Bapatla Engineering College

(*Autonomous*)

BAPATLA

B.Tech

Electronics and Communications Engineering

Curriculum Effective from A.Y. 2018-19 (R18 Regulations)

Bapatla Engineering College:: Bapatla

(Autonomous under Acharya Nagarjuna University)

(Sponsored by Bapatla Education Society)

BAPATLA - 522102 Guntur District, A.P., India

www.becbapatla.ac.in

Bapatla Engineering College::Bapatla

(Autonomous)

Department of Electronics and Communications Engineering

COURSE STRUCTURE

Course Structure Summary:

S.No.	Category	Proposed	Percentage
1	Humanities & Social Science including Management Courses	9	5.38%
2	Basic Science Courses	23	13.7%
3	Engineering Science Courses	18	10.77%
4	Professional Core Courses	74	44.31%
5	Professional Elective Courses	15	8.98%
6	Open Elective Courses	12	7.18%
7	Project work, seminar and internship in industry or elsewhere	12	7.18%
8	Industry Internship	2	1.19%
9	MOOCs	2	1.19%
	Total:-	**167**	**100**

Semester wise Credits

SEMESTER	Credits
SEMESTER – I	17
SEMESTER – II	18
SEMESTER – III	22
SEMESTER – IV	24
SEMESTER – V	24
SEMESTER – VI	19
SEMESTER – VII	24
SEMESTER – VIII	19
Total	**167**

BAPATLA ENGINEERING COLLEGE: BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

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Effective from the Academic Year2018-2019(R18 Regulations)

First Year B.Tech (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA001	Linear Algebra and ODE	4	0	0	4	50	50	100	3
18PH001	Waves and Modern Physics	4	0	0	4	50	50	100	3
18CY001	Engineering Chemistry	4	0	0	4	50	50	100	3
18CE001	Environmental Studies	3	0	0	3	50	50	100	2
18CS001	Problem Solving with Programming	4	0	0	4	50	50	100	3
18CYL01	Engineering Chemistry Lab	0	0	3	3	50	50	100	1
18ECL12	Hardware Lab	0	0	3	3	50	50	100	1
18CSL01	Problem Solving with Programming Lab	0	0	3	3	50	50	100	1
	TOTAL	19	0	9	28	400	400	800	17

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electronics and Communications Engineering

Effective from the Academic Year2018-2019(R18 Regulations)

First Year B.Tech (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA002	Numerical Methods and Advanced Calculus	4	0	0	4	50	50	100	3
18EC202	Basic Instrumentation	4	0	0	4	50	50	100	3
18EC203	Programming with C ++	4	0	0	4	50	50	100	3
18EL001	Communicative English	3	0	0	3	50	50	100	2
18EC205	Circuit Theory	4	1	0	5	50	50	100	4
18PHL01	Physics lab	0	0	3	3	50	50	100	1
18ECL22	Programming with C ++ Lab	0	0	3	3	50	50	100	1
18ELL01	English Communication and Skills Lab	0	0	3	3	50	50	100	1
	TOTAL	19	1	9	29	400	400	800	18

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

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Effective from the Academic Year2018-2019 (R18 Regulations)

Second Year B.Tech (SEMESTER – III)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA003	Probability and Statistics	4	0	0	4	50	50	100	3
18EC302	Data Structures using Python	4	0	0	4	50	50	100	3
18EC303	Electronic Devices and Circuits	4	0	0	4	50	50	100	3
18EC304	Electromagnetic Field Theory	4	1	0	5	50	50	100	4
18EC305	Digital Electronics	4	1	0	5	50	50	100	4
18EL002	Technical English	3	0	0	3	50	50	100	2
18ECL31	Data Structures using Python Lab			3	3	50	50	100	1
18ECL32	Electronic Devices & Digital Electronics Lab			3	3	50	50	100	1
18ECL33	PSPICE Lab			3	3	50	50	100	1
	TOTAL	23	2	9	34	450	450	900	22

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

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Effective from the Academic Year2018-2019 (R18 Regulations)

Second Year B.Tech (SEMESTER – IV)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA004	Complex Variables and Special Functions	4	0	0	4	50	50	100	3
18EC402	Electronic Circuit Analysis	4	0	0	4	50	50	100	3
18EC403	EM Waves and Transmission Lines	4	1	0	5	50	50	100	4
18EC404	Signals & Systems	4	1	0	5	50	50	100	4
18EC405	Digital Design Using HDL	4	1	0	5	50	50	100	4
18EC406	Professional Ethics and Human Values	4	0	0	4	50	50	100	3
18ECL41	Electronic Circuits Lab			3	3	50	50	100	1
18ECL42	HDL Lab			3	3	50	50	100	1
18ECL43	Signals and Systems lab			3	3	50	50	100	1
	TOTAL	24	3	9	36	450	450	900	24

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

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Effective from the Academic Year2018-2019 (R18 Regulations)

Third Year B. Tech (SEMESTER – V)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18EC501	Linear Integrated Circuits	4	0	0	4	50	50	100	3
18EC502	Linear Control Systems	4	1	0	5	50	50	100	4
18EC503	Microprocessors and Microcontrollers	4	0	0	4	50	50	100	3
18EC504	Digital Signal Processing	4	0	0	4	50	50	100	3
18EC505	Analog and Digital Communications	4	0	0	4	50	50	100	3
18ECD11,..,14	Elective-1	4	0	0	4	50	50	100	3
18ECL51	Microprocessors and Microcontrollers programming lab			3	3	50	50	100	1
18ECL52	Linear Integrated Circuits Lab			3	3	50	50	100	1
18ECL53	Analog and Digital Communications Lab			3	3	50	50	100	1
18ECMOOC1	MOOCs								2*
	TOTAL	24	1	9	34	450	450	900	**24**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

* Means No Classwork / Exam.

Elective-I

18ECD11: Computer Organization & Architecture
18ECD12: Data Communication and Computer Networks
18ECD13: Programming with JAVA
18ECD14: Pulse and Switching Circuits

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Third Year B. Tech (SEMESTER – VI)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18EC601	Constitution of India	4	0	0	4	50	50	100	0
18EC602	Internet of Things	4	1	0	5	50	50	100	4
18EC603	Digital Image Processing	4	0	0	4	50	50	100	3
18EC604	Antenna and Wave Propagation	4	0	0	4	50	50	100	3
18EC605	VLSI Design	4	0	0	4	50	50	100	3
18ECD21,…,24	Elective – II	4	0	0	4	50	50	100	3
18ECL61	Signal and Image Processing using SCI Lab			3	3	50	50	100	1
18ECL62	Internet of Things Lab			3	3	50	50	100	1
18ELL02	Soft Skills Lab			3	3	50	50	100	1
	TOTAL	24	1	9	34	450	450	900	**19**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

Elective – II

18ECD21: Artificial Intelligence

18ECD22: Information Theory and Coding

18ECD23: Embedded System Design

18ECD24: Telecommunication Switching Systems and Networks

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electronics and Communications Engineering

Effective from the Academic Year2018-2019 (R18 Regulations)

Fourth Year B. Tech (SEMESTER – VII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18ME002	Industrial Management and Entrepreneurship Development	4	0	0	4	50	50	100	3
18EC701	Microwave and Radar Engineering	4	0	0	4	50	50	100	3
18EC702	Wireless and Mobile Communications	4	0	0	4	50	50	100	3
18EC703	Fiber Optics Communications	4	0	0	4	50	50	100	3
18ECD31,…,34	Elective - III	4	0	0	4	50	50	100	3
18—I--	Institutional Elective - I	4	0	0	4	50	50	100	3
18ECL71	Fiber Optic and Microwave Engineering Lab			3	3	50	50	100	1
18ECL72	Wireless and Mobile Communications Lab			3	3	50	50	100	2
18ECP01	Term Paper			3	3	50	50	100	2
18ECII1	Internship					100		100	2*
	TOTAL	20	0	9	29	500	400	900	**24**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

Elective – III

18ECD31: Introduction to Nano-Science and Nanotechnology

18ECD32: Machine Learning

18ECD33: Bio-Medical Instrumentation

18ECD34: Pattern Recognition and Application

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Electronics and Communications Engineering

Effective from the Academic Year2018-2019 (R18 Regulations)

Fourth Year B. Tech (SEMESTER – VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18ECD41,…,44	Elective –IV	4	0	0	4	50	50	100	3
18—I--	Institutional Elective – II	4	0	0	4	50	50	100	3
18ECD51,…,54	Elective – V	4	0	0	4	50	50	100	3
18ECP02	Project Work - II			12	12	75	75	150	10
	TOTAL	12	0	12	24	225	225	450	**19**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

Elective –IV

18ECD41: Wireless Adhoc and Sensor Networks
18ECD42: Robotics
18ECD43: MEMS
18ECD44: Satellite Communications

Elective – V

18ECD51: Advanced DSP
18ECD52: Artificial Neural Networks
18ECD53: Software Defined Radio
18ECD54: FPGA Design for Embedded Systems

Institutional Elective – 1

1. 18CE101 AIR POLLUTION & CONTROL
2. 18CE102 RURAL WATER SUPPLY AND ENVIRONMENT SANITATION
3. 18CS101 JAVA PROGRAMMING
4. 18CS102 DATABASE MANAGEMENT SYSTEM
5. 18ECI01 DIGITAL IMAGE PROCESSING
6. 18ECI02 EMBEDDED SYSTEMS
7. 18EEI01 APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS
8. 18EEI02 INDUSTRIAL ELECTRICAL SYSTEMS
9. 18EII01 PRINCIPLES & APPLICATIONS OF MEMS
10. 18EII02 POWER PLANT INSTRUMENTATION
11. 18ITI01 INTRODUCTION TO DATA ANALYTICS
12. 18ITI02 CYBER SECURITY

13. 18ME101 FLUID POWER & CONTROL SYSTEMS
14. 18ME102 PROJECT MANAGEMENT
15. 18MA006 GRAPH THEORY
16. 18PH101 NANO MATERIALS AND TECHNOLOGY
17. 18PH102 FIBER OPTICS COMMUNICATIONS
18. 18EL003 PROFESSIONAL COMMUNICATION
19. 18NC001 NCC (NATIONAL CADET CORPS)

Institutional Elective – II

1. 18CE103 DISASTER MANAGEMENT
2. 18CE104 REMOTE SENSING &GIS
3. 18CS103 PYTHON PROGRAMMING
4. 18CS104 COMPUTER NETWORKS
5. 18ECI03 WIRELESS COMMUNICATIONS
6. 18ECI04 ARTIFICIAL NEURAL NETWORKS
7. 18EEI03 HIGH VOLTAGE ENGINEERING
8. 18EEI04 ELECTRICAL ENERGY CONSERVATION & AUDITING
9. 18EII03 ROBOTICS AND AUTOMATION
10. 18EII04 SENSORS AND SIGNAL CONDITIONING
11. 18ITI03 MOBILE APPLICATION DEVELOPMENT
12. 18ITI04 WEB TECHNOLOGIES
13. 18ME103 NON-CONVENTIONAL ENERGY SOURCES
14. 18ME104 AUTOMOBILE ENGINEERING
15. 18PH103 ADVANCED MATERIALS
16. 18PH104 OPTO ELECTRONIC DEVICES AND APPLICATIONS
17. 18EL004 ENGLISH FOR COMPETITIVE EXAMINATIONS
18. 18NC001 NCC (NATIONAL CADET CORPS)

Linear Algebra and ODE
I B.Tech –I Semester (Code: 18MA001)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives:

CO1: To learn about solving a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors.

CO2: Identify the type of a given differential equation and select and apply the appropriateanalytical technique for finding the solution of first order and higher order ordinary differential equations.

CO3: Create and analyze mathematical models using first and second order differential equationsto solve application problems that arises in engineering.

CO4: To learn about solving linear Differential equations with constant coefficients with the given initial conditions using Laplace transform technique.

Course Outcomes: Students will be able to

CLO-1: Apply elementary row operations to find the rank of a matrix, to solve a system of linear equations and to find the inverse of a matrix.

CLO-2: Find the Eigen values and Eigen vectors of the given square matrix and also compute the higher powers of the given matrix.

CLO-3: Solve separable, linear, exact differential equations with and without initial conditions.

CLO-4: Distinguish between linear and non-linear differential equation.

CLO-5: Write the piecewise continuous functions in terms of unit step functions and hence find itsLaplace transforms.

CLO-6: Solve linear differential equation with constant coefficients and unit step input functions usingLaplace transforms technique.

SYLLABUS

UNIT – I

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values(without proofs); Cayley-Hamilton theorem (without proof).

[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.] [12 Hours]

UNIT - II

Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations; Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation M dx+ N dy=0.

Applications of a first order Differential equations: Newton's law of cooling; Rate of decay ofRadio-active materials.

[Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8] [12 Hours]

UNIT – III

Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementaryfunction; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation;

Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits.

[Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5][12 Hours]

UNIT – IV

Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms.

[Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1] [12 Hours]

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

WAVES AND MODERNPHYSICS
(ENGINEERINGPHYSICS-1)
I B.TECH – I SEMESTER (CODE-18PH001)

(Common for ECE, EEE, EIE)

Lectures	**4**	Tutorial	**0**	Practical	**0**	Credits	**3**
Continuous Internal Assessment			**50**	Semester End Examination (3hours)			**50**

COURSE OBJECTIVES

CO1: To familiarize the students in getting knowledge about modern optics and their Engineering applications.
CO2: To make aware of the students to obtain circuit knowledge regarding electrical, Electronics and Magnetism.
CO 3: To make the students to understand the quantum theory and solving the various Physical problems using quantum mechanics.
CO 4: To get the knowledge of various methods of analytical techniques for material testing.

COURSE OUTCOMES:

Student will be able to
CLO1: Learn about principle and working of different types of lasers and their applications.CLO2: Know about principle, types of optical fibres of their importance in communication.
CLO3: Analyze the electromagnetic principles in electrical and electronic circuits and Maxwell's equations.
CLO4: Study about quantum mechanics and its applications.
CLO5: Read about properties and applications of ultrasonic in various fields.CLO6: Know about radio isotopes and their applications.

SYLLABUS

UNIT-I
(ADVANCED OPTICS)

Lasers: Interaction of radiation with matter. Einstein co-efficients, Properties of laser,Population inversion, LASER principle, pumping schemes-Three level and four level laser, ypes of lasers: solid-state lasers (Ruby), gas lasers (He-Ne), Semiconductor lasers; applications of lasers in industry and medicine.
Fibre Optics: Importance of optical fibre, Structure and principle of optical fibre, acceptance angle and numerical aperture, Types of optical fibres based on modes and refractive index, V-number, losses associated with optical fibres, , fibre optical communication, advantages of optical fibres

UNIT-II
(ELECTRO-MAGNETIC INDUCTION AND MAXWELL'S EQUATIONS)

Maxwell's equations in vacuum and conducting medium. Velocity of electromagnetic wave in vacuum. Electromagnetic oscillations in LC circuit, LCR series resonance in A.C circuit and resonant frequency, Quality factor. Concept of skin effect, Energy in an electromagnetic field; Flow of energy and Poynting vector. Principle of circulating charge and cyclotron, Hall Effect.

UNIT-III
(MODERN PHYSICS)

Dual nature of light, Debroglie concept of matter waves, Davission-Germer experiment, Heisenberg uncertainty principle and applications (non existence of electron in nucleus and finite width of spectral lines), one dimensional time independent and dependent Schrodinger wave equation, physical significance of wave

function, application of Schrödinger wave equation to particle in a one dimensional potential box, concept of quantum tunnelling and construction and working of Scanning Tunnelling Electron Microscope.

UNIT-IV
(ANALYTICAL TECHNIQUES)

Ultrosonics: Properties of ultrasonics, Production of ultrasonic waves by magnetostriction and piezo-electric method, Determination of velocity of ultrasonic wave in liquids by Ultrasonic interferometer. Medical applications, Ultrasonic Imaging technique(Doppler Ultrasound Imaging advantages and limitations), industrial applications, NDT : Pulse echo technique, Time of flight diffraction technique.
Nuclear Techniques: Radio isotopes and its applications (medical and Industrial), GM counter, Scintillation counter.

Text Books:

1. Engineering physics M.V. Avadhanulu, P.G.Kshirsagar S.Chand & Company Pvt. Ltd.
2. Engineering physics, Palani Swamy, Scitech publication
3. Reference books: 1. Basic engineering physics – Dr. P.srinivasa Rao, Dr.K.Muralidhar, Himalaya Publication
4. Applied physics - Dr. P. Srinivasa Rao, Dr. K. Muralidhar, Himalaya publication

ENGINEERING CHEMISTRY
I B.TECH – I SEMESTER (Code: 18CY001)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			50	Semester End Examination (3hours)			50

PREREQUISITES: None

COURSE OBJECTIVES: The student should be conversant:

CO1: With the principles of water characterization and treatment of water for industrial purposesand methods of producing water for potable purposes.
CO2: To understand the thermodynamic concepts, energy changes, concept of corrosion & itscontrol.
CO3: With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge ofknocking and anti-knocking characteristics.
CO4: With aim to gain good knowledge of organic reactions, plastics, conducting polymers &biodegradable polymers.

COURSE OUTCOME: After studying this course, students will be able to:

CLO-1: Develop innovative methods to produce soft water for industrial use and potable water atcheaper cost.
CLO-2: Apply their knowledge in converting various energies of different systems and protection ofdifferent metals from corrosion.
CLO-3: Have the capacity of applying energy sources efficiently and economically for variousneeds.
CLO-4: Design economically and new methods of organic synthesis and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.

SYLLABUS

UNIT I: Water Chemistry

Introduction: water quality parameters
Characteristics: Alkalinity, Hardness - Estimation & simple neumerical problems,
Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;
Internal conditioning - phosphate, calgon and carbonate methods.
External conditioning - Ion exchange process & Zeolite proess
WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration. Disinfection methods: Chlorination, ozonization and UV treatment.
Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.

UNIT II

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Freeenergy and emf. Cell potentials, the Nernst equation and applications.

Corrosion: Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion, **Corrosion control** – Cathodic protection, and electro plating (Au) & electoless Ni plating.

UNIT III: Fuels

Classification of fuels; Calorific value of fuels (lower, higher)

Solid fuels: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking,

Liquid Fuels: Petroleum refining and fractions, composition and uses. Knocking and anti- knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages

Gaseous fuels: CNG and LPG, Flue gas analysis – Orsat apparatus.

UNIT IV

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution (SN^1, SN^2), addition (Markownikoff's and anti-Markwnikoff's rules) , elimination ($E1$ & $E2$), Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)

Polymers: Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications**.** Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC.

Bio degradable polymers: types, examples-Polyhydroxy buterate (PHB), Polyhydroxy buterate-co-β-hydroxy valerate (PHBV), applications.

TEXT BOOKS:

1. P.C. Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi 17th edition (2017).
2. Seshi Chawla, "Engineering Chemistry" Dhanpat Rai Pub, Co LTD, New Delhi 13 th edition, 2013.

REFERENCES:

1 Essential Of Physical Chemistry by Arun Bahl, B.S. Bahl, G.D.Tuli, by Arun Bahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th Edition, 2012.

2 Text Book of Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

3 Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

Environmental Studies
I B.Tech – I Semester (Code: 14CE001)

Lectures	3	Tutorial	0	Practical	0	Credits	2		
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50				

Prerequisites: None

Course Objectives: To learn

CO1: To develop an awareness, knowledge, and appreciation for the natural environment.
CO2: To understand different types of ecosystems exist in nature.
CO3: To know our biodiversity.
CO4: To understand different types of pollutants present in Environment.
CO5: To know the global environmental problems.

Course Outcomes: Students will be able to

CLO 1: Develop an appreciation for the local and natural history of the area.
CLO 2: Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.
CLO 3: Know how to manage the harmful pollutants.
CLO 4: Gain the knowledge of Environment.
CLO 5: Create awareness among the youth on environmental concerns important in the long-term interest of the society

SYLLABUS

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic(Marine, pond and estuaries).
Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. Chipko movement case study

UNIT – II

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. **Forest**: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. **Water**: Uses, floods and drought, Dams - benefits and problems.

Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. Silent Valley Project and Narmada Bachao Andolan case studies 8 periods **Sustainability:** Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management.6 periods + 6 hours fieldwork/Demonstration

UNIT – III

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Chernobyl Nuclear Disaster case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermicomposting. 12 periods **Environmental acts:** Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act. 6 periods

UNIT – IV

Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment.Environmental Standards (ISO 14000, etc.)12 periods**Case Studies:** Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare).6 periods

Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.6 hrs.

TEXT BOOKS:

1. Environmental Studies‖ by Benny Joseph, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Comprehensive environmental studies‖- JP Sharma, Laxmi Publications.
3. Text Book of environmental Studies – ErachBharucha

REFERENCE BOOKS:

1. Environmental studies‖, R.Rajagopalan, Oxford University Press.
2. Introduction to Environmental Science‖, Anjaneyulu Y, B S Publications
3. Environmental Science‖, 11th Edition – Thomson Series – By Jr. G. Tyler Miller.

PROBLEM SOLVING USING PROGRAMMING

(Common for all branches except Civil Engineering) I B.Tech – I Semester (Code: 18CS001)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: BASIC MATHEMATICS

Course Objectives: Students will be able to

1. Understand basic concepts of C Programming such as: C-tokens, Operators,Input/output, and Arithmetic rules.
2. Develop problem-solving skills to translate English' described problems into programs written using C language.
3. Use Conditional Branching, Looping, and Functions.
4. Apply pointers for parameter passing, referencing and differencing and linking datastructures.
5. Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Outcomes: After the course the students are expected to be able to

1. Choose the right data representation formats based on the requirements of the problem.
2. Analyse a given problem and develop an algorithm to solve the problem.
3. Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
4. Write the program on a computer, edit, compile, debug, correct, recompile and run it.
5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

SYLLABUS

UNIT I (17 Periods)

Overview of C, Constants, Variables and Data Types, Operators and Expressions, Managing I/O Operations. Decision Making and Branching.

Programming Exercises for Unit I:C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic and logical errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, finding given year is leap year or not, and conversion of lower case character to its upper case.

UNIT II **(17 Periods)**

Decision Making and Looping, Arrays, Character Arrays and Strings.

Programming Exercises for Unit II: To print the sum of the digits of a given number and todisplay the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number.To print graphic patterns of symbols and numbers.To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not with and without using String Handling Functions. Transpose of a matrix and sorting of names using arrays.

UNIT III (18 Periods)

User-defined Functions,Structures and Unions,Pointers

Programming Exercises for Unit - III: Functions - Recursive functions to find factorial & GCD (Greatest Common Divisor), string operations using pointers and pointer arithmetic. Swapping two variable values. Sorting a list of student records on register number using arrayof pointers

UNIT IV **(18 Periods)**

File Management in C,Dynamic Memory Allocation,Preprocessor

Programming Exercises for Unit - IV: Operations on complex numbers, and to read an input file of marks and generate a result file, sorting a list of names using command line arguments. Copy the contents of one file to another file. Allocating memory to variables dynamically.

Text Book:

1. Programming in ANSI C by E.Balaguruswamy,Fifth Edition.

References:

1. Kernighan BW and Dennis Ritchie M, ―C programming language‖, 2nded, Prentice Hall.
2. Yashavant P. Kanetkar, ―Let us C‖, BPB Publications.
3. Herbert Schildt, ―C: The Complete Reference‖, 4th edition, Tata Mcgraw-Hill.
4. Ashok N.Kamthane, ―Programming in C‖, PEARSON 2nd Edition.

ENGINEERING CHEMISTRY LABORATORY

(Common to all branches)

I B.Tech – I Semester (Code: 18CYL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

LIST OF EXPERIMENTS

1. **Introduction to Chemistry Lab** (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and error, accuracy, precision, theory of indicators, use of volumetric titrations).

2. Volumetric Analysis:
    a. Estimation of Washing Soda.
    b. Estimation of Active Chlorine Content in Bleaching Powder
    c. Estimation of Mohr's salt by permanganometry.
    d. Estimation of given salt by using Ion-exchange resin using Dowex-50.
3. Analysis of Water:
    a. Determination of Alkalinity of Tap water.
    b. Determination of Total Hardness of ground water sample by EDTA method
    c. Determination of Salinity of water sample
4. Estimation of properties of oil:
    a. Estimation of Acid Value
    b. Estimation of Saponification value
5. Preparations:
    a. Preparation of Soap
    b. Preparation of Urea-formaldehyde resin
    c. Preparation of Phenyl benzoate
6. Demonstration Experiments (Any two of the following):
    a. Determination of $p^H$of given sample.
    b. Determination of conductivity of given sample by conductometer.
    c. Potentiometric Determination of Iron.

TEXT BOOKS (for Chemistry 1 and 2):

1. Practical Engineering Chemistry by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad, 2009.
2. Inorganic quantitative analysis, Vogel, 5^{th} edition, Longman group Ltd. London, 1979.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel.
2. A text book on experiments and calculations- Engineering Chemistry. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

HARDWARE LAB

I B.Tech – I Semester (Code: 18ECL12)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

List of Lab Experiments

1. Identification and testing of various circuit elements
2. Study of CRO and Function Generator.
3. Study of RPS Multimeter.
4. Verification of KCL and KVL.
5. Testing of basic gates.
6. Realization of basic gates using discrete components.
7. V-I characteristics of Diode.
8. V-I characteristics of Zener Diode.
9. Verification of Thevenin‘s Theorem.
10. Component testing using CR

Problem Solving using Programming Lab
I B.Tech – I Semester (Code: 18CSL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Lab Examination (3 Hours)			:	50

List of Lab Programs

1. .A program for electricity bill taking different categories of users, different slabs ineach category. (Using nested if-else statement).

Domestic Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 200	0.50 per unit	
201 – 400	100 plus	0.65 per unit
401 – 600	230 plus	0.80 per unit
601 and above	390 plus	1.00 per unit
Commercial Customer:		
Consumption Units	**Rate of Charges(Rs.)**	
0 – 100	0.50 per unit	
101 – 200	50 plus	0.6 per unit
201 – 300	100 plus	0.70 per unit
301 and above	200 plus	1.00 per unit

2. Write a C program to evaluate the following (usingloops):
   a) $1 + x^2/2! + x^4 / 4!+ \ldots$upto tenterms
   b) $x + x^3/3! + x^5/5!+ \ldots$ upto ten terms
3. Write a C program to check whether the given numberis
   a) Prime ornot.
   b) Perfect or Abundant orDeficient.
4. Write a C program to display statistical parameters (using one – dimensionalarray).
   a) Mean
   b) Mode
   c) Median
   d) Variance.
5. WriteaCprogramtoreadalistofnumbersandperformthefollowingoperations
   a) Print thelist.
   b) Delete duplicates from thelist.
   c) Reverse thelist.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display

the message “Element not found in theList”.

7. Write a C program to read two matrices and compute their sum and product.

8. Write a C program to read list of student names and perform the followingoperations
    a) To print the list of names.
    b) To sort them in ascending order.
    c) To print the list after sorting.

9. Write a C program that consists of recursive functions to
    a) Find factorial of a given number
    b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.

10. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author, and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message “required copies not in stock” is displayed. Write a program for the above in structures with suitable functions.
11. Write a C program to read a data file of students’ records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to adata file.
12. Write a C program to read a file as command line argument and count the given word frequency in a file

Numerical Methods and Advanced Calculus

I B.Tech –II Semester (Code: 18MA002)

Lectures	4	Tutorial	0	Practical	0	Credits	3		
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50				

Prerequisites: None

Course Objectives:

CO1: To learn about some advanced numerical techniques e.g. solving a nonlinear equation,linear system of equations, Interpolation and Approximation techniques.

CO2: To learn about evaluation of double and triple integrals and their applications.

CO3: To learn some basic properties of scalar and vector point functions and their applications to line,surface and volume integrals.

Course Outcomes: Students will be able to

CLO-1: Solve non-linear equations in one variable and system of linear equations using iteration methods.

CLO-2: Choose appropriate interpolation formulae based on the given data.

CLO-3: Compute the value of a definite integral using numerical integration techniques.

CLO-4: Predict the numerical solution of the derivative at a point from the given initial valueproblem using appropriate numerical method.

CLO-4: Evaluate the double and triple integrals using change of variables.

CLO-5: Transform line integrals to surface and surface to volume integrals and evaluatethem.

SYLLABUS

UNIT - I

Numerical Solution of Equations: Introduction; Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi‘s iterative method, Gauss-Seidel iterative method. [Sections: 28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2]. [12 Hours]

UNIT - II

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton‘s interpolation formulae: Newton‘s forward interpolation formula, Newton‘s backward interpolation formula; Interpolation with unequal intervals; Lagrange‘s interpolation formula; Divided differences; Newton‘s divided difference formula; Numerical integration; Trapezoidal rule; Simpson‘s one-third rule; Simpson‘s three-eighth rule; Numerical solution of ODE‘s: Introduction; Picard‘s method; Euler‘s method; Runge-Kutta method.

[Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7]. [12 Hours]

UNIT – III

Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volume as Triple integrals, Change of variables.
[Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2; 7.7.2]. [12 Hours]

UNIT – IV

Vector calculus and its Applications: Scalar and vector point functions; Del applied toscalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green's theorem in the plane (without proof); Stokes theorem (without proof); Gaussdivergence theorem(without proof).
[Sections: 8.4; 8.5.1; 8.5.3; 8.6; 8.11; 8.12; 8.13; 8.14; 8.16] [12 Hours]

TEXT BOOK:

1. B.S.Grewal, ―Higher Engineering Mathematics‖, 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS:

1. [1] ErwinKreyszig, ―Advanced Engineering Mathematics‖, 9th edition, John Wiley & Sons.
2. [2] N.P.Bali and M.Goyal, ―A Text book of Engineering Mathematics‖ Laxmi Publications, 2010.

BASIC INSTRUMENTATION

I B.Tech – II Semester (Code: 18EC202)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: Explain basic concepts and definitions in measurement.
CO2 : Describe the bridge configurations and their applications.
CO3: Elaborate discussion about the importance of signal generators and analyzers in Measurement.
CO4: Describe the different types of transducers and data acquisition systems.

Course Outcomes: Students will be able to

CLO-1: Recognize the evolution and history of units and standards in Measurements.
CLO-2: Identify the various parameters that are measurable in electronic instrumentation.
CLO-3: To have a deep understanding about instrumentation concepts which can be appliedto Control systems.
CLO-4: Relate the usage of various instrumentation standards.

SYLLABUS

UNIT-I

Measurement and Error: Definitions, Accuracy and Precision, Significant figures, Types oferror, Statistical analysis, Probability of errors, Limiting Errors.
Electromechanical Indicating Instruments: Torque and Deflection of the Galvanometer, Permanent Magnet Moving Coil Mechanism, DC Ammeters, DC Voltmeters, Voltmeter Sensitivity, Series type Ohmmeter, Shunt type Ohmmeter, Calibration of DC Instruments, Alternating Current indicating Instruments.

UNIT-II

Bridge Measurements: Introduction, Wheatstone Bridge, Kelvin Bridge, AC Bridges and their Application-Maxwell Bridge, Hay Bridge, Schering Bridge, Wein Bridge.
Electronic Instruments for measuring Basic Parameters : AC voltmeter using rectifiers, True RMS-Responding voltmeter, Electronic Multimeter, Digital voltmeters, Q Meter, Vector Impedance Meter, Vector Voltmeter, RF Power and Voltage measurement.

UNIT-III

Oscilloscopes: Oscilloscope Block diagram, Cathode Ray Tube, Oscilloscope Techniques. **Special Oscilloscopes**: Storage Oscilloscope, Sampling Oscilloscope, Digital Storage Oscilloscopes.

Signal Analysis: Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analysis. **Frequency Counter and Time-Interval Measurements**: Simple Frequency counter, Display Counter, Time Base, Input Signal Processing, Period Measurement.

UNIT-IV

Transducers as Input Elements to Instrumentation Systems: Classification of Transducers, Selecting a Transducer,Strain gauges, Displacement Transducers, TemperatureMeasurements.

Analog and Digital Data Acquisition Systems: Instrumentation systems.

TEXT BOOK:

1. Modern Electronic Instrumentation and Measurement Techniques by W.D Cooper & A.D Helfrick PHI, 2008.

REFERENCE BOOKS:

1. A Course in Electrical and Electronics Measurements and Instrumentation by Sawhney. A.K, 18th Edition, DhanpatRai& Company Private Limited, 2007.
2. Electronic Instrumentation by H S Kalsi, Tata McGraw-Hill Education, 1995.

PROGRAMMING WITH C++

I B.Tech – II Semester (Code: 18EC203)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: Develop a greater understanding of the issues involved in programming languagedesign and implementation.

CO2: Develop an in-depth understanding of functional, logic, and object-orientedprogramming paradigms.

CO3: Implement several programs in languages other than the one emphasized in the corecurriculum (C++).

CO4: Understand design/implementation issues involved with variable allocation andbinding, control flow, types, subroutines, parameter passing.

Course Outcomes: Students will be able to

CLO-1: Understand the features of C++ supporting object oriented programming.

CLO-2: Understand the relative merits of C++ as an object oriented programming language.

CLO-3: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.

CLO-4: Understand advanced features of C++ specifically stream I/O, templates andoperator overloading.

SYLLABUS

UNIT I

Introduction: Basic concepts of OOP, benefits and applications of OOP, what is C++, applications of C++, C++ statements, structure of a C++ program, creating the source file, compiling and linking. C++ tokens, keywords, identifiers and constants, data types in C++, operators in C++,symbolic constants, type compatibility, declaration of variables, dynamic initialization of variables, reference variables, scope resolution operator, member dereferencing operator, memory management operator, type cast operator, expressions and their types, special assignment expressions, implicit conversions, operator overloading, operator precedence, control structures. C++ streams and stream classes, unformatted I/O operations, formatted I/O operations, managing output with manipulators

UNIT II

Functions in C++: main function, function prototyping, call by reference, return by reference, inline functions, default arguments, const arguments, function overloading, friend and virtual functions. **Classes and objects**: specifying a class, defining member functions,

nesting member functions, private member functions, static data members and member functions, arrays of objects, objects as function arguments, returning objects, local classes.

UNIT III

Constructors and Destructors: constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, dynamic initialization of objects, copy constructor, dynamic constructor, const objects, destructors. Defining Operator overloading, overloading unary and binary operators, overloading binary operators using friends, rules for operator overloading, manipulation of strings using operators.

UNIT IV

Pointers, pointers to objects, this pointer, pointers to derived classes, pure virtual functions. Inheritance: single inheritance, making a private member inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, abstract classes.

TEXT BOOK

1. Object oriented programming with C++, Balagurusamy, 4th edition, Tata McGraw-Hill publications, 2008.

REFERENCE BOOKS

1. Object oriented programming with ANSI and turbo C++, Ashok N.Kamthane, Pearson Education, 2005.
2. C++ programming language by Bjarne Stroustup,3rd edition, Pearson education,2009.

Communicative English

I B.Tech – II Semester (Code: 18EL001)

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Outcomes: Students will be able to

CLO-1: Understand how to build academic vocabulary to enrich their writing skills

CLO-2: Produce accurate grammatical sentences

CLO-3: Analyse the content of the text in writing.

CLO-4: Produce coherent and unified paragraphs with adequate support and detail.

SYLLABUS

UNIT-I

1.1 **Vocabulary Development**: Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes

1.2 **Essential Grammar:** Prepositions, Conjunctions, Articles

1.3 **Basic Writing Skills**: Punctuation in writing

1.4 **Writing Practices**: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT-II

2.1 **Vocabulary Development**: Synonyms and Antonyms

2.2 **Essential Grammar**: Concord, Modal Verbs, Common Errors

2.3 **Basic Writing Skills**: Using Phrases and clauses

2.4 **Writing Practices**: Hint Development, Essay Writing

Unit III

3.1 **Vocabulary Development**: One word Substitutes

3.2 **Essential Grammar**: Tenses, Voices

3.3 **Basic Writing Skills**: Sentence structures (Simple, Complex, Compound)

3.4 **Writing Practices**: Note Making

Unit IV

4.1 **Vocabulary Development**: Words often confused

4.2 **Essential Grammar**: Reported speech, Common Errors

4.3 **Basic Writing Skills**: Coherence in Writing: Jumbled Sentences

4.4 **Writing Practices**: Paraphrasing & Summarising

Reference Books

1. Communication Skills, Sanjay Kumar & Pushpa Latha. Oxford University Press: 2011.
2. Practical English Usage, Michael Swan. Oxford University Press: 1995.
3. Remedial English Grammar, F.T.Wood. Macmillan: 2007.
4. Study Writing, Liz Hamp lyons & Ben Heasley. Cambridge University Press:2

CIRCUIT THEORY

I B.Tech – II Semester (Code: 18EC205)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: Basics of circuit analysis-KVL, KCL, Mesh analysis and Nodal analysis.

CO2: Analysis of dc/ac electric circuits and important theorems of circuit analysis.

CO3: To expose the students to the concept of resonance and its applications.

CO4: To familiarize the students to the Laplace transform concept for applying it to obtain transient response for DC & AC inputs.

Course Outcomes: Students will be able to

CLO-1: Identify the main circuit elements and apply Kirchhoff‘s Laws to calculate currents, voltages and powers in typical linear electric circuits using a variety of analytical methods.

CLO-2: Reduce more complicated circuits into the Thevenin‘s and Norton‘s equivalent circuits.

CLO-3: Obtain the transient responses of RC, RL and RLC circuits.

CLO-4: know the application of Laplace transform to circuit analysis.

SYLLABUS

UNIT – I

Voltage and current Laws: Introduction, nodes, paths, loops and branches, Kirchhoff‘s current and voltage laws, series and parallel connected sources, resistors in series and parallel, voltage and current division.

Basic Nodal and Mesh Analysis: Nodal analysis, the super node, Mesh analysis, and The super mesh, Nodal vs. Mesh analysis: A comparison

UNIT II

Useful circuit analysis techniques: Linearity and superposition, source transformations, Thevenin and Norton equivalent circuits, maximum power transfer Theorem, Reciprocity Theorem, and delta-wye conversion.

UNIT III

Basic RL and RC Circuits: The source free RL circuit, properties of the exponentialresponse, the source free RC circuit, driven RL circuits, natural and forced response, driven RC circuits

The RLC Circuit: The source free Parallel circuit, the over damped Parallel RLC circuit, Critical damping, the under damped parallel RLC circuit, the complete response of the RLC circuit.

Sinusoidal steady state Analysis: Characteristics of sinusoids, forced response to sinusoidal functions, the complete forcing function, the phasor, phasor relationships for R, L and C, impedance, admittance, phasor diagrams.

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UNIT IV

Complex frequency and the Laplace transform: complex frequency, the damped sinusoidal Forcing function, Application of Laplace transform to circuit analysis

Frequency Response: Parallel Resonance, Bandwidth and High Q circuits, Series resonance, other resonant forms, scaling.

TEXT BOOK:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 8th Edition, Tata McGraw Hill, 2016.

REFERENCE BOOKS:

1. Circuits & Networks: Analysis and Synthesis, A.Sudhakar and ShyammohanS.Pilli, Tata McGraw Hill, 2007.
2. Network Analysis, M. E. Vanvalkenburg, 3rd Edition, PHI, 2

Physics Laboratory

I B.Tech – II Semester (Code: 18PHL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1		
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50				

Course Outcomes: Students will be able to

CLO-1: Acknowledge the important aspects of earth magnetic field, realize the use of Maxwells equations in various magnetic applications

CLO-2: Sentences Realization of material properties and parameters.

CLO-3: Get hands on experience in various opto-electronic devices like Solar Cell, Photo Cell and their applications.

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee‘s apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of wavelengths of mercury spectrum using grating normal incidence method.
5. Determination of dispersive power of a given material of prism using prism minimum deviation method.
6. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
7. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
8. Verify the laws of transverse vibration of stretched string using sonometer.
9. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
10. Draw the load characteristic curves of a solar cell.
11. Determination of Hall coefficient of a semiconductor.
12. Determination of voltage and frequency of an A.C. signal using C.R.O.
13. Determination of Forbidden energy gap of Si &Ge.
14. Determination of wavelength of laser source using Diode laser.

Any three experiments are virtual

TEXT BOOK:

1. Engineering physics laboratory manual P.Srinivasarao & K.Muralidhar, Himalaya publications.

PROGRAMMING WITH C++ LAB

I B.Tech – II Semester (Code: 18ECL22)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Outcomes: Students will be able to

CLO-1: Understand the key features of Object-Oriented Programming languages and distinguishes the relative merits of C++ over structured programming language.

CLO-2: Demonstrate the concepts of parameter passing mechanisms and develop classes with various data members and member functions.

CLO-3: Illustrate different types of constructors and operator overloading mechanisms.

CLO-4: Analyze the types of inheritance and categorize the pointers and virtual functions.

List of Lab Programs

Write C++ programs to illustrate the concept of the following:

1. Arrays
2. Structures
3. Pointers
4. Objects and Classes
5. Console I/O operations
6. Scope resolution and memory management operators
7. Inheritance
8. Polymorphism
9. Virtual Functions
10. Friend Functions
11. Operator overloading
12. Function overloading
13. Constructors and Destructors
14. Pointers
15. File I/O operations

Note: A minimum of ten programs are to be executed and recorded to attain eligibility for University Practical examination.

English Communication Skills Laboratory

I B.Tech – II Semester (Code: 18ELL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Outcomes: Students will be able to

CLO-1: Better understand the nuances of English language through audio- visual experience and group activities.

CLO-2: Develop neutralization of accent for intelligibility.

CLO-3: Build confidence to enhance their speaking skills

CLO-4: Use effective vocabulary both in formal and informal situations

UNIT-I

Listening Skills; Importance – Purpose- Process- Types
Barriers to Listening
Strategies for Effective Listening

UNIT-II

Phonetics; Introduction to Consonant, Vowel and Diphthong sounds
Stress
Rhythm
Intonation

UNIT-III

Formal and Informal Situations
Expressions used in different situations
Introducing Yourself & Others-Greeting & Parting-Congratulating-Giving Suggestions & Advices-Expressing Opinions-Inviting People- Requesting-Seeking Permission-Giving Information- Giving Directions- Sympathizing- Convincing People-Complaining & Apologizing-Thanking Others- Shopping- Travelling-Conversational Gambits

UNIT-IV

JAM Session
Debates
Extempore

Reference Books:

1. Communication Skills, Sanjay Kumar and PushpaLata. Oxford University Press. 2011
2. Better English Pronunciation, J.D. O‘ Connor. Cambridge University Press:1984

3. New Interchange (4rth Edition), Jack C Richards. Cambridge University Press:2015
4. English Conversation Practice, Grant Taylor. McGraw Hill:2001

Software:

1. Buzzers for conversations, New Interchange series
2. English in Mind series, Telephoning in English
3. Speech Solutions, A Course in Listening and Speaking

Probability and Statistics
III - Semester (Code: 18 MA 003) Common to All Branches

Lectures	:	3 Hours/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Course Outcomes: Students will be able to

CLO-1: Understand probabilities and able to solve using an appropriate sample space & Compute various operations like expectations from probability density/distribution functions (pdfs)

CLO-2: Perform Likelihood ratio tests from pdfs for statistical engineering problems & Mean and covariance functions for simple random variables.

CLO-3: Understand Auto-correlation and cross correlation properties between two random variables & the concept of random process, differentiate between stochastic and ergodic processes

CLO-4: Understand the concept of power spectral density and power density spectrum of a random process & apply the principles of a random process in system concepts.

SYLLABUS

UNIT – I

Continuous Random Variables, Normal Distribution, Normal Approximation to the Binomial Distribution, Uniform Distribution, Gamma Distribution and its applications, Beta Distribution and its applications, Joint Distributions (Discrete),Joint Distributions (Continuous).Populations and Samples, Law of large numbers,Central limit theorem and its applications,The sampling distribution of the mean (σ unknown),The sampling distribution of the variance.

[12 Hours]

(Sections 5.1, 5.2, 5.3, 5.5,5.7, 5.8, 5.10, 6.1, 6.2, 6.3, 6.4 of Text Book [1])

UNIT – II

Point estimation, Interval estimation, Tests of Hypotheses, Null Hypothesis and Tests of hypotheses, Hypothesis concerning one mean, Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Paired sample t test. [12 Hours]

(Sections 7.1,7.2, 7.4, 7.5, 7.6, 8.2, 8.3, 8.4 of Text Book [1])

UNIT-III

The estimation of variances,Hypotheses concerning one variance,Hypotheses concerning two variances, Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions, Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- one way classification(Completely randomized designs), Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- two way classification(Randomized block designs). [12 Hours]

(Sections 9.1, 9.2, 9.3, 10.1, 10.2, 10.3, 12.2, 12.3 of Text Book [1])

UNIT -IV

Multivariate Analysis: The concept of bivariate relationship, scatter diagram, Pearson's correlation and correlation matrix. Simple linear regression model and assumptions, Least Squares Estimation of the parameters of the model, Testing the significance of the model. Regression versus Correlation, Multiple linear regression model with k explanatory variables and assumptions of the model. Least Square Estimation of regression coefficients. Concept of the coefficient of determination R^2. Test for

significance of the regression model and individual regression coefficients. Applications of multiple regression analysis. [12 Hours]
(1st and 2nd Chapters of Text Book [2])

TEXT BOOKS:

1. Miller & Freund's "Probability and Statistics for Engineers", Richard A. Johnson, 8th Edition, PHI.
2. Introduction to Linear Regression Analysis, Douglas C. Montgomery, E.A. Peck and G.G. Vining, 3rdedition, Wiley.

REFERENCE BOOKS:

1. R.E Walpole, R.H. Myers & S.L. Myers 'Probability & Statistics for Engineers and Scientists', 6th Edition, PHI.
2. Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor,11th Edition, Sultan Chand & Sons.
3. Murray R Spiegel, John J.Schiller, R. AluSrinivasa, 'Probability &Satistics', Schaum's outline series.
4. K.V.S.Sarma,'Statistics Made Simple – Do it yourself on PC',Prentice Hall India, Second Edition, 2015.

Data Structures using 'Python'

II B.Tech – I Semester (Code: 18EC302)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Problem solving with Programming

Course Objectives: To learn

CO1: impart the different python programming Concepts

CO2: Understand the linear and nonlinear data structures

CO3: Understand the concept of trees, tree traversal techniques and its implementations.

CO4: Understand the Concept of graph representations and searching techniques

Course Outcomes: Students will be able to

CLO-1: Understand the fundamentals of Python programming

CLO-2: Apply python programming to linear data structures and Analyze linear data structures

CLO-3: Analyze and demonstrate python programming of trees and tree traversal techniques.

CLO-4: Explain the graph representations and searching techniques

SYLLABUS

UNIT – I

Python Primer: Python overview, objects in Python, Expressions, operators and precedence, Control flow, functions, simple Input and Output, Iterators and generators, additional python conveniences, Scopes and namespaces, Modules and the import statement.

Array-Based Sequences: python's sequence types, low- level arrays, dynamic arrays and amortization, efficiency of python's sequence types: python's list and tuple classes, python's string class.

UNIT – II

Linked lists: Singly linked list, circularly linked list, doubly linked list

Stacks: The stack abstract data type, Simple array-based stack implementation, reversing data using a stack, implementing stack with a linked list

Queues: the queue abstract data type, Array based queue implementation, implementing queue with a linked list.

Double-ended queues: the DE queue abstract data type, implementing a de queue with a circular array, implementing de queue with a linked list, de queues in the python collections module

UNIT – III

Trees: tree definitions and properties, tree abstract data type, computing depth and height, binary trees, linked structure for binary tree, Array-based representation of a binary tree, tree traversal algorithms, binary search trees, AVL trees.

UNIT – IV

Graph: The graph ADT, Edge list structure, Adjacency list structure, Adjacency map structure, Adjacency matrix structure, Graph traversal algorithms: depth first search, breadth first search, minimum spanning trees.

TEXT BOOKS

1. "Data Structures & Algorithms", Michael T. GoodRich, Roberto Tamassia, Michael H. Goldwasser.John Wiley & sons ,2013

REFERENCES

1. "Introduction to programming using python", Y.Daniel Liang, Pearson, 2013.
2. "Introducing Python- Modern Computing in Simple Packages", Bill Lubanovic ,O_Reilly Publication, 1st Edition, 2015.
3. "Core python programming",R. NageswaraRao, Dreamtech, 2017.
4. "Programming in Python 3", Mark Summerfield, Pearson Education, 2nd Edition
5. "Beginning Python –From Novice to Professional", Magnus Lie Hetland, APress Publication, 3rdEdition, 2017

ELECTRONIC DEVICES AND CIRCUITS

II B.Tech – I Semester (Code: 18EC303)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Outcomes: Students will be able to

CLO-1: Understand and know the characteristics of various semiconductor diodes and their applications

CLO-2: Design of various rectifier circuits with and without filters

CLO-3: Analyze the BJT characteristics and biasing techniques

CLO-4: Design and analyze FET characteristics and illustrate characteristics of PNPN devices

SYLLABUS

UNIT – I

The P-N Diode Volt-Ampere equation, The Temperature Dependence of P-N characteristics, Diode Resistance(Static and Dynamic), Space Charge Capacitance, Diffusion Capacitance.

Special Diodes: Varactor Diode, Break Down diodes, Tunnel Diode, V-I characteristics of Tunnel Diode with the help of Energy Band Diagrams, Photo Diode, Light emitting diode.

UNIT II

Rectifiers: Half wave, Full wave and Bridge Rectifiers without filter and with inductor filter, Capacitor filter, L section and π- section filters.

UNIT III

Transistors Characteristics: The Junction transistor, Transistor current components, Transistor as an amplifier, Common Base Configuration, Common Emitter Configuration, CE cutoff region, CE Saturation region, CE current gain, Common Collector Configuration, Photo Transistor.

Transistor Biasing and Thermal Stabilization : Operating point, Bias Stability, Self Bias, Stabilization against variations in ICO, VBE, and β, Bias Compensation, Thermistor and Sensistor compensation, Thermal runaway, Thermal stability.

UNIT IV

Field Effect Transistors: The Junction Field Effect Transistor, Pinch-Off voltage, JFET V-I Characteristics, FET Small signal model, Metal-Oxide-Semiconductor FET.

PNPN and Other Devices: SCR, DIAC, TRIAC, UJT and The Phototransistor (their characteristics only).

TEXT BOOK:

1. Integrated Electronics-Jacob Millman, Chritos C. Halkies,TataMc-Graw Hill, 2009.
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, Tata McGraw Hill, Second Edition.

REFERENCE BOOKS:

1. Electronic Devices and Circuits – J. Millman, C. C. Halkias, Tata Mc-Graw Hill.
2. Robert L Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, 8th Edition, PHI, 2003.

Electromagnetic field theory

II B.Tech – I Semester (Code: 18EC304)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Different coordinate systems and Vector calculus

Course Objectives:

CO1: To introduce the basic mathematical concepts related to electric force, electric field and electric potential concepts.

CO2: To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.

CO3: To impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.

CO4: To impart knowledge on the concepts of Faraday‘s law, Modified Amperes Circuital Law and Maxwell‘s equations.

Course Outcomes: Students will be able to

CO1: Understand the basic things related to static electric fields and to develop expressions for potential and the energy stored in the field.

CO2: Analyze the behavior of static electric fields when entering a different medium and analyze different capacitor problems and fields associated with them

CO3: Understand how magneto static field varies with various current distributions and how current elements experiences force when placed in magnetic field.

CO4: Derive the Maxwell's equations for time varying fields and analyze how uniform plane waves propagates in different media

SYLLABUS

UNIT – I

Electrostatics –I: The experimental law of coulomb, Electric field intensity, Field due to a continuