers 2017

Reference Books:

1. Nevers, “Air Pollution Control Engineering”, McGraw-Hill, Inc., 2000.
2. Dr. B.S.N. Raju, “Fundamentals of Air Pollution” Oxford & I.B.H.
3. T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. “Air Pollution and Health” Maynard publisher Academic Press.

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(ME20AOE703) INTRODUCTION TO INDUSTRIAL ENGINEERING

Pre-Requisite: Operation Research, Production & Operation Management

Course Objectives:

- Through reading the text, references and discussion of cases students should be able to understand the fundamentals underlying the management of an Organization.
- Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout.
- Determine work measurement techniques for time study.
- Recognize the importance of Inventory control to ensure their availability with minimum capital lock up.
- Understand the concepts of TQM, ISO, BIS etc.

UNIT – 1:

Concepts of Management-Administration and Organization – Functions of Management– Schools of Management Thought: Taylor"s Scientific Management, Fayol"s Principles of Management, Douglas Mc-Gregor"s Theory X and Y, Mayo's Hawthorne Experiments, Hertzberg"s Two factor Theory of Motivation, Maslow"s Hierarchy of Human needs – Systems Approach to Management. Organizational Structures- Functional- Divisional- Matrix etc.,Basic Concepts Related to Organization.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Management, Scientific management, management theories etc. (L2)
- Define the types of structures of an organization. (L2)

UNIT – 2:

Plant Location: Definition, Factors affecting the Plant Location, Comparison of Rural and Urban sites, Selection of Plant Location, Plant Layout: Definition, Objectives, Types of Plant Layout.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout. (L2)
- Analyze plant layout design to facilitate material flow and processing of a product in the most efficient manner through the shortest possible time. (L4)

UNIT – 3:

Work Study – Definition, Objectives, Method Study – Steps Involved – Various Types of Process Charts –Micro motion and Memo motion Studies. Work Measurement - Definition, Time Study, Steps involved - Equipment, Different Methods of Performance Rating - Allowances, Standard Time Calculation. Work Sampling - Definition, Steps Involved, Standard Time Calculations - Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Work study, Method study, steps, process charts etc. (L2)
- Determine work measurement techniques for time study (L3)
- Evaluate Work sampling methods to calculate standard time. (L4)

UNIT – 4:

Inventory Models- Deterministic models- EOQ Models – With and Without Shortages Models; Inventory Models with Price Breaks -Probabilistic Models –Discrete Variable, Continuous Variable. Inventory Control Systems

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Inventory, Classification, Functions, it's associated costs etc., (L2)
- Determine the Economic order quantity. (L2)

UNIT – 5:

Inspection & Quality Control: Statistical Quality Control- Techniques-Variables and Attributes- Control Charts: X and R Charts; P Charts and C Charts. Introduction to TQM-Quality circles-BIS & ISO Standards-Importance.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Inspection and Quality control concepts. (L2)
- Apply SQC techniques of Variables and attribute charts for effective inspection. (L3)
- Understand the concepts of TQM, ISO, BIS etc. (L2)

Textbooks:

1. Manufacturing Organization and Management, T.Amrine/ Pearson, 2nd Edition, 2004
2. Industrial Engineering and Management ,O.P.Khanna, DhanpatiRai, 18th edition, 2013.
3. Industrial Engineering and Management, Dr. C.Nadamuni Reddy, New Age International Publishers, 1st edition, 2011.

Reference Books:

1. Industrial Engineering and production management, MartindTelsang S.Chand..
2. Work Study by ILO(International Labour Organization)
3. Management by James AF Stoner, Freeman 6th Ed, Pearson Education, New Delhi,2005
4. Production and Operations management, PanneerSelvam, PHI,2004.
5. Statistical Quality Control by EL Grantt, McGrawhil
6. Motion and time studies by Ralph M Barnes, John Wiley and Sons,2004

Course Outcomes:

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

- **Understand** the various concepts, principles and theories of management. (L2)
- **Understand** the structure of an organization through understanding various structures of organizations. (L2)
- **Understand** where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout. (L2)
- **Understand** the concepts of Work study, Method study, steps, process charts etc. (L2)
- **Define** Work sampling and methods of work sampling to calculate standard time. (L4)
- **Understand** the concepts of Inventory, Classification, Functions, it's associated costs etc., (L2)
- **Recognize** the importance of Inventory control to ensure their availability with minimum capital lock up. (L1)

Apply SQC techniques of Variables and attribute charts for effective inspection. (L4)

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(EE20AOE701) EMBEDDED SYSTEMS

Course Objectives:

The objective of this course is to

1. To understand the basics of an embedded system and RTOS.
2. To introduce the typical components of an embedded system and different communication interfaces.
3. To provide knowledge on the design process of embedded system

UNIT I - Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History and classification of Embedded Systems, Major Application Areas, Characteristics and Quality Attributes of Embedded Systems.

UNIT II - Typical Embedded System

Core of the Embedded System - General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory - ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces

UNIT III - Embedded Firmware

Fundamental issues in hardware software co-design, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV - RTOS based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT-V - Task Communication

Task Communication - Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization - Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

Text Books:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. An Embedded software primer - David E. Simon, Pearson Ed. 2005.

References:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - A Unified Hardware/Software Introduction - Frank Vahid, Tony d. Givargis, John Wiley, 2002.

Course Outcomes:

After completion of the course, student will be able to:

CO1. Understand the selection procedure of Processors in the embedded domain.

CO2. Explain different components of Embedded system

CO3. Design procedure for embedded firmware

CO4. Describe the role of real time operating systems in Embedded systems

CO5. Evaluate the correlation between task synchronization and latency issues

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(AM20A0E601)Machine Learning Tools & Techniques

UNIT I

Introduction: Introduction to Machine Learning: Introduction. Different types of learning, Hypothesis space and inductive bias, Evaluation. Training and test sets, cross validation, Concept of over fitting, under fitting, Bias and Variance.

Linear Regression: Introduction, Linear regression, Simple and Multiple Linear regression, evaluating regression fit.

UNIT II

Decision tree learning: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning, Python exercise on Decision Tree.

(Principal Component Analysis) ,Python exercise on kNN and PCA.

UNIT III

Instance based Learning: K nearest neighbor, the Curse of Dimensionality, **Feature Selection:** forward search, backward search, univariate , multivariate feature selection approach, Feature reduction.

Probability and Bayes Learning(Move to Data Mining): Bayesian Learning, Naïve Bayes, Python exercise on Naïve Bayes, Logistic Regression.

UNIT IV

Support Vector Machine: Introduction, the Dual formulation, Maximum margin with noise, nonlinear SVM and Kernel function, solution to dual problem.

Artificial Neural Networks: Introduction, Biological motivation, ANN representation, appropriate, problem for ANN learning, Perceptron, multilayer networks and the back propagation algorithm;

UNIT V

Ensembles: Introduction, Bagging and boosting, Random forest, Clustering: Introduction, K-mean clustering, agglomerative hierarchical clustering, Python exercise on k-mean clustering.

TEXTBOOKS

1.Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.

2.Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020.

REFERENCES

1.Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012

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(CS20A0E503)Structured Query Language

Course Objectives:

- To be able to write SQL statements that edit existing data. Be able to write SQL statements that create database objects.
- To understand the structure and design of relational databases and understand the importance and major issues of database security and the maintenance of data integrity.
- To add, update, or delete records within a database.
- SQL can create new databases.
- SQL users can add new tables to an existing database.
- SQL can create views or stored procedures in a database.

UNIT-I

Introduction to Database and RDBMS, Introduction to SQL, Database Engine, SQL Syntax, Introduction to mysql workbench, mysql workbench usage. SQL Datatypes and operators.

Learning Outcomes:

At the end of the unit, students will be able to:

1.Distinguish between DBMS and RDBMS

2.Explain about mysql.

3.Know usage of mysql workbench.

4.List datatypes of sql for different workbench.

UNIT-II

SQL Database: create database, use database, drop database, rename database, delete database.

SQL table: create table,droptable,deletetable,rename table, truncate table,copy table and alter table.

Learning Outcomes:

At the end of the unit, students will be able to:

1.Create databases and tables

2.Perform operations on database as well as table.

3.Explain Databases and its usage.

UNIT-III

SQL SELECT: Select statement , select IN, Select Multiple, Select Date.

SQL WHERE clause, SQL AS, SQL HAVING clause.

DDL(data definition language) commands in sql.

Learning Outcomes:

At the end of the unit, students will be able to:

1.Use select statement to retrieve data.

2.List DDL commands

UNIT-IV

DML(Data manipulation Langugae) commands in SQL.

SQL Keys: Primarykey,foreign key, unique key.

Learning Outcomes:

At the end of the unit, students will be able to:

1.List DML commands

2.Construct key relationships on a table.

3.Explain types of keys and its uses

UNIT-V

SQL Insert: INSERT statement, INSERT INTO statement, INSERT multiple rows.

SQL joins: Types of joins(four types along with an examples).

Learning Outcomes:

At the end of the unit, students will be able to:

1.Insert data into the table.

2.Explain how to join more than one table..

TEXT BOOKS:

1. Getting Started with SQL Author: Thomas Nield ,Edition: 1st Edition
2. SQL: A Step-by-Step Guide for Beginners , by Daniel Bell.

REFERENCE BOOKS:

1.SQL Quickstart Guide: The Simplified Beginner's Guide to SQL Paperback – 11 March 2015

Online Learning Resources:

1.https://www.guru99.com/sql.html

2.https://www.w3schools.com/sql/

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(EE20AOE704) INTRODUCTION TO SMART GRID & ELECTRIC VEHICLES

COURSE OBJECTIVES

- To understand various aspects of smart grid.
- To Study about Smart Grid technologies, different smart meters and advanced metering infrastructure.
- To familiarize the power quality management issues in Smart Grid.
- To familiarize the high performance computing for Smart Grid applications.

UNIT 1 INTRODUCTION TO SMART GRID

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid.

UNIT 2 SMART GRID TECHNOLOGIES AND SMART METERS

Components and Architecture of Smart Grid Design, Smart Grid Communication, Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED)

UNIT 3 POWER QUALITY MANAGEMENT IN SMART GRID

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Need of CLOUD Computing and Cyber Security for Smart Grid.

UNIT 4 Hybrid Electric Vehicles

Concepts of hybrid electric drive train, types, architecture of series and parallel hybrid electric drive train, merits and demerits, series and parallel hybrid electric drive train design.

UNIT 5 Energy Storages

Electrochemical batteries – lead acid batteries and lithium based batteries, Ultra capacitors, Flywheels. Basic principles of Fuel Cell and Solar Cell.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Illustrate the concepts of Smart Grid and its present developments.

CO2 - Analyze the various Smart Grid technologies.

CO3 - Realize the power quality management in Smart Grids.

CO4 - Analyze the concepts of Hybrid Electric Vehicles.

CO5 – Apply the Concepts of Energy Storage system technologies in Smart Grid.

TEXT BOOKS:

1. Stuart Borlase "Smart Grid: Infrastructure, Technology and Solutions", CRC Press 2012.

2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley, 2012.

3. Larminie, J. and Lowry, J. (2012) Electric Vehicle Technology Explained, Second Edition.John Wiley & Sons, Chichester

4. Alfred Rufer, Energy Storage: Systems and Components, CRC Press, 2017

REFERENCE BOOKS:

1. Vehbi C. Güngör, Dilan Sahin, Taskin Kocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, "Smart Grid Technologies: Communication Technologies and Standards", IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.

2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Smart Grid – The New and Improved Power Grid: A Survey", IEEE Transaction on Smart Grids,Vol.14, No.4, pp.944-980, 2012.

3. Denton, T. (2013) Automobile Electrical and Electronic Systems. Routledge, London.

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(MA20AOE701) NUMERICAL METHODS FOR ENGINEERS

Course objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

UNIT-I:

Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method. System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Learning Outcomes:

Students will be able to

- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

UNIT-II:

Curve Fitting

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

Learning Outcomes:

Students will be able to

- understand curve fitting
- understand fitting of several types of curves

UNIT-III:

Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Learning Outcomes:

Students will be able to

- Understand the concept of interpolation.
- Derive interpolating polynomial using newton's forward and backward formulae.
- Derive interpolating polynomial using lagrange's formulae.
- Derive interpolating polynomial using gauss forward and backward formulae.

UNIT-IV:
Numerical Integration
Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Learning Outcomes:

Students will be able to

- Solve integral equations using Simson's 1/3 and Simson's 3/8 rule.
- Solve integral equations using Trapezoidal rule.

UNIT-V:

Solution of Initial value problems to Ordinary differential equations
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Learning Outcomes:

Students will be able to

- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

Course Outcomes:

After the completion of course, students will be able to

- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. "Probability and Statistics for Engineers and Scientists", Walpole,PNIE.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

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(CE20AOE704) Environmental Impact Analysis & Management

Course Objectives:

- To impart knowledge on different concepts of Environmental Impact Assessment.
- To teach procedures of risk assessment.
- To teach the EIA methodologies and the criterion for selection of EIA methods.
- To teach the procedures for environmental clearances and audit.
- To know the impact quantification of various projects on the environment.

UNIT –I

Concepts and methodologies of EIA

Initial environmental Examination, Elements of EIA, - Factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters- Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods.

Learning outcomes:

After completion of this unit student will

- Understand the elements of EIA.
- Explain the criteria for selection of EIA methodology

UNIT II

Impact of Developmental Activities and Land Use

Introduction and Methodology for the assessment of soil and ground water, EIA in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface waterenvironment, Air pollution sources, Generalized approach for assessment of Air pollution Impact

Learning outcomes:

After completion of this unit student will

- Study the factors causing impact of development activities
- Decide mitigation measures of pollution on environment

UNIT – III

Assessment of Impact on Vegetation& Wildlife

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Learning outcomes:

After completion of this unit student will

- Understand effect of development activities on environment.
- Know the design procedures for assessment of environmental risk

UNIT – IV

Environmental Audit

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data.

Learning outcomes:

After completion of this unit student will

- Learn about the process of environmental auditing.
- Understand procedures for preparation of environmental audit report

UNIT –V

Environmental Acts and Notifications

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- Evaluation of EIA report. Concept of ISO and ISO 14000.

Learning outcomes:

After completion of this unit student will

- Understand the importance of environmental protection acts
- Explain acts and notifications in Environmental legislation

CourseOutcomes (CO):

- To prepare EMP, EIS, and EIA report.
- To identify the risks and impacts of a project.
- To choose an appropriate EIA methodology.
- To evaluation the EIA report.
- To Estimate the cost benefit ratio of a project

Textbooks:

1. Canter Larry W., “Environmental Impact Assessment”, McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu, “Environmental Impact Assessment Methodologies”, B. S. Publication, Hyderabad 2^{nd} edition 2011

Reference Books:

1. Peavy, H. S, Rowe, “Environmental Engineering”, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985
2. J. Glynn and Gary W. Hein Ke, “Environmental Science and Engineering”, Prentice Hall Publishers 1988
3. Suresh K. Dhaneja, S.K., “Environmental Science and Engineering”, Katania& Sons Publication, ND

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(ME20AOE704) INTRODUCTION TO PRODUCT MARKETING

Pre-Requisite: Managerial Economics & Financial Analysis

Course Objectives:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research.
- Understand the nature and importance of industrial market.
- Discuss the major stages in new product development.
- Identify the factors affecting pricing decisions.

UNIT – 1:

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Marketing management, philosophies etc. (L2)
- Classification of consumer products, types of buying decisions. (L2)

UNIT – 2:

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, major factors influencing industrial buying behavior, characteristics of industrial market demand.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply skills and techniques in designing data collection instruments including surveys. (L3)
- Sales Forecast of objective and subjective methods to analyze market demand. (L4)

UNIT – 3:

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of "New – product; major stages in new – product development product life cycle.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate an understanding of fundamental concepts related to product and branding. (L2)
- Evaluate new product and branding ideas. (L5)

UNIT – 4:

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging**:** Meaning, growth of packaging, function of packaging, kinds of packaging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish relevant from irrelevant costs when setting prices. (L3)
- Analyze competition for pricing decisions. (L3)

UNIT – 5:

Advertising and sales promotion**:** Objectives of advertisement, function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling **:** Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Advertisement and their classifications. (L2)
- Analyze a firm's marketing and promotional situation. (L4)

Textbooks:

1. Philip Kotler, Principles of Marketing, Prentice – Hall.
2. Philip Kotler, Marketing Management, Prentice – Hall.

Reference Books:

1. Wiliam J Stanton, Fundamentals of Marketing, McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, Marketing, S. Chand & Co. Ltd.
3. Rajagopal, Marketing Management Text & Cases, Vikas Publishing House.

Course Outcomes:

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

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

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(EE20AOE703) IOT APPLICATIONS IN ELECTRICAL ENGINEERING (OPEN ELECTIVE)

COURSE OBJECTIVES

- To program Arduino to control lights, motors, and other devices.
- To learn Arduino's architecture, including inputs and connectors for add-on devices.
- To add third-party components such as LCDs, accelerometers, gyroscopes, and GPS trackers to extend Arduino's functionality.
- To understand various options in programming languages, from C to drag-and-drop languages.
- To test, debug, and deploy the Arduino to solve real world problems.

UNIT 1: Introduction to sensors

Transducers, Classification, Roles of sensors in IOT, Various types of sensors, Design of sensors, sensor architecture, special requirements for IOT sensors, Role of actuators, types of actuators.

UNIT 2: Hardware

Physical device – Arduino Interfaces, Hardware requirement for Arduino, Connecting remotely over the network using VNC, GPIO Basics, Controlling GPIO Outputs Using a Web Interface, – Programming, APIs / Packages- Quark SOC processor, programming, Arduino Boards using GPIO (LED, LCD, Keypad, Motor control and sensor)

UNIT 3: Platforms

History - Creative Coding Platforms - Open Source Platforms – PIC - Arduino, Sketch, Iterative coding methodology – Python Programming - Mobile phones and similar devices - Arm Devices - Basic Electronics (circuit theory, measurements, parts identification) Sensors and Software: Understanding Processing Code Structure, variables and flow control, Interfacing to the Real World

Unit 4 Programming an Arduino IoT

Preparing the development environment (Arduino IDE), Exploring the Arduino language (C/C++) syntax, Coding, compiling, and uploading to the microcontroller, Working with Arduino Communication Modules: Bluetooth Modules, WiFi Modules and I2C and SPI, Interfacing arduino and Blynk via USB : LED Blinking, Controlling a Servomotor.

Unit 5 DOMAIN SPECIFIC APPLICATIONS OF IoT

Home automation, Industry applications, Surveillance applications, Other IoT applications – Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform – case studies: Soil moisture monitoring, Weather monitoring, Air quality Monitoring, Movement Detection

TEXT BOOKS :

1.Adrian McEwen and Hakim Cassimally, ―Designing the Internet of Things‖, John Wiley and Sons Ltd, UK, 2014.

2.Vijay Madisetti, Arshdeep Bahga, ―Internet of Things (A Hands-on Approach), Universities Press, 2015.

REFERENCE BOOKS:

1.Dieter Uckelmann, Mark Harrison, Florian Michahelles, ―Architecting the Internet of Things‖, Springer, New York, 2011.

2.John H. Davies, ―MSP430 Microcontroller Basics‖, First Edition, Newnes Publication. 2010.

COURSE OUTCOMES:

CO1: Recall the basics of sensors, its functioning.

CO2: Execute basic and advanced assembly language programs.

CO3: Learn the ways to interface I/O devices with processor for task sharing.

CO4: Recall the basics of co-processor and its ways to handle float values by its instruction set.

CO5: Apply the IOT technology in various fields.

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(AM20A0E701) Cyber Security Techniques

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the network sand cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNITI

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Out comes:

AftercompletingthisUnit, studentswill beableto

- Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks. Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

LearningOutcomes:

AftercompletingthisUnit, studentswill beableto

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threatsto Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of service Strategic Defenses:Security Counter measures, Crypto graphy in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management. Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, SecuringIaaS.

LearningOutcomes:

AftercompletingthisUnit, studentswill beableto

- Identify the network securitythreatsand attacks.[L3]
- Design the Counter measures to defend the network security attacks.[L6]
- Analyze the security tools and techniques for Cloud computing[L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, DataMining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies,Where theFieldIs Headed.

ManagementandIncidents:Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis,Dealing with Disaster.

Learning Outcomes:

AftercompletingthisUnit, studentswill beableto

- Interpret the need for Privacy and its impacts of Emerging Technologies.[L2]
- Explain how to handle incidents and deal with Disaster.[L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights ofEmployees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues inComputer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things,Economics,ComputerizedElections,CyberWarfare.

LearningOutcomes:

AftercompletingthisUnit, studentswill beableto

- Adaptlegalissuesandethics incomputersecurity.[L6]
- ElaborateontheEmerging topics.[L6]

Course Outcomes:

Uponcompletionofthe course,the studentsshouldbe able to:

CO1. Understand the concepts of cyber security & its essential building blocks

CO2. Understand websecurity & Network Security

CO3. Analyze the cyber security challenges for Networks & cloud computing

CO4. Understand Privacy principles and policies

CO5. Analyze the legal issues and ethics in computer security

TextBooks:

1. Pfleeger,C.P.,SecurityinComputing,PrenticeHall,2010,5thedition.
2. Schneier,Bruce.AppliedCryptography, SecondEdition,JohnWiley&Sons,1996

ReferenceBooks:

1. Rhodes-Ousley, Mark. Information Security: The Complete Reference, SecondEdition,Information Security Management: Concepts and Practice, McGraw-Hill,2013.
2. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Info sec Managers.Boston, MA:Course Technology,2011.

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(CS20AOE601) Data Analysis Using R

Course Objectives:

- Understand the R Programming Language.
- Exposure on Solving of data science problems.
- Understand The Regression Model

Unit 1: INTRODUCTION TO COMPUTING

Installation of R , The basics of R syntax, workspace , Matrices and lists, Sub setting, System-defined functions; the help system, Errors and warnings; coherence of the workspace, Viewing and manipulating Data, Viewing and manipulating Data, Plotting data, Reading the data from console, file (.csv) local disk and web, Working with larger datasets

Unit 2: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS

Tables, charts and plots, Univariate data, measures of central tendency, frequency distributions, variation, and Shape Multivariate data, relationships between a categorical and a continuous variable, Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations, Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.

Unit 3: PROBABILITY DISTRIBUTIONS

Sampling from distributions – Binomial distribution, normal distribution, tTest, zTest, Chi Square test, . Density functions, Data Visualization using ggplot – Box plot,histograms, scatter plotter, line chart, bar chart, heat maps.

EXPLORATORY DATA ANALYSIS Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.

Unit 4: TESTING HYPOTHESES

Null hypothesis significance testing, Testing the mean of one sample, Testing two means, Linear models, Simple linear regression, Multiple regression, Bias-variance trade-off – cross-validation

Unit 5: CORRELATION

How to calculate the correlation between two variables, How to make scatter plots, Use the scatter plot to investigate the relationship between two variables, Perform tests of hypotheses about the mean when the variance is known, Compute the p-value, . Explore the connection between the critical region, the test statistic, and the p-value, Least Squares Estimates, The R Function lm, scrutinizing the Residuals

Course Outcomes:

- Install and use R for simple programming tasks (L3).
- Extract data from files and other sources and perform various data manipulation tasks on them (L3).
- Explore statistical functions in R (L4).
- Use R Graphics and Tables to visualize results of various statistical operations on data (L3).
- Apply the knowledge of R gained to data Analytics for real-life applications (L3).

Reference Books:

1. SandipRakshit, “Statistics with R Programming”, McGraw Hill Education, 2018.

2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “AN Introduction to Statistical Learning: with Applications in R”, Springer Texts in Statistics, 2017.

3. Joseph Schmuller, “Statistical Analysis with R for Dummies”, Wiley, 2017.

4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, “Statistical Programming in R”, Oxford Higher Education, 2017

Web References:

- http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/
- http://www.ats.ucla.edu/stat/r/dae/rreg.htm
- http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html
- http://www.ats.ucla.edu/stat/r/data/binary.csv

SOFTWARE REQUIREMENTS:

SOFTWARE: R Software, R Studio Software

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(PH20AOE701) NANOMATERIALS

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- To characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

Course Outcomes:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

UNIT I

Introduction: Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods**:** Bottom-Up approach**:** Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT II

Top-Down approach: Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

UNIT III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT IV

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

UNIT V
Engineering Applications of Nanomaterials

Textbooks:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012.

References:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Wiley-VCH, 2011.
2. Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.
3. Nanomaterials Chemistry, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

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(BA20AHS703) ENTREPRENEURSHIP & INCUBATION

Course Objectives:

- To make the student underst and about Entrepreneurship
- Toenable the student in knowing various sources of generating new ideas in setting up of new enterprise
- To facilitate the student in knowing various sources off in acne in starting up of a business
- To impart knowledge about various government sources which provide financial assistance toentrepreneurs / women entrepreneurs?
- To encourage the student in creating and designing business plans

UNIT-I

Entrepreneurship-Concept, knowledge and skills requirement - Characteristics of successfulentrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship -Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality-Recent trends in Entrepreneurship.

Learning Outcomes:

AttheendiftheUnit, thelearnerswillbeableto

- Understandthe concept ofEntrepreneur andEntrepreneurshipinIndia
- KnowEntrepreneurshipprocessandemergenceofEntrepreneurship
- AnalyzethedifferencesbetweenEntrepreneurandIntrapreneur
- Developacreative mindsetandpersonality
- Understandrecenttrends inEntrepreneurshipacrosstheglobe

UNIT-II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas-Opportunity recognition-Feasibility study-Marketfeasibility, technical / operational feasibility - Financial feasibility - Drawing business plan – Preparingprojectreport-Presentingbusinessplant investors.

LearningOutcomes:

Attheend of the Unit, thelearnerswillbeableto

- Knowtheprocessofstarting anewventure

- Analyzethesourcesofnewmethods ingeneratingbusinessidea
- Evaluatemarket feasibility,financialfeasibilityandtechnicalfeasibility
- Designanddrawbusinessplansinprojectpreparationandprepareprojectreports

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short termsources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India – theirway of financing in India for small and medium business -Entrepreneurship developmentprogramsinIndia-The entrepreneurial journey – Institutions in aid of entrepreneurship development

LearningOutcomes:

Attheend of the Unit, thelearnerswillbeableto

- Knowthevarioussourcesoffinanceto start anewventure
- Contrast&comparebetweenLong term&Shorttermfinancesources
- Analyze the role of banks and other financial institutions inpromoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of CentralGovernment and State Government in promoting women Entrepreneurship - Introduction tovarious incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available-Womenentrepreneurship-Roleandimportance-Growth of women entrepreneurship in India –Issues & Challenges –Entrepreneurialmotivations.

LearningOutcomes:

At the end of the Unit, the learners will be able to

- Understandtheroleofgovernmentinpromotingwomenentrepreneurship
- Knowvariousincentives,subsidiesandgrantsavailabletowomenentrepreneurs
- Analyzetheroleofexport-oriented units
- Knowaboutthetaxconcessionsavailablefor Womenentrepreneurs
- Preparetofacetheissuesandchallenges.

UNIT-V

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influencethe Type/benefits of incubators - Corporate/educational / institutional incubators –

Broaderbusiness incubation environment - Pre-Incubation and Post - Incubation process - Idea lab,Businessplanstructure –Valueproposition

CourseOutcomes:

At theend ofthecourse,students will be ableto

- Understand the concept of Entrepreneurship and challenges in the world of Competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources off in ance and subsidies to entrepreneur / women Entrepreneurs.
- Evaluate the role of central government and state government inpromoting Entrepreneurship.
- Create and design business plan structure through incubations.

Textbooks:

- D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – CengageLearning, 2012. (For PPT, Case Solutions Facultymay visit:login.cengage.com)
- NandanH, "FundamentalsofEntrepreneurship",PHI,2013

References:

- VasantDesai,"SmallScaleIndustries andEntrepreneurship", HimalayaPublishing2012.
- RajeevRoy"Entrepreneurship", 2ndEdition,Oxford, 2012.
- B.JanakiramandM.Rizwana"EntrepreneurshipDevelopment: Text&Cases",Excel Books, 2011.
- Stuart Read, Effectual"Entrepreneurship",Routledge, 2013.

E-RESOURCES

- Entrepreneurship-Through-the-Lens-of-VentureCapital
- http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
- http://nptel.ac.in/courses/122106032/Pdf/7_4.pd

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VII Sem **L T P C**
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(BA20AHS704) ENTERPRISE RESOURCE PLANNING

Course Objectives:

- To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the
- Business organizations in achieving a multi-dimensional growth.
- Impart knowledge about the historical back ground of BPR
- Toaimatpreparingthestudents,technologicallycompetitiveandmakethemreadytoself-upgradewiththehighertechnicalskills

UNIT-I

Introduction to ERP: Enterprise–An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management(SCM), Customer Relationship Management(CRM)

UNIT-II

Benefits of ERP: Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

UNIT-III

ERP Implementation Lifecycle :Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live,End-userTraining,Post-implementation(Maintenance mode)

UNIT-IV

BPR: Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes

UNIT-V

IT in ERP: Role of information technology (IT) and identifying IT levers. Designing and building aprototype of the new process: BPR phases, Relationship between BPR phases. MIS–Management Information System, DSS-Decision Support System, EIS- Executive Information System

CourseOutcomes:

- UnderstandthebasicuseofERPPackageandits roleinintegratingbusinessfunctions.
- ExplainthechallengesofERPsystemintheorganization
- ApplytheknowledgeinimplementingERPsystemforbusiness
- EvaluatetheroleofITintakingdecisions withMIS
- Createreengineeredbusinessprocesses withprocessredesign

Textbooks:

- PankajSharma. “EnterpriseResourcePlanning”.AphPublishingCorporation,New Delhi, 2004.
- AlexisLeon, “Enterprise Resource Planning”, IVEdition,Mc.GrawHill,2019

References:

- MarianneBradford‟ModernERP”, 3rdedition.
- “ERP making it happen Thomas F. Wallace and Michael
- Directing the ERP Implementation Michael wpelphrey

SRI VENKATESWARA COLLEGE OF ENGINEERING

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B. Tech- VII Sem **L T P C**
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(BA20AHS705) MANAGEMENT SCIENCE

Course Objectives:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HR Min order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

UNIT-I

INTRODUCTION TO MANAGEMENT:

Management- Concept and meaning- Nature- Functions-Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles –EltanMayo's Human relations - Systems Theory - Organisational Designs - Line organization - Line &StaffOrganization-FunctionalOrganization-MatrixOrganization-Project Organization-Committeeform of Organization – Social responsibilities of Management.

UNIT-II

OPERATIONS MANAGEMENT– Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production),Work Study - Statistical Quality Control-Deming's contribution to Quality. Material Management -Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis – Purchase Procedureand Stores Management-MarketingManagement-Concept-Meaning-Nature-Functionsof Marketing - Marketing Mix- Channels of Distribution –Advertisement and Sales Promotion-Marketing Strategies based on Product Life Cycle.

UNIT-III

HUMAN RESOURCES MANAGEMENT(HRM)– HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM -Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment –Employee Selection-Process and Tests in Employee Selection-Employee Training and Development-On-the-job& Off-the-job training methods-Performance Appraisal Concept-Methods of Performance Appraisal–Placement-Employee Induction-Wage and Salary Administration

UNIT-IV

STRATEGIC&PROJECT MANAGEMENT: Differences between Leader & Manager - Leadership – Leadership styles Leadership theories – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of a good leader- Women Leadership in India.

UNIT-V

CONTEMPORARY ISSUES IN MANAGEMENT –The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) -Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept –Supply Chain Management(SCM)-Enterprise Resource Planning(ERP)-Performance Management- Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking –Balanced Score Card -Knowledge Management.

Course Outcomes:

CO1. Understand the concepts &principles of management and designs of organization in a practical world.

CO2. Apply the knowledge of Work-study principles & Quality Control techniques in industry

CO3. Analyze the concepts of HR Min Recruitment, Selection and Training& Development.

CO4. Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time &cost of project & to analyze the business through SWOT.

CO5. Create Modern technology in management science.

Textbooks:

- A.R.Aryasri,"Management Science", TMH,2013
- Stoner,Freeman,Gilbert, Management,PearsonEducation, NewDelhi,2012.

References:

- Koontz&Weihrich, "EssentialsofManagement", 6thedition, TMH, 2005.
- ThomasN.Duening&JohnM.Ivancevich,"ManagementPrinciplesandGuidelines",Biztantra KanishkaBedi, "Production and Operations Management", oxford University Press, 2004.
- SamuelC.Certo, "ModernManagement", 9thedition,PHI,2005

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B.Tech- VII Sem

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(EC20ASC701) IOT AND INDUSTRIAL AUTOMATION

Course Objectives:

1. Introduce the fundamental concepts of IoT and physical computing
2. Expose the student to a variety of embedded boards and IoT Platforms
3. Create a basic understanding of the communication protocols in IoT communications.
4. Familiarize the student with application program interfaces for IoT.
5. Enable student's to create simple IoT applications.

UNIT-I
Overview of IoT:

The Internet of Things: An Overview, The Flavour of the Internet of Things, The "Internet"of "Things", The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

DesignPrinciplesforConnectedDevices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching,Familiarity,Costs Vs Ease of Prototyping,Prototypes and Production, Open source Vs Close source, Tapping into the community.

- Explain IoT architecture.[L2]
- Interpret the design principles that govern connected devices[L2]

UNIT-II
Embedded Devices:

Electronics, Embedded Computing Basics, Arduino, RaspberryPi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

- Explain the basics of microcontrollers [L2]
- Outline the architecture of Arduino [L2]

UNIT-III

Communication in the IoT:

InternetCommunications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components:

GettingStartedwithanAPI, Writing a NewAPI,Real-Time Reactions,Other ProtocolsProtocol

- Interpret different protocols and compare them [L2]
- Select which protocol can be used for a specific application [L3]

Practice Exercises:

Any 10 experiments are to be done (Any Software 6 **+4 Hardware)**

1. Data acquisition using MyDAQ. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication) Note: The client and server should be connected to same local area network.
5. Create any cloud platform account, explore IoT services and register a thing on the platform. Push sensor data to cloud.
6. Control an actuator through cloud.
7. Accesses the data pushed from sensor to cloud and apply any data analytics or visualization services.
8. Create a mobile app to control an actuator.
9. Design an IoT based air pollution control system which monitors the air pollution by measuring carbon monoxide, ammonia, etc and gives alarm or sends message when the pollution level is more than permitted range.
10. Design an IoT based system which measures the physical and chemical properties of the water and displays the measured values.
11. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).
12. Design a business model canvas for a digital display

Course outcomes:

CO1. Choose the sensors and actuators for an IoT application

CO2. Select protocols for a specific IoT application.

CO3. Utilize the cloud platform and APIs for IoTapplications.

CO4. Experiment with embedded boards for creating IoT prototypes.

CO5. Design a solution for a given IoT application.

Text Books:

1. Adrian McEwen, Hakim Cassimally- Designing the Internet of Things, WileyPublications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011.

ReferenceBooks:

1. ArshdeepBahga, Vijay Madisetti- Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. TheInternetofThings,Enablingtechnologiesandusecases–PethuruRaj,AnupamaC.Raman, CRC Press.

Referencesites:

1. https://www.arduino.cc/
2. https://www.raspberrypi.org/

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B. Tech- V Sem

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(EC20AOE501) BASIC VLSI DESIGN

Course Objectives:

1. Learn about the various processing steps involved in the fabrication of a nMOS, pMOS and CMOS transistors.
2. Learn about the various Design rules and Layout of MOS transistors.
3. Enable the students to learn about the Scaling Models and Scaling factors of MOS transistors.
4. Study the various examples of structured design.
5. Learn about the Testing concepts in VLSI Chip design.

Unit I

Review of Microelectronics and Introduction to MOS technology:

The IC era, Basic MOS transistors- Enhancement mode and Depletion mode transistor action, nMOS fabrication, CMOS fabrication-P-Well, N-Well and Twin-tub process, Drain-to-Source Current versus Voltage V_{DS} relationships, MOS transconductance, output conductance and Figure of Merit.

Unit II

MOS circuits and Design process:

The Pass transistor, nMOS inverter, Pull-up to Pull-down ratio of different cases, CMOS inverter and Latch-up in CMOS circuits, MOS layers, Stick diagrams-nMOS and CMOS design styles, Design rules and Layout- Lambda-based design rules, Contact cuts.

Unit III

Circuit Concepts and Scaling of MOS circuits:

Sheet resistance concept, Area Capacitance of layers and calculations, The Delay unit, Inverter delay, Driving large capacitance loads, Propagation delays and Wiring capacitances, Scaling Models and Scaling factors, Scaling factors for various device parameters and its summary.

Unit IV

Subsystem Design:

Architectural issues, Switch logic, Gate restoring logic-The inverter, Two-input nMOS, CMOS and BiCMOS NAND and NOR gates and Other forms of CMOS logic.

Unit V

Test and Testability:

System partitioning, Layout and Testability, Reset/Initialization, Design for Testability, Testing Combinational Logic and Sequential Logic, Practical Design for Test guidelines, Scan Design Techniques and Built-In-Self-Test (BIST).

Text Books:

1. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

References:

1. Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison –Wesley, USA, 1980.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

Course Outcomes:

CO1: Outline the processing steps in the fabrication of a nMOS, pMOS and CMOS structure.

CO2: Illustrate the Layout procedure of simple MOS circuit using Lambda based design rules.

CO3: Summarize the scaling effects of various key parameters of MOSFET devices.

CO4: Design various MOS based logic circuits.

CO5: Develop algorithms for automatic test generation for combinational and sequential circuits.

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B. Tech- V Sem	**L**	**T**	**P**	**C**
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(EC20AOE502) DIGITAL ELECTRONICS

Course Objectives:

1. To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
2. To learn about Gate Minimization techniques.
3. To illustrate the concepts and study the procedures for the analysis and design of Combinational circuits.
4. To study the procedures for the analysis and design of Sequential circuits.
5. To introduce the concepts of programmable logic devices.

UNIT I

Number System & Boolean Algebra:

Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes.

Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

UNIT II

Gate Level Minimization:

The map method, four variable & Five variable K-map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III

Combinational Logic Circuits:

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV

Sequential Logic Circuits:

Sequential Circuits, Latches, Flips-Flops - RS, JK, Master-Slave JK, D & T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers &

Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, and Asynchronous counters.

UNIT V

Programmable Devices:

Memory organization, classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD, Flash memories, content addressable memory and Programmable logic devices-PROM, Programmable logic array (PLA) and Programmable array logic (PAL), field programmable gate array (FPGA).

Text Books:

1. M.Morris Mano & Michel D. Ciletti, "Digital Design", 5th Edition, Pearson education.
2. Zvi Kohavi and Nirah K.Jha, "Switching theory and Finite Automata Theory", 3rd Edition Cambridge.

References:

1. Subratha Goshal, "Digital Electronics", Cambridge Publishers.
2. Comer, "Digital & State Machine Design", Third Indian edition, OXFORD publishers.

Course Outcomes:

CO1: Apply basic postulates of Boolean Algebra in the design of design systems.

CO2: Design digital logic circuits using K-Map minimization technique.

CO3: Develop an Arithmetic Logic Unit using different Combinational circuits.

CO4: Design Sequential circuits.

CO5: Compare various Programmable logic devices.

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B. Tech- VI Sem

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(EC20AOE601) ELECTRONIC INSTRUMENTATION & MEASUREMENTS

Course Objectives:

1. To understand various measurement metrics for performance analysis and basic principles of various measurements like voltage, current, Resistance
2. To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes.
3. To explain principles of operation and working of different electronic instruments like signal generators, wave analyzers etc.
4. Understand the basic principle of various DC/AC bridges for the measurement of unknown passive elements like R, L and C.
5. To provide exposure to working principles of different sensors and transducers.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Learning Outcomes:

- Define different terms used for characterizing the performance of an instrument/measurement system (L1)
- Understand the principle of operation of various meters (L1)

UNIT-II

Oscilloscopes-I: Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type,

Learning Outcomes:

- Understand the basic blocks of analog CROs (L1)
- Measure amplitude and frequency utilizing oscilloscopes (L2)

UNIT-III

Oscilloscopes-II: Dual trace/beam CRO, Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

Learning Outcomes:

- Understand the basic blocks of digital CROs (L1)
- Measure amplitude and frequency utilizing oscilloscopes (L2)

UNIT-IV

Signal generators & Analyzers: Specifications & principles of working (Block diagram approach) Signal generators-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers.

Learning Outcomes:

- Understand the basic principle of various signal generators and analyzers (L1)
- Describe characteristics of signal generators and analyzers (L2)

UNIT-V

Review of DC Bridges: Wheatstone bridge, Kelvin Bridge, errors and precautions in using bridges.

AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Schering Bridge. Measurement of frequency- Wein Bridge, Q-meter.

Learning Outcomes:

- Understand principles of measurements associated with different DC/AC bridges(L2)
- Ability to derive balance condition of various bridges to find unknown values (L2)

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition,2002.
2. H.S.Kalsi, "Electronic instrumentation", second edition, Tata McGraw Hill, 2004.
3. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education,2009.

REFERENCES:

1. Robert A. Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.

Course Outcomes:

CO 1: Describe the basic principles involved in the meters for measuring voltage, current, resistance and frequency (L2).

CO 2: Analyze CRO for measuring signal characteristics (L4).

CO3: Analyze different waveforms using advanced instruments such as signal generators, logic analyzer & Spectrum analyzer (L4).

CO4: Apply the principles of various DC/AC bridges to solve various measurement parameters (L3).

CO5: Analyze various parameters using sensors and transducers (L4).

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B. Tech- VI Sem **L T P C**
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(EC20AOE602) SIGNAL PROCESSING

Course Objectives:

1. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
2. To present Fourier tools through the analogy between vectors and signals.
3. To teach concept of sampling and reconstruction of signals.
4. To analyze characteristics of linear systems in time and frequency domains.
5. To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

UNIT I

SIGNALS & SYSTEMS:

Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum

UNIT II

CONTINUOUS TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals.

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 characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time. Energy and Power Spectral Densities

UNIT IV

DISCRETE TIME FOURIER TRANSFORM:

Definition, Computation and properties of Fourier Transform for different types of signals.

UNIT V

LAPLACE TRANSFORM:

Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer functions-System Response to standard signals-Solution of differential equations with initial conditions.

The Z–TRANSFORM: Derivation and definition-ROC-Properties- Inverse Z-Transform-System analysis-Transfer function-BIBO stability-System.

TEXT BOOKS:

1. B. P. Lathi, "Linear Systems and Signals", Second Edition, Oxford University press.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", Pearson, 2nd Edition.
3. A. Ramakrishna Rao, "Signals and Systems", 2008, TMH.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009,BS Publications.

Course Outcomes:

CO1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques.

CO2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems.

CO3: Analyze the frequency spectra of various continuous-time signals using different transform methods.

CO4: Analyze the systems based on their properties and determine the response of them.

CO5: Analyze the frequency spectra of various discrete-time signals using different transform methods.

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B.Tech-VII Sem **L T P C**
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(EC20AOE701) IC APPLICATIONS

Course Objectives:

1. To introduce the basic building blocks of Opamp
2. To explain linear and nonlinear applications of opamp
3. To introduce the concept of IC 555 and PLL
4. To study working principle of data converters
5. To illustrate combinational & sequential circuits

UNIT I:

LINEAR INTEGRATED CIRCUITS

Introduction, Classification of ICs, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics. 741 Op-Amp and its Features, Modes of operation-inverting, non-inverting, differential.

Linear Applications of Op-Amp, adder ,subtractor, AC Amplifier, V to I and I to V Converters, Differentiators and Integrators.

Learning outcomes:

1. Understand ideal and practical Op-Amps (L2)
2. Understand internal blocks and characteristics of Op-Amp (L2)

UNIT II:

OSCILLATORS& WAVEFORM GENERATORS

Comparators, Schmitt Trigger. Multivibrators-Astable and monostable Principle of Operation and Types of Oscillators – RC, Wien Bridge.

Waveform Generators - Triangular. Saw Tooth, Square Wave.

Learning outcomes:

1. Illustrate the applications using Op-Amp (L3)
2. Demonstrate waveform generators using Op-Amp (L3)

UNIT III:

TIMERS & PHASE LOCKED LOOPS

Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger, PLL- Introduction, Block Schematic, Principles and Description of individual Blocks of 565.

Learning outcomes:

1. Describe internal circuit operation of 555 timer (L2)
2. Illustrate the concept of PLL (L3)

UNIT IV:

D-A AND A- D CONVERTERS

Introduction, Basic DAC Techniques - Weighted Resistor Type. R-2R Ladder Type, inverted R-2R Type. Different types of ADCs - Parallel Comparator Type. Counter Type. Successive Approximation Register Type and Dual Slope Type DAC and ADC Specifications.

Learning outcomes:

1. Explain operation principles of different A/D & D/A converters (L2)
2. Demonstrate different types of A /D & D/A converter circuits (L3)

UNIT V:

COMBINATIONAL & SEQUENTIAL LOGIC DESIGN

COMBINATIONAL CIRCUIT ICs: Use of TTL-74XX Series–Logic gates using 74XX ICs, adders, Comparator, multiplexers, encoders, Decoders, Demultiplexers, Priority Encoders(Pin Diagram, Function table)

SEQUENTIAL CIRCUIT ICs: Commonly Available 74XX ICs –Latches, Flip flops- RS, JK, D and T-Type Flip-Flops, Binary counter, Decade counter. Shift Registers & applications.

Learning outcomes:

1. Describe internal circuit operation of different Combinational I Cs(L2)
2. Demonstrate Sequential circuits using 74XX ICs (L3)

TEXT BOOKS:

1. Linear Integrated Circuits -D. Roy Chowdhury, New Age International (p)Ltd, 3rd Ed., 2008.
2. Wakerly J.F. Digital Design: Principles and Practices, 4th Edition, Pearson India, 2008.

REFERENCE BOOKS:

1. R. P. Jain, Modern Digital Electronics, McGraw Hill Education (India Private Limited), 4^{th} edition, 2012.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI, 1987.

Course Outcomes:

CO1: Understand the basic building blocks of Op-Amp.

CO2: Illustrate waveform generators and oscillators using Op-Amp.

CO3: Analyze concept of 555 timer and PLL.

CO4: Analyze the operation & characteristics of data converters.

CO5: Study the design of various 74XX ICs, Combinational & sequential.

B.Tech-VII Sem

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(EC20AOE702) PRINCIPLES OF COMMUNICATION ENGINEERING

Course Objectives:

1. To understand the concept of various modulation schemes and multiplexing.
2. To apply the concept of various modulation schemes to solve engineering problems.
3. To analyze various modulation schemes.
4. To evaluate various modulation scheme in real time applications.

UNIT I

Amplitude Modulation

Introduction, An overview of Electronic Communication Systems**.** Need for Frequency Translation, classification of modulation schemes, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB, Modulators and demodulators. The Superheterodyne Receiver.

UNIT II

Angle Modulation

Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase modulation, AM vs PM.

UNIT III

Pulse Modulation

Sampling Theorem, Quantization, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse position modulation, Pulse code modulation.

Concept of Time Division Multiplexing, Frequency Division Multiplexing.

UNIT IV

Digital Modulation

Digital Representation of Analog Signals. Phase shift keying-Binary Amplitude Shift Keying, Binary Phase Shift Keying ,Differential phase shift keying, and Quadrature Phase Shift Keying, Frequency Shift Keying— Comparison.

UNIT V

MULTI-USER RADIO COMMUNICATION

Global System for Mobile Communications (GSM),Mobile &Cellular communication

Concept – Overview of Multiple Access Schemes – Code division multiple access (CDMA) ,Frequency division multiple access (FDMA),Satellite Communication – Bluetooth.(Block diagram approach only).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Textbooks:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3rdEdition, Tata McGraw-Hill Publishing Company Ltd., 2008.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004

References:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition, 2008.
3. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.

Course Outcomes:

CO1. Analyze and design of various continuous wave modulation and demodulation techniques.

CO2. Attain the knowledge about angle modulation and FM Transmitters and Receivers.

CO3. Analyze and design the various Pulse Modulation Techniques.

CO4. Understand the concepts of Digital Modulation Techniques and Baseband transmission.

CO5. Comprehend the principles of radio communication systems like GSM.CDMA, Bluetooth, Mobile and satellite communications etc.,

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B. Tech- VII Sem

L	T	P	C
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(EC20AOE703) SENSORS AND SYSTEMS

Course Objectives:

1. To learn about the characterization of sensors.
2. To understand about the working of Electromechanical, Thermal, Magnetic and radiation sensors
3. To understand the concepts of Electro analytic and smart sensors.
4. To learn about the various characteristics of radiation sensors.
5. To learn about the usage of different sensors in various real time applications.

UNIT I

Sensors / Transducers:

Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization Electromechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor -Types-Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors.

UNIT II

Thermal Sensors-I:

Introduction ,Gas thermometric Sensors ,Thermal Expansion Type Thermometric Sensors ,Acoustic Temperature Sensor ,Dielectric Constant and Refractive Index thermo sensors ,Helium Low Temperature Thermometer ,Nuclear Thermometer and Magnetic Thermometer.

UNIT III

Magnetic sensors:

Introduction, Sensors and the Principles Behind, Magneto-resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers and Synchros.

UNIT IV

Radiation Sensors:

Introduction, Basic Characteristics, Types of Photo resistors/ Photo detectors, X-ray and Nuclear Radiation Sensors, Fiber Optic Sensors Electro analytical Sensors: 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 V

Smart Sensors:

Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing – Data Communication, Standards for Smart Sensor Interface, the Automation Sensors -Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing and Environmental Monitoring.

Text Books:

1. Sensors and Actuators, D. Patranabis, 2nd Ed., PHI, 2013.
2. Introduction to sensors- John Veteline, Aravindraghu, CRC press, 2011.

References:

1. Sensors handbook- Sabrie soloman, 2nd Ed. TMH, 2009
2. Make sensors: Terokarvinen, kemo, karvinen and Villey valtokari, 1st edition, maker media, 2014.

Course Outcomes:

CO1: Understand Classification and Characterization of Sensors.

CO2: Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analytic sensors.

CO3: Analyze and Model various losses occurring in Magnetic sensors.

CO4: Compare the working performance of various radiation sensors.

CO5: Design a complete system for monitoring of environmental parameters.

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B. Tech- VII Sem

L	T	P	C
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(EC20AOE704) INTERNET OF THINGS

Course Objectives:

1. Understand IOT design requirements.
2. Understand various technologies and protocols.
3. Understand storage and intelligent analytics.
4. Analyze security requirements along with threat model.
5. Create and Design various applications.

UNIT 1

Introduction to IoT: Architectural overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Role of cloud in IoT.

UNIT II

Elements of IoT: Hardware components – computing (Arduino, Raspberry Pi), communication, Sensing, Actuation, I/O interfaces Software Components- Programming APIs (Using Python/Arduino) for communication protocols-MQTT, Zigbee, Bluetooth, CoAP, UDP and TCP.

UNIT III

Sensing and Actuation: Definition of Sensor, Sensor features, Resolution, Classes, Different types of sensors, Actuator, Different types of Actuators, purpose of Sensors and Actuators in IoT.

UNIT IV

IoT Application Development: Solution frame work for IoT Applications-Implementation of Device integration, Data acquisition and Integration, Device data storage on cloud/local server, Authentication, authorization of Devices.

UNIT V

IoT Case Studies: IoT Case studies and mini projects based on industrial Automation, Transportation, Agriculture, Healthcare and Home Automation.

Textbooks:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things a Hands-On- Approach",2014.
2. Dr SRN Reddy, Rachit Thukral and Manasi Mishra ," Introduction to Internet of Things": A practical Approach" ETI Labs

References:

1. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill Education.
2. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013.

Course Outcomes:

CO1: Understand the concepts of Internet of Things.

CO2: Identify hardware and software components of Internet of Things.

CO3: Analyze basic communication protocols.

CO4: Discuss various techniques related to authorization of Devices.

CO5: Design IoT applications in different domain and be able to analyze their performance.

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B.Tech- VII Sem

L	T	P	C
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(EC20AOE705)INTRODUCTION TO IMAGE PROCESSING

Course Objectives:

1. To introduce fundamentals of Image Processing
2. To expose various relationships between pixels
3. To descript various intensity transformations in spatial domains.
4. To descript various spatial and frequency domains filters.
5. To dissimilate various segmentation and compression techniques for image processing.

Unit I

Fundamentals of Image Processing – I:

Introduction, A simple image model, Components of image processing system, Fundamental Steps in digital image processing, image sensing and acquisition, Applications of image processing.

Unit II

Fundamentals of Image Processing – II:

Image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures, mathematical operations in image processing.

Unit III

Image Enhancement in spatial domain:

Introduction to gray level transformations, Point processing - Image negative, contrast stretching, intensity slicing, Bit plane slicing and grey level slicing, Histogram Processing, Histogram equalization and Specifications.

Unit IV

Image Enhancement in frequency domain:

Spatial Filtering, Smoothing filters, Sharpening filters, Enhancement in Frequency domain –image smoothing, image sharpening and Homomorphic filtering.

Unit V

Image Segmentation and compression:

Point, Line and Edge Detection, Fundamentals of Compression, Image compression model, Types of Redundancy – Coding, Inter pixel and Psycho visual, Lossless compression – Huffman coding, Shannon-Fano coding.

Text Books:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S. Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image processing", Tata McGraw Hill.

References:

1. Milan Sonka, Vaclav Hlavac, Roger Boule, Image Processing, Analysis, and Machine Vision, Third Edition, Cengage Learning, 2016.
2. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004

Course Outcomes:

CO1: Understand fundamentals of digital image processing and apply engineering mathematics in processing of digital image.

CO2: Compute the relationship between the pixels in image processing

CO3: Analyze different image enhancement techniques in spatial domain.

CO4: Describe various image spatial filters and Analyze different image enhancement techniques in frequency domain

CO5: Analyze various techniques in image segmentation and apply various algorithms to perform image compression.

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B.Tech-VII Sem

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(EC20AOE706) MICROCONTROLLER AND APPLICATIONS

Course Objectives:

4. To introduce architectural concepts of 8051 microcontroller.
5. To impart knowledge on addressing modes and instruction set of 8051.
6. To describe timers, counters and serial communication in 8051.
7. To explain interfacing concepts of 8051.

UNIT I

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, I/O ports functions, Internal Memory organization, External Memory, 8051 Pin diagram.

UNIT II

8051 - Addressing Modes, instruction set. Simple Assembly language programs.

UNIT III

8051 - Stack, Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

UNIT-IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, Simple Serial Port programming in C to transmit a message and to receive data serially. 8051 - Interrupts, Assembly language programming to generate an external interrupt using a switch.

UNIT-V

Interfacing 8051 with LCD, Stepper Motor Interfacing, PWM generation using 8051.

Text Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C", PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson/Cengage Learning.

References:

1. Manish K Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.

Course Outcomes:

CO1: Understand the architecture of 8051 microcontroller.
CO2: Develop 8051 assemble language programming.
CO3: Develop assembly language programs based on timers and counters of 8051 .
CO4: Understand the serial communication basics of 8051 microcontroller.
CO5: Describe 8051 Microcontroller interfacing with I/O devices.

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B.Tech IV Sem

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4	0	0	4

(EC20AHO401) ELECTRONICS PACKAGING

(Honors)

Unit 1

Introduction and Role of Packaging:

Integrated Circuits, IC Packaging, Semiconductor Roadmap, IC Packaging Challenges, Summary and Future Trends, Role of Packaging in the Computer Industry, Telecommunication Industry, Automotive Systems, Medical Electronics, Consumer Electronics and MEMS Products

Unit 2

Design for Reliability and Thermal Management:

What Is Design for Reliability, Microsystems Failures and Failure Mechanisms, Fundamentals of Design for Reliability, Thermomechanically-Induced Failures, Electrically-Induced Failures, Chemically-Induced Failures.

Introduction to thermal management, Cooling Requirements for Microsystems, Thermal Management Fundamentals, Thermal Management of IC and PWB Packages, Electronic Cooling Methods.

Unit 3

Single Chip Packaging and Multichip Packaging:

Single Chip Package: Introduction and Functions, Types and Fundamentals, Materials, Processes, Properties and Characteristics of Single Chip Packages.

Multichip Packaging: Functionality, Multichip, Advantages, Multichip Modules at the System Level, Types of Multichip Module Substrates, Multichip Module Design, Multichip Module Technology Comparisons.

Unit 4

IC Assembly and Wafer-Level Packaging:

IC Assembly: Introduction and Purpose, Requirements, IC Assembly Technologies Wire bonding, Tape Automated Bonding and Introduction to Flip Chip.

Wafer-Level Packaging: Introduction, Various Technologies, Reliability and Wafer-level Burn-in and Test.

Unit 5

Sealing and Encapsulation:

Introduction and Fundamentals of Encapsulation and Sealing, Encapsulation Requirements, Encapsulant Materials, Encapsulation Processes and Hermetic Sealing.

Text Books:

1. Rao. R. Tummala, “Fundamentals of Microsystems Packaging”, McGraw Hill, 3rd edition, 2019.
2. William D. Brown, “Advanced Electronic Packaging”, Second edition, IEEE Press, 2011.

References:

1. Walter C Bosshart, “Printed Circuit Boards: Design and Technology”, TMGH 1998.
2. Glenn R.Blackwell, “The Electronic Packaging Handbook”, CRC Press, 2010.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AHO402)STRUCTURED DIGITAL SYSTEM DESIGN

(HONORS)

Course Objectives:

1. To study about structural functionality of different Digital blocks (Both combinational and Sequential).
2. To provide an exposure to ASM charts, their notations and their realizations.
3. To provide an exposure to VHDL and different styles of modelling using VHDL.
4. To introduce concept of micro programming and study issues related to micro programming.

UNIT-1

BUILDING BLOCKS FOR DIGITAL DESIGN: Multiplexer, Demultiplexer, Decoder, Encoder, Comparator, Adder, ALU, Carry-look-ahead adder.

BUILDING BLOCKS WITH MEMORY: Clocked building blocks, register building blocks, RAM, ROM, PLA, PAL, Timing devices.

UNIT -II

DESIGN METHODS: Elements of design style, top-down design, separation of controller and architecture, refining architecture, and control algorithm, Algorithmic State Machines, ASM chart notations.

UNIT-III

REALISING ASMS - Traditional synthesis from ASM chart, multiplexer controller method, one-shot method, ROM based method.

ASYNCHRONOUS INPUTS AND RACES - Asynchronous ASMs, Design for testability, test vectors, fault analysis tools.

UNIT-IV

MICROPROGRAMED DESIGN: Classical Microprogramming with Modem Technology; Enhancing the Control Unit; The 2910 Microprogram Sequencer; Choosing a Microprogram Memory; A Development System for Microprogramming; Designing a Microprogrammed Minicomputer

UNIT-V

MODELLING WITH VHDL: CAD tools, simulators, schematic entry, synthesis from VHDL.

DESIGN CASE STUDIES: Single pulse, system clock, serial to parallel data conversion, traffic light controller.

TEXT BOOKS:

1. Franklin P. Prosser and David E. Winkel, "The Art of Digital Design", Prentice Hall.
2. Roth, "Digital System Design using VHDL", McGraw Hill, 2000.

REFERENCE BOOKS:

1. William Fletcher, An Engineering Approach to Digital Design, 1st Edition, Prentice-Hall India, 1997.
2. William J Dally and John W Poulton, Digital Systems Engineering, Cambridge University Press, 2008.
3. Jayaram Bhasker, A VHDL Primer, 3rd edition, Prentice-Hall India, 2009.
4. Kevin Skahill, VHDL for Programmable Logic, Cypress Semiconductors.

Course Outcomes:

CO1: Understand structural functionality of different digital blocks.

CO2: Represent and Realize their designs in ASM charts.

CO3: Represent their designs in different modelling styles by using VHDL.

CO4: Understand concept of Micro program and issues related to microprogramming.

B.Tech - V Sem

L	T	P	C
4	0	0	4

(EC20AHO501) MEMS TECHNOLOGY
(HONORS)

UNIT I

Introduction: Introduction to MEMS & Microsystems, Introduction to Microsensors, Evaluation of MEMS, Microsensors, Market Survey, Application of MEMS, MEMS Materials and its Properties.

UNIT II

Microelectronic Technology for MEMS: Microelectronic Technology for MEMS, Micromachining Technology for MEMS, Micromachining Process, Etch Stop Techniques and Microstructure, Surface and Quartz Micromachining, Fabrication of Micromachined Microstructure and Microstereolithography.

UNIT III

Micro Sensors: MEMS Microsensors, Thermal Microsensors, Mechanical Micromachined Microsensors, MEMS Pressure Sensor, MEMS Flow Sensor, Micromachined Flow Sensors, MEMS Inertial Sensors, MEMS Gyro Sensor.

UNIT IV

MEMS Accelerometers: Micromachined Micro accelerometers for MEMS, MEMS Accelerometers for Avionics, Temperature Drift and Damping Analysis, Piezoresistive Accelerometer Technology, MEMS Capacitive Accelerometer and its design process, MEMS for Space Applications.

UNIT V

MEMS Applications: Polymer MEMS & Carbon Nano Tubes CNT, Wafer Bonding & Packaging of MEMS, Interface Electronics for MEMS, Introduction to Bio-MEMS and Micro Fluidics, Introduction to Bio-Nano Technology, Bio-Sensors, Fluidics, MEMS for Biomedical Applications (Bio-MEMS).

Text Books:

1. Nadim Maluf Kirt Williams "An Introduction to Microelectromechanical Systems Engineering", Second Edition, Artech House, Inc. Boston London, International Standard Book Number: 1-58053-590-9.
2. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalakrishnan, K. N. Bhat and V. K. Atre,

“Micro and smart systems”, Wiley India, 2010.

References:

1. M.J. Usher, “Sensors and Transducers”, McMillian Hampshire, second edition, 2014.
2. R.S. Muller, Howe, Senturia and Smith, “Micro sensors”, IEEE Press.

Course Outcomes:

CO1: Understand the Basic concept of MEMS Fabrication Technologies,Piezo-resistance Effect, Piezo electricity and Piezoresistive Sensor.

CO2: Explain Mechanics of Beam and Diaphragm Structures.

CO3: Understand the Basic concept of Air Damping and Basic Equations for Slide-film Air Damping, Couette-flow Model, Stokes-flow Model.

CO4: Analyze the modeling of Electrostatic Actuation.

CO5: Analyze various applications of MEMS in RF.

B.Tech-V Sem

L	T	P	C
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(EC20AHO502) MODERN COMMUNICATION SYSTEMS
(HONORS)

Unit I:

Digital Communication Systems

Introduction to communications systems, digital communication systems, review ofdigital modulation techniques, PCM, BPSK, QPSK, GMSK, Delta Modulation, Adaptive Delta Modulation, Sigma Delta Modulation, Basic principles of orthogonality, Single vs Multicarrier Systems, OFDM block diagram and its Explanations, Shannon- Fano Coding, Huffman Coding, Hamming Coding.

Unit II:

Stochastic Process

Introduction, Mathematical definition of a stochastic process, Mean-Square Stochastic Integrals, Mean-Square Stochastic Differential Equations, Markov process, Poisson process, Ergodic Process.

Unit III:

Optimum Receivers

Optimum receivers for signals corrupted by additive white gaussian noise, Correlation demodulator, Optimum detector. ML sequence detector, Probability of error for binary modulation techniques.

Unit IV:

Software Defined Radio

Need for software radio, general structure for transceiver for SDR, third generation SDR system architecture, trends in SDR, cognitive radio, spectrum sensing in cognitive radio.

Unit V:

MIMO Systems

Introduction, space diversity and systems based on space diversity, MIMO based system architecture, MIMO channel modeling, MIMO channel measurement, MIMO channel capacity.

Text Books:

1. U. Dalal, “Wireless Communication”, Oxford University Press, fifth edition, 2012.
2. H. Stark and J. Woods, “Probability, Statistics, and Random Processes for Engineers”,4th Edition, Pearson, 2012.

References:

1. John G. Proakis, “Digital Communication”, 5/e , McGraw Hill Education, 2014.
2. W. Tomasi, “Advanced Communication Systems”, Pearson Education.
3. S. Haykin “Digital Communication Systems”, John Wiley& sons, 2013.

Course Outcomes:

CO1: Discuss about the concept of Multicarrier Modulation.
CO2: Analyze errors in system using optimum receivers and detectors.
CO3: Comprehend the concepts of related to stochastic processes.
CO4: Contribute in the areas of software defines radio and cognitive radio.
CO5: Understand MIMO systems and channel modeling.

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(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AHO601) ADVANCED COMPUTER ARCHITECTURE

(Honors)

UNIT-I:

Pipeline and vector processing:

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

UNIT-II:

Computer Arithmetic:

Addition and Subtraction, Hardware Implementation, Multiplication Algorithms and Hardware Implementation, Division Algorithms and Hardware Implementation, Floating Point Arithmetic Operations.

UNIT-III:

Parallel Computer Models:

Evolution of Computer Architecture, System Attributes to Performance, Shared Memory Multiprocessors, Distributed Memory Multicomputers, Vector Super Computers, SIMD Super Computers.

UNIT-IV:

Processors and Memory Hierarchy:

Advanced Processor Technology: Design Space of Processors, Instruction-Set Architectures, CISC scalar Processors, RISC scalar Processors, Super Scalar and Vector Processors: Superscalar Processors.

UNIT-V:

Pipelining and Superscalar Techniques:

Linear Pipeline Processors: Asynchronous and Synchronous models, Clocking and Timing Control, Speedup, Efficiency and Throughput, Pipeline Schedule Optimization, Instruction Pipeline Design: Instruction Execution Phases, Mechanisms for Instruction Pipelining, Dynamic Instruction Scheduling, Branch Handling Techniques.

Text Books:

1. Computer System Architecture, Morris M. Mano, 3rd edition, Pearson/Prentice Hall India.
2. Advanced Computer Architecture, Kai Hwang, McGraw-Hill, India.

References:

1. Computer Organization and Architecture, William Stallings ,8th edition, PHI.
2. Computer Organization, Carl Hamacher, Z. Vranesic, S. Zaky, 5th edition, McGraw Hill.

Course Outcomes:

CO1: Understand the Concept of Parallel Processing and its applications.

CO2: Implement the Hardware for Arithmetic Operations.

CO3: Analyze the performance of different scalar Computers.

CO4: Develop the Pipelining Concept for a given set of Instructions.

CO5: Distinguish the performance of pipelining and non-pipelining environment in a processor.

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B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AHO602) DIGITAL SPEECH PROCESSING

(HONORS)

UNIT-I:

Fundamentals of Digital Speech Processing

Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

UNIT-II:

Time Domain Models for Speech Processing

Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT-III:

Linear Predictive Coding (LPC) Analysis:

Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT-IV:

Homomorphic Speech Processing:

Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder. Speech Enhancement:

Nature of interfering sounds, Speech enhancement techniques: Single Microphone Approach : spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

UNIT-V:

Automatic Speech & Speaker Recognition:

Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System. Hidden Markov Model (HMM) for Speech: Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS. Speaker Recognition: Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

Text Books:

1. L.R. Rabiner and S. W. Schafer, "Digital Processing of Speech Signals", 2nd Ed., Pearson Education.
2. Douglas O'Shaughnessy, "Speech Communications: Human & Machine", 2nd Ed., Wiley India, 2000.

References:

1. Thomas F. Quateri, "Discrete Time Speech Signal Processing: Principles and Practice", 1st Edition., PE.
2. Ben Gold & Nelson Morgan, "Speech & Audio Signal Processing", 1st Edition, J.Wiley

Course Outcomes:

CO1: Express the speech signal in terms of its time domain and frequency domain representations and the different ways in which it can be modeled.

CO2: Derive expressions for simple features used in speech classification applications.

CO3: Discuss the operation of example algorithms covered in lectures, and discuss the effects of varying parameter values within these.

CO4: Synthesize block diagrams for speech applications, explain the purpose of the various blocks, and describe in detail algorithms that could be used to implement them.

CO5: Deduce the behavior of previously unseen speech processing systems and hypothesize about their merits.

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(Autonomous)

B.Tech VII Sem

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(EC20AHO701) DIGITAL VIDEO PROCESSING

(ECE)

UNIT-I:

Introduction and Fundamentals:

Representation of video, analog video, spatio-temporal sampling, sampling of analog and digital video, sampling of 3-D structures, reconstruction from samples.

UNIT-II:

Video Motion Estimation-I:

Real versus apparent motion, spatial-temporal constraint methods (optical flow equation), general methodologies-Block matching algorithm, Deformable block matching algorithm.

UNIT-III:

Video Motion Estimation-II:

Mesh based motion estimation, Global motion estimation, Region based motion estimation, Multiresolution motion estimation Feature based Motion Estimation and Direct motion Estimation.

UNIT-IV:

Video Coding:

Content dependent video coding, Region based video coding, Object based video coding, Knowledge based video coding, Semantic video coding, Scalable video coding, Applications of motion estimator in video coding.

UNIT-V:

Digital Video Compression Standards:

Inter-frame and intra-frame compression, Lossy and Loss less compression techniques, MPEG-1 and MPEG-2 Standard, H.265/HEVC.

Text Books:

1. M.Tekalp, Digital Video Processing, Prentice Hall, 2nd Edition, 2018.
2. Alan C. Bovik, The Essential Guide to Video Processing, Elsevier Science, 2nd Edition, 2016.

References:

1. Y.Wang, J. Ostermann and Y.-Q. Zhang, Video Processing and Communications. Signal Proc. Series, Prentice Hall, 2012.
2. J. Watkinson, The Art of Digital Video, 3rd edition, Focal Press, 2014.

Course Outcomes:

CO1: Understand the video sampling and reconstruction.

CO2: Describe algorithms of video motion estimation.

CO3: Interpret video coding and segmentation algorithms.

CO4: Analyze various applications of motion estimator in video coding.

CO5: Familiarize with video compression standards.

B.Tech VII Sem

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(EC20AHO702) TESTING & TESTABILITY
(HONORS)

UNIT-I:

Need for testing, the problems in digital Design testing, the problems in Analog Design testing, the problems in mixed analog/digital design testing, design for test, printed-circuit board (PCB) testing, software testing, Fault in Digital Circuits: General Introduction, Controllability and Observability, Fault Models, stuck at faults, bridging faults, CMOS technology considerations, intermittent faults.

UNIT-II:

General Introduction to test pattern generation, Test Pattern generation for combinational logic circuits, Manual test pattern generation, automatic test pattern generation, Boolean difference method, Roth's D- algorithm, Developments following Roth's D-algorithm, Pseudorandom test pattern generation.

UNIT-III:

Pseudorandom test pattern generators, Design of test pattern generator using Linear feedback shift registers (LFSRs) and Cellular Automata (CAs).

UNIT-IV:

Design for Testability for combinational circuits: Basic Concepts of testability, controllability and observability, the Reed Muller's expansion techniques, use of control logic and syndrome testable designs.

UNIT-V:

Making sequential circuits testable, testability insertion, full scan DFT technique-Full scan insertion, flip- flop structures, Full scan design and test, scan architectures-full scan design, shadow register DFT, partial scan methods, multiple scan design, other scan designs.

Text Books:

1. Digital Systems Testing and Testable Design-Miron Abramovici, Melvin A. Breuer

and Arthur D. Friedman, IEEE, Wiley-Interscience, 2008.

2. Michael. L. Bushnell, and Vishwani. D. Agrawal, "Essentials of Electronic Testing For Digital, Memory And Mixed Signal VLSI Circuits" Kluwer Academic Publishers, Third Edition, 2012.

References:

1. H. Fujiwara, "Logic Testing and Design for testability" MIT Press, 1985.
2. Chris Spear, "System Verilog for Verification," Springer Publications, second edition 2008.

Course Outcomes:

CO1: Model the digital circuits at logic level and register level.

CO2: Identify the problems associated with testing of semiconductor circuits at earlier design levels so as to significantly reduce the testing costs.

CO3: Analyze various Trade-Offs and Techniques for Testability.

CO4: Explain the concepts of built-in-self-test.

CO5: Illustrate the Memory Test Architectures and Techniques.

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B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI401) COMMUNICATION SYSTEMS-I

(Minor)

UNIT-I:

Amplitude Modulation

Time-Domain Description, Frequency domain description, Generation of AM waves, Detection of AM waves, AM/DSB, Time-Domain Description, Frequency domain description Generation of DSBSC waves, Coherent Detection of DSBSC Modulated waves, Costas loop, Quadrature Carrier multiplexing, Comparison of amplitude modulation techniques, frequency translation, FDM.

UNIT-II:

Angle Modulation

Basic Concepts, Frequency Modulation, Spectrum Analysis Of sinusoidal FM wave, NBFM,WBFM, Constant Average power, Transmission bandwidth of FM waves, Generation of FM waves, Direct FM, demodulation of FM waves, frequency discriminator, ZCD, phase locked loop (1^{st} order) comparison of AM and FM.

UNIT-III:

Noise in Analog Modulation Systems

Signal-to-noise ratios, AM receiver model, DSBSC receiver, noise in AM receivers using envelope detection, threshold effect, FM receiver model, noise in FM reception, FM threshold effect, pre-emphasis and de-emphasis in FM systems.

UNIT-IV:

Pulse Modulation

Sampling theorem for low-pass and band-pass signal, statement and proof, PAM, Channel Bandwidth for a PAM signal, natural sampling, flat-top sampling, signal recovery through holding, quantization of signals, quantization error, PCM, electrical representations of binary digits, PCM systems, DPCM , delta Modulation, Adaptive delta modulation.

UNIT-V:

Digital Modulation

Introduction, Binary Shift Keying, DPSK, QPSK, QPSK transmitter, QPSK receiver, signal space representation, BFSK, spectrum, receiver for BFSK, line codes, TDM. Application of analog/digital communication in Instrumentation and Automation.

Text Books:

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2017.
2. S. Haykin "Digital Communications" John Wiley 2015.

References:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2017.
2. H P Hsu, "Analog and Digital Communications", Schaum's Outline Series TMH 2016.

Course Outcomes:

CO1: Define, understand and explain the concept of modulation, demodulation, figure of merit ,sampling, quantization, multiplexing.

CO2: Apply the knowledge of basic systems to articulate the building blocks of the given analog/digital communication system and derive figure of merit for the system.

CO3: Analyze interaction among various blocks of a given analog/digital communication system to obtain waveform at different points for given specifications and obtain noise performance parameters.

CO4: Design and decide the modulators, demodulators, sampling rate, type of encoding for given specifications of analog/digital communication systems.

CO5: Design the modulator-demodulator for the given analog/digital communication system using modern tools.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI402)ELECTRONIC INSTRUMENTATION

(Minor)

Course Objectives:

1. Understand the measurement of electrical parameters such as voltage, current, resistance.
2. Apply the basic concepts signals to illustrate working of CRO and signal generators
3. Design of Ammeters, Voltmeter and Multimeters
4. Analyze the working of Display Devices and Recorders in practical fields.
5. Learn the different measurement techniques for non-physiological parameters.

UNIT 1

Measurements: Introduction, Functions of instruments and measurement systems, Applications of measurement systems. Static & dynamic characteristics. Measurement Errors: Introduction Gross errors and systematic errors, Absolute and relative errors, Measurement error combinations. Basic concepts of accuracy, Precision, Resolution and Significant figures.

UNIT 2

Ammeters, Voltmeter and Multimeters: Introduction, DC ammeter principle only, DC voltmeter, Multi-range voltmeter, Extending voltmeter ranges, Loading. Digital Voltmeters: Introduction, Ramp type, Dual slope integrating type (V–T), integrating type (V–F) and Successive approximation type (relevant problems). Digital Instruments: Introduction, Block diagram of a Basic Digital Multimeter. Digital frequency meters.

UNIT 3

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working CRO, Typical CRT connections, Dual beam and dual trace CROs, Special Oscilloscopes: Analog storage oscilloscopes, Digital storage oscilloscopes Sampling Oscilloscope.

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Modern laboratory signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator.

UNIT 4

Display Devices and Recorders: Introduction, Segmental Displays: Seven segmental display, dot matrices, LED, LCD, decade counting assemblies, display systems. Recorders: Recording requirements, analog recorders- Graphic recorders, strip chart recorders & its types, X-Y recorder.

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors).

UNIT 5

Biomedical Measurements:

Bio signals characteristics – frequency and amplitude ranges. ECG – Einthovens triangle, standard lead system, Principles of EEG,EMG- unipolar and bipolar mode. Recording of ERG, EOG and EGG.

Biochemical sensors – pH, pO2 and pCO2, Ion selective Field effect Transistor (ISFET), Immunologically sensitive FET (IMFET), Blood glucose sensors, Blood gas analyzers - colorimeter, Sodium Potassium Analyser, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description) – Bio Sensors – Principles – amperometric and voltometric techniques.

Text books:

1. "Electronic Instrumentation", H. S. Kalsi, TMH, 2004.
2. "Electronic Instrumentation and Measurements", David A Bell, PHI / Pearson Education 2006 / Oxford Higher Education, 2013.
3. Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, 17^{th} Edition (Reprint 2004), Dhanpat Rai & Co. Pvt. Ltd., 2004.
4. Leslie Cromwell, Biomedical Instrumentation and measurement, 2nd edition, Prentice hall of India, New Delhi, 2015.

Reference Books:

1. "Modern Electronic Instrumentation and Measuring Techniques", Cooper D & A D Helfrick, PHI, 1998.
2. Joseph J. Carr and John M. Brown, Introduction to Biomedical Equipment Technology, Pearson Education, 2004.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, 3^{rd} edition, Tata McGraw-Hill New Delhi, 2014

Course Outcomes:

CO1: Understand instrument characteristics, errors and generalized measurement system.

CO2: Analyze and use the circuits for the measurement of R, L, C, F, I, V etc.

CO3: Use of Ammeters, Voltmeter and Multimeters and CRO for measurement.

CO4: Interpret different signal generator circuits for the generation of various waveforms.

CO5: Demonstrate different biochemical measurement techniques.

SRI VENKATESWARA COLLEGE OF ENGINEERING
(Autonomous)

B.Tech V Sem

L	T	P	C
4	0	0	4

(EC20AMI501) AUTOMOTIVE ELECTRONICS
(Minor)

UNIT-I:

Fundamentals of Automotive Electronics

Components for electronic engine management system, open and closed loop control strategies, PID control, Lookup tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines.

UNIT-II:

Sensors &Actuators

Hall Effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Introduction, basic sensor arrangement, types of sensors, oxygen concentration sensor, lambda sensor, crankshaft angular position sensor, cam position sensor, Mass air flow (MAF) rate, Manifold absolute pressure (MAP), Throttle plate angular position, engine oil pressure sensor, vehicle speed sensor, stepper motors, relays, detonation sensor and emission sensors.

UNIT-III:

Digital Engine Control System

Open loop and close loop control system, engine cooling and warm up control, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control exhaust emission control, on-board diagnostics, diagnostics, future automotive electronic systems, Electronic dash board instruments – Onboard diagnosis system.

UNIT-IV:

SI Engine Management

Feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, three way catalytic converter, conversion efficiency versus lambda. Working of the fuel system components. Advantages of electronic ignition systems. Types of solid state ignition systems and their principle of operation, Contactless electronic ignition system and Electronic spark timing control.

UNIT-V:

CI Engine Management

Fuel injection system, parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced, post injection and retarded post injection. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valve control in electronically controlled systems.

Text Books:

1. Automobile Electrical & Electronic Equipments - Young, Griffitns - Butterworths, London.
2. Understanding Automotive Electronics, Wiliam B. Ribbens, 5th Edition, Newnes, Butterworth–Heinemann.

References:

1. Fundamentals of Automotive Electronics - V.A.W.Hilliers - Hatchin, London.
2. Automotive Computer & Control System – Tom wather J. R., Cland Hunter, Prentice Inc. NJ.

Course Outcomes:

CO1: Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.

CO2: Gain fundamental knowledge to develop electronic controls for automotive subsystems.

CO3: Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.

CO4: Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.

CO5: Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech V Sem

L	T	P	C
4	0	0	4

(EC20AMI502) COMMUNICATION SYSTEMS-II

(Minor)

UNIT I

Optical Fiber Transmission Media:

Introduction, History of optical fiber communications, Optical Fibers vs metallic cable facilities, electromagnetic spectrum, block diagram of an optical fiber communication system, optical fiber types, light propagation, optical fiber configurations, optical fiber classifications, losses in optical fiber cables, light sources, optical sources, light detectors, lasers, optical fiber system link budget.

UNIT II

Microwave Radio Communications and System Gain

Introduction, Advantages and Disadvantages of Microwave radio, Analog vs digital microwave, frequency vs amplitude modulation, frequency modulated microwave radio system, FM microwave radio repeaters, diversity, protection switching arrangements, FM microwave radio stations, microwave repeater station, light of sight path characteristics, microwave radio system gain.

UNIT III

Digital Telephone Transmission:

Pulse Modulation, PCM, PCM Sampling, Signal to Quantization Noise ratio, linear vs nonlinear pcm codes, idle channel noise, coding methods, companding, vocoders, pcm line speed, delta modulation pcm, adaptive delta modulation pcm, differential pcm, pulse transmission, signal power in binary digital signals. Time division multiplexing, frequency division multiplexing, Public Telephone Network: Telephone transmission system environment, public telephone network, instruments, local loops, trunk circuits and exchanges.

UNIT IV

Cellular Telephone Concepts

Mobile Telephone Service, evolution of cellular telephone, cellular telephone, frequency reuse, interference, cell splitting, sectoring, segmentation and dualization, cellular system topology, roaming and handoffs, cellular telephone network components, cellular telephone call processing.

UNIT V

Cellular Telephone Systems

Introduction, First generation analog cellular telephone, personal communications, system, second generation cellular telephone systems, Digital Cellular telephone, interim standard 95 (IS-95), Global system for mobile communications, personal satellite communication systems.

Text Books:

1. W. Tomasi, Advanced Electronic Communication Systems, 6/e, Pearson, 2019.
2. Theodore S. Rappaport: Wireless communication principles and practice, 2/e, Pearson Education, 1990.

References:

1. George Kennedy, Electronic Communication systems, TMGH, 2016.
2. John Bellamy, Digital Telephony, Wiley Publications, 2015.

Course Outcomes:

CO1: Appreciate the importance of microwave signal and learn important microwave devices.

CO2: Describe the working principle of different RADAR systems and their applications.

CO3: Understand the Satellite fundamentals and types of satellite.

CO4: Analyze the working of a Satellite communication system and its inner modules.

CO5: Explain the working principle of Mobile communication and GSM Services.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AMI601) DIGITAL INTEGRTAED CIRCUITS

(ECE)

Course Objectives:

1. Learn the modeling of MOS transistors
2. Learn about the use resistive Load inverter circuits in VLSI.
3. Learn about the calculation of delay times in MOS inverter circuits.
4. Learn about the working principle of two, three and four input CMOS logic circuits.
5. Study the working cycles of DRAM and SRAM cells.

Unit I

Modeling of MOS Transistors using SPICE:

Basic Concepts, The LEVEL 1 Model Equations, The LEVEL 2 Model Equations, The LEVEL 3 Model Equations, Capacitance Models and Comparison of the SPICE MOSFET Models.

Unit II

MOS Inverters: Static Characteristics

Introduction, Resistive-Load Inverter, Inverters with n-Type MOSFET Load and CMOS Inverter.

Unit III

MOS Inverters: Switching Characteristics:

Introduction, Delay-Time Definitions, Calculation of Delay Times, Inverter Design with Delay Constraints.

Unit IV

Combinational and Sequential MOS Logic Circuits:

MOS logic circuits with Depletion nMOS loads, CMOS logic circuits, Complex logic circuits, Behavior of Bistable elements, SR Latch circuit, Clocked latch and Flip-Flop circuits, CMOS D-Latch and Edge–Triggered Flip-Flop.

Unit V

Semiconductor Memories:

Overview of Semiconductor memories, RAM array organization, DRAM-Cell types, Operation of Three-Transistor DRAM cell and One-Transistor DRAM cell, Leakage currents and Refresh operation, SRAM- Various configurations, Full CMOS SRAM cell, Memory structure of SRAM Cell array and Leakage currents.

Text Books:

1. S.M.Kang & Y.Leblebici, "CMOS Digital Integrated Circuits-Analysis and Design" Third edition, McGraw Hill Education (India) Pvt. Ltd., 2020.
2. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.

References:

1. T.C.Carusone, D.A.Johns & K.W.Martin, "Analog Integrated Circuit Design", Second Edition, John Wiley & Sons, Inc., 2019.
2. Kiat Seng Yeo and Kaushik Roy, "Low- Voltage, Low-Power VLSI Subsystems", McGraw Hill Professional Engineering Education, 2018.

Course Outcomes:

CO1: Interpret the various Modelling effects encountered in a MOSFET

CO2: Analyze CMOS inverter circuits using different loads.

CO3: Design a inverter for a specified delay.

CO4: Design two, three and four input CMOS logic circuits.

CO5: Illustrate the working cycles of DRAM and SRAM cells.

SRI VENKATESWARA COLLEGE OF ENGINEERING
(Autonomous)

B.Tech VI Sem

L	T	P	C
4	0	0	4

(EC20AMI602) NANOTECHNOLOGY
(Minor)

Unit-I:

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: Softmagnetic 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, Sol-gel 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:

Tools to Characterize nanomaterials:

X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM).

UNIT-V:

Applications of Nanomaterials:

Nano-electronics, Micro- and Nanoelectromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water- Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications, Concerns and challenges of Nanotechnology.

Text Books:

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wiley India Edition, 2018.

References:

1. Nano: The Essentials by T.Pradeep, McGraw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.

Course Outcomes:

CO1: Explain the fundamental principles of nanotechnology and their application to biomedical engineering.

CO2: Apply engineering and physics concepts to the nano-scale and non-continuum domain.

CO3: Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature.

CO4: Design processing conditions to engineer functional nanomaterials.

CO5: Apply and transfer interdisciplinary systems engineering approaches to the field of bio and nanotechnology projects.

SRI VENKATESWARA COLLEGE OF ENGINEERING
(Autonomous)

B.Tech VII Sem

L	T	P	C
4	0	0	4

(EC20AMI701) DIGITAL IMAGE AND VIDEO PROCESSING
(Minor)

UNIT-I:

Introduction and Image Enhancement:

Digital image fundamentals, Concept of pixels and gray levels, Applications of image processing, Introduction to image enhancement, spatial domain methods: point processing – intensity transformations, histogram processing, image averaging, image subtraction, Spatial filtering- smoothing filters, sharpening filters, Frequency domain methods: low pass filtering, high pass filtering, Homomorphic filtering.

UNIT-II:

Image Restoration:

Introduction to Image restoration, Degradation model, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise reduction by Frequency domain Filtering, Algebraic approaches- Inverse filtering, Wiener filtering, Constrained Least squares restoration. Color Image Processing: Introduction, Fundamentals of Color image processing: Color models- RGB, CMY, YIQ, HSI, Pseudo color image processing – intensity slicing, gray level to color transformation, Basics of Full Color image processing.

UNIT-III:

Image Compression:

Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standards, Wavelet-based image compression.

UNIT-IV:

Image Segmentation:

Introduction to image segmentation, Detection of discontinuities -point, line and edge and combined detection; Edge linking and boundary description - local and global processing using Hough transform, Thresholding, Region oriented segmentation – basic formulation, region growing by pixel aggregation, region splitting and merging.

UNIT-V:

Digital Video & Coding:

Basics of Video, Time-varying Image formation Models, Spatio Temporal Sampling, Optical flow, General methodologies, Overview of coding systems, Video Compression Standards.

Text Books:

1. R. Gonzalez, R.E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education, India, 2019.
2. M. Tekalp, "Digital Video Processing", Prentice-Hall, 2015.

References:

1. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddins,"Digital Image Processing using MAT LAB" , Pearson Edu., 2018.
2. Bovik, "Handbook of Image & Video Processing", Academic Press, 2016.

Course Outcomes:

CO1: Comprehend the image processing fundamentals and enhancement techniques in spatial and frequency domain.

CO2: Describe the color image fundamentals, models and various restoration techniques.

CO3: Design and Analyze the image compression systems.

CO4: Outline the various image segmentation operations.

CO5: Comprehend the basics of video processing and video coding.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech VII Sem

L	T	P	C
4	0	0	4

(EC20AMI604) EMBEDDED SYSTEM DESIGN

(Minor)

UNIT-I:

Embedded Systems Basics:

Introduction to Embedded systems, Examples of embedded systems, Typical Hardware, Gates, Timing Diagrams, Memory, Microprocessors, Buses, Direct Memory Access, Interrupts, Microprocessor Architecture, and Interrupt Basics.

UNIT-II:

8051 Architecture:

Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts.

UNIT-III:

Basic Assembly Language Programming Concepts:

The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

UNIT-IV:

Moving Data:

Introduction, Addressing Modes, External Data Moves, Code Memory Read Only Data Moves, Push and Pop Opcodes, Data Exchanges.

Basic Design Using a Real-Time Operating System:

Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-V:

Applications:

Introduction, keyboards, Human Factor, Key Switch Factors, Keyboard Configurations, Displays, Seven-Segment Numeric Display, D/A and A/D Conversions.

Embedded Software Development Tools:

Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Text Books:

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

References:

1. 8051 Microcontrollers, Satish Shah, Oxford Higher Education.
2. Embedded Microcomputer Systems Real Time Interfacing, Jonathan W. Valvano, Cengage Learning.

Course Outcomes:

CO1: Understand the microprocessor architecture and its components used in embedded systems.

CO2: Write the 8051 assembly language code for specific purposes.

CO3: Implement code for interfacing various devices.

CO4: Develop simple embedded systems for real time operations.

CO5: Compose simple embedded system with error free software to obtain target system.

B.Tech IV Sem	L	T	P	C
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(EC20AMI403) INTRODUCTION TO SIGNAL PROCESSING
(Minor)

Unit I

Signals & Systems:

Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Fourier series: Trigonometric & Exponential, concept of discrete spectrum, Illustrative Problems.

Unit II

Continuous Time Fourier Transform:

Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Unit III

Discrete Time Fourier Transform:

Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Unit IV

Laplace Transform:

Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions.

Z–Transform:

Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z- Transform, System analysis, Transfer function, Solution of difference equations with initial conditions, Illustrative Problems.

Unit V

Discrete Fourier Transform:

Discrete Fourier series, Properties of Discrete Fourier series, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Properties of DFT.

Fast Fourier Transforms:

Efficient computation of DFT algorithms - Radix 2-Decimation- in-Time & Decimation-in-Frequency algorithms, Inverse FFT, Illustrative problems.

Text Books:

1 A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd Edition, PHI, 2009.

2 John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," Pearson Education/PHI, 4th ed., 2007.

References:

1 B P Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford University Press, 015.

2 Simon Haykin and Van Veen, "Signals & Systems", 2nd Edition, Wiley, 2005.

3 Avtar Singh and S. Srinivasan, "Digital Signal Processing," Thomson Publications, 2004.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech IV Sem

L	T	P	C
4	0	0	4

(EC20AMI402)ELECTRONIC INSTRUMENTATION

(Minor)

Course Objectives:

1. Understand the measurement of electrical parameters such as voltage, current, resistance.
2. Apply the basic concepts signals to illustrate working of CRO and signal generators
3. Design of Ammeters, Voltmeter and Multimeters
4. Analyze the working of Display Devices and Recorders in practical fields.
5. Learn the different measurement techniques for non-physiological parameters.

UNIT 1

Measurements: Introduction, Functions of instruments and measurement systems, Applications of measurement systems. Static & dynamic characteristics. Measurement Errors: Introduction Gross errors and systematic errors, Absolute and relative errors, Measurement error combinations. Basic concepts of accuracy, Precision, Resolution and Significant figures.

UNIT 2

Ammeters, Voltmeter and Multimeters: Introduction, DC ammeter principle only, DC voltmeter, Multi-range voltmeter, Extending voltmeter ranges, Loading. Digital Voltmeters: Introduction, Ramp type, Dual slope integrating type (V–T), integrating type (V–F) and Successive approximation type (relevant problems). Digital Instruments: Introduction, Block diagram of a Basic Digital Multimeter. Digital frequency meters.

UNIT 3

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working CRO, Typical CRT connections, Dual beam and dual trace CROs, Special Oscilloscopes: Analog storage oscilloscopes, Digital storage oscilloscopes Sampling Oscilloscope.

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Modern laboratory signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator.

UNIT 4

Display Devices and Recorders:

Introduction, Segmental Displays: Seven segmental display, dot matrices, LED, LCD, decade counting assemblies, display systems. Recorders: Recording requirements, analog recorders-Graphic recorders, strip chart recorders & its types, X-Y recorder.

Sensors and Transducers –

Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors).

UNIT 5

Biomedical Measurements:

Bio signals characteristics – frequency and amplitude ranges. ECG – Einthovens triangle, standard lead system, Principles of EEG,EMG- unipolar and bipolar mode. Recording of ERG, EOG and EGG.

Biochemical sensors –

pH, pO2 and pCO2, Ion selective Field effect Transistor (ISFET), Immunologically sensitive FET (IMFET), Blood glucose sensors, Blood gas analyzers -colorimeter, Sodium Potassium Analyser, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description) – Bio Sensors – Principles – amperometric and voltometric techniques.

Text books:

1. Electronic Instrumentation, H. S. Kalsi, TMH, 2004.
2. Electronic Instrumentation and Measurements, David A Bell, PHI / Pearson Education 2006 / Oxford Higher Education, 2013.
3. Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, 17^{th} Edition (Reprint 2004), Dhanpat Rai & Co. Pvt. Ltd., 2004.
4. Leslie Cromwell, Biomedical Instrumentation and measurement, 2^{nd} edition, Prentice hall of India, New Delhi, 2015.

Reference Books:

1. "Modern Electronic Instrumentation and Measuring Techniques", Cooper D & A D Helfrick, PHI, 1998.
2. Joseph J. Carr and John M. Brown, Introduction to Biomedical Equipment Technology, Pearson Education, 2004.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, 3^{rd} edition, Tata McGraw-Hill New Delhi, 2014

Course Outcomes:

CO1: Understand instrument characteristics, errors and generalized measurement system.

CO2: Analyze and use the circuits for the measurement of R, L, C, F, I, V etc.

CO3: Use of Ammeters, Voltmeter and Multimeters and CRO for measurement.

CO4: Interpret different signal generator circuits for the generation of various waveforms.

CO5: Demonstrate different biochemical measurement techniques.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech V SEM	**L**	**T**	**P**	**C**
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(EC20AMI401) COMMUNICATION SYSTEMS-I

(Minor)

UNIT-I:

Amplitude Modulation

Time-Domain Description, Frequency domain description, Generation of AM waves, Detection of AM waves, AM/DSB, Time-Domain Description, Frequency domain description Generation of DSBSC waves, Coherent Detection of DSBSC Modulated waves, Costas loop, Quadrature Carrier multiplexing, Comparison of amplitude modulation techniques, frequency translation, FDM.

UNIT-II:

Angle Modulation

Basic Concepts, Frequency Modulation, Spectrum Analysis Of sinusoidal FM wave, NBFM,WBFM, Constant Average power, Transmission bandwidth of FM waves, Generation of FM waves, Direct FM, demodulation of FM waves, frequency discriminator, ZCD, phase locked loop (1st order) comparison of AM and FM.

UNIT-III:

Noise in Analog Modulation Systems

Signal-to-noise ratios, AM receiver model, DSBSC receiver, noise in AM receivers using envelope detection, threshold effect, FM receiver model, noise in FM reception, FM threshold effect, pre-emphasis and de-emphasis in FM systems.

UNIT-IV:

Pulse Modulation

Sampling theorem for low-pass and band-pass signal, statement and proof, PAM, Channel Bandwidth for a PAM signal, natural sampling, flat-top sampling, signal recovery through holding, quantization of signals, quantization error, PCM, electrical representations of binary digits, PCM systems, DPCM , delta Modulation, Adaptive delta modulation.

UNIT-V:

Digital Modulation

Introduction, Binary Shift Keying, DPSK, QPSK, QPSK transmitter, QPSK receiver, signal space representation, BFSK, spectrum, receiver for BFSK, line codes, TDM. Application of analog/digital communication in Instrumentation and Automation.

Text Books:

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2017.
2. S. Haykin "Digital Communications" John Wiley 2015.

References:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2017.
2. H P Hsu, "Analog and Digital Communications", Schaum's Outline Series TMH 2016.

Course Outcomes:

CO1: Define, understand and explain the concept of modulation, demodulation, figure of merit ,sampling, quantization, multiplexing.

CO2: Apply the knowledge of basic systems to articulate the building blocks of the given analog/digital communication system and derive figure of merit for the system.

CO3: Analyze interaction among various blocks of a given analog/digital communication system to obtain waveform at different points for given specifications and obtain noise performance parameters.

CO4: Design and decide the modulators, demodulators, sampling rate, type of encoding for given specifications of analog/digital communication systems.

CO5: Design the modulator-demodulator for the given analog/digital communication system using modern tools.

SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous)

B.Tech V SEM

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(EC20AMI504) MATLAB PROGRAMMING

(Minor)

UNIT-I:

Introduction to MATLAB

MATLAB Interactive Sessions, Menus and the toolbar, computing with MATLAB, Script files and the Editor Debugger, MATLAB Help System, Programming in MATLAB.

UNIT-II:

Arrays

Arrays, Multidimensional Arrays, Element by Element Operations, Polynomial Operations Using Arrays, Cell Arrays, Structure Arrays.

UNIT-III:

Functions & Files:

Elementary Mathematical Functions, User Defined Functions, Advanced Function Programming, Working with Data Files.

UNIT-IV:

Programming Techniques:

Program Design and Development, Relational Operators and Logical Variables, Logical Operators and Functions, Conditional Statements, Loops, the Switch Structure, Debugging Mat Lab Programs.

Plotting :XY- plotting functions, Subplots and Overlay plots, Special Plot types, Interactive plotting, Function Discovery, Regression, 3-D plots.

UNIT-V:

Linear Algebraic Equations:

Elementary Solution Methods, Matrix Methods for (Linear Equations), Cramer's Method, Undetermined Systems, Order Systems.

Text Books:

1. G. H. Golub and C. F. Van Loan, Matrix Computations, 3rd Ed., Johns Hopkins University Press, 2014.
2. Delores M. Etter, David C. Kuncicky, Holly Moore, “Introduction to MATLAB 7.0”, Pearson, 2018.

References:

1. RudraPratap, “Getting Started with MATLAB”, OXFORD University Press, 2017.
2. Agam Kumar Tyagi, “MATLAB and Simulink for Engineers”, University Press, 2019.

Course Outcomes:

CO1: Use MATLAB Tool and help system to solve problems.

CO2: Analyze the concepts of Arrays and examine the Operations in MATLAB.

CO3: Develop various Functions and Files in MATLAB Programming.

CO4: Develop MATLAB programming techniques using logical and conditional operators.

CO5: Solve Linear Equations using MATLAB.

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(Autonomous)

B.Tech VI SEM

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(EC20AMI604) EMBEDDED SYSTEM DESIGN

(Minor)

UNIT-I:

Embedded Systems Basics:

Introduction to Embedded systems, Examples of embedded systems, Typical Hardware, Gates, Timing Diagrams, Memory, Microprocessors, Buses, Direct Memory Access, Interrupts, Microprocessor Architecture, and Interrupt Basics.

UNIT-II:

8051 Architecture:

Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts.

UNIT-III:

Basic Assembly Language Programming Concepts:

The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051.

UNIT-IV:

Moving Data:

Introduction, Addressing Modes, External Data Moves, Code Memory Read Only Data Moves, Push and Pop Opcodes, Data Exchanges.

Basic Design Using a Real-Time Operating System:

Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-V:

Applications:

Introduction, keyboards, Human Factor, Key Switch Factors, Keyboard Configurations, Displays, Seven-Segment Numeric Display, D/A and A/D Conversions.

Embedded Software Development Tools:

Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Text Books:

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

References:

1. 8051 Microcontrollers, Satish Shah, Oxford Higher Education.
2. Embedded Microcomputer Systems Real Time Interfacing, Jonathan W. Valvano, Cengage Learning.

Course Outcomes:

CO1: Understand the microprocessor architecture and its components used in embedded systems.

CO2: Write the 8051 assembly language code for specific purposes.

CO3: Implement code for interfacing various devices.

CO4: Develop simple embedded systems for real time operations.

CO5: Compose simple embedded system with error free software to obtain target system.

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B. Tech- VI Sem **L T P C**

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(EC20AMI605) INTRODUCTION TO CMOS VLSI DESIGN

(Minor)

Course Objectives:

1. Learn about the various MOSFET models.
2. Learn about the implementation of logic functions using CMOS.
3. Study the design principles involved in the design of Combinational circuits.
4. Study the design principles involved in the design of Sequential circuits.
5. Learn about the Testing concepts in VLSI Chip design.

UNIT 1

MOS Transistor Theory: Introduction, Long-Channel I-V Characteristics and C-V Characteristics, Simple MOS Capacitance Models, Detailed MOS Gate Capacitance Model, Detailed MOS Diffusion Capacitance Model, Non-deal I-V Effects, Mobility Degradation and Velocity Saturation, Channel Length Modulation, Threshold Voltage Effects, Leakage, Temperature Dependence and Geometry Dependence.

UNIT II

CMOS Logic and Fabrication: CMOS Logic - The Inverter, The NAND Gate, CMOS Logic Gates, The NOR Gate, Compound Gates, Pass Transistors and Transmission Gates, Tristates, Multiplexers, and Sequential Circuits.

CMOS Fabrication-Inverter Cross-Section and Fabrication Process.

UNIT III

Combinational circuit design: Introduction, Circuit Families- Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits and Pass-Transistor Circuits.

UNIT IV

Sequential circuit design: Circuit Design of Latches and Flip-Flops, Conventional CMOS Latches, Conventional CMOS Flip-Flops, Pulsed Latches, Resettable Latches and Flip-Flops, Enabled Latches and Flip-Flops, Incorporating Logic into Latches, Klass Semi-dynamic Flip-

Flop (SDFF), Differential Flip-Flops, Dual Edge-Triggered Flip-Flops, Radiation-Hardened Flip-Flops, True Single-Phase-Clock (TSPC) Latches and Flip-Flops.

UNIT V

Testing and Verification: Introduction- Logic Verification and Manufacturing Tests , Testers and Test Fixtures, Test Programs, and Handlers, Test Vectors, Test benches and Harnesses and Regression Testing.

Manufacturing Test Principles- Fault Models, Observability, Controllability, Repeatability, Survivability, Fault Coverage, Automatic Test Pattern Generation and Delay Fault Testing.

Design for Testability: Ad Hoc Testing, Scan Design, Built-In Self-Test (BIST) and IDDQ Testing.

Text Books:

1. Neil H. E. Weste & D.M.Harris, "CMOS VLSI Design-A Circuits and Systems Perspective", Fourth edition, Pearson Edition, 2020.
2. K.Eshraghian, D.A. Pucknell and S.Eshraghian, "Essentials of VLSI Circuits and Systems", Third Edition, PHI Learning Pvt. Ltd., 2019.

References:

1. Mead, C.A and Conway, L.A., "Introduction to VLSI Systems", Addison –Wesley, USA, 1980.
2. W.Wolf "Modern VLSI Design IP based design" Fourth edition, PHI Learning Pvt. Ltd., 2020.

Course Outcomes:

CO1: Summarize the modeling effects of MOSFET.

CO2: Implement various logic functions using CMOS logic.

CO3: Design CMOS based Switching circuits.

CO4: Design CMOS based Flip-flops.

CO5: Develop algorithms for automatic test generation for combinational and sequential circuits.

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(Autonomous)

B.Tech VII SEM

L	T	P	C
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(EC20AMI501) AUTOMOTIVE ELECTRONICS
(Minor)

UNIT-I:

Fundamentals of Automotive Electronics

Components for electronic engine management system, open and closed loop control strategies, PID control, Lookup tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines.

UNIT-II:

Sensors & Actuators

Hall Effect, hot wire, thermistor, piezo electric, piezoresistive, based sensors. Introduction, basic sensor arrangement, types of sensors, oxygen concentration sensor, lambda sensor, crankshaft angular position sensor, cam position sensor, Mass air flow (MAF) rate, Manifold absolute pressure (MAP), Throttle plate angular position, engine oil pressure sensor, vehicle speed sensor, stepper motors, relays, detonation sensor and emission sensors.

UNIT-III:

Digital Engine Control System

Open loop and close loop control system, engine cooling and warm up control, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control exhaust emission control, on-board diagnostics, diagnostics, future automotive electronic systems, Electronic dash board instruments – Onboard diagnosis system.

UNIT-IV:

SI Engine Management

Feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, three way catalytic converter, conversion efficiency versus lambda. Working of the fuel system components. Advantages of electronic ignition systems. Types of solid state ignition systems and their principle of operation, Contactless electronic ignition system and Electronic spark timing control.

UNIT-V:

CI Engine Management

Fuel injection system, parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced, post injection and retarded post injection. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valve control in electronically controlled systems.

Text Books:

1. Automobile Electrical & Electronic Equipments - Young, Griffitns - Butterworths, London.
2. Understanding Automotive Electronics, Wiliam B. Ribbens, 5th Edition, Newnes, Butterworth–Heinemann.

References:

1. Fundamentals of Automotive Electronics - V.A.W.Hilliers - Hatchin, London.
2. Automotive Computer & Control System – Tomwather J. R., Cland Hunter, Prentice Inc. NJ.

Course Outcomes:

- **CO1:** Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
- **CO2:** Gain fundamental knowledge to develop electronic controls for automotive subsystems.
- **CO3:** Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.
- **CO4:** Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.
- **CO5:** Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems.

B. Tech- VII SEM

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(EC20AMI702) INTRODUCTION TO IoT
(Minor)

Course Objectives:
1. Study about the genesis and impact of IoT applications, architectures in real world.
2. Learn about the diverse methods of deploying smart objects and connect them to network.
3. Study different Application protocols for IoT.
4. Study the role of Data Analytics and Security in IoT.
5. Learn about the sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry

UNIT 1

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

UNIT II

Smart Objects- The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

UNIT III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

UNIT IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

UNIT V

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using RaspberryPi Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture. Smart City Security Architecture, Smart City Use-Case Examples.

Textbooks:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1^{st} Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017.

References:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1^{st} Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Course Outcomes:

CO1: Interpret the impact and challenges posed by IoT networks leading to new architectural models.

CO2: Compare and contrast the deployment of smart objects and the technologies to connect them to network.

CO3: Appraise the role of IoT protocols for efficient network communication.

CO4: Elaborate the need for Data Analytics and Security in IoT.

CO5: Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.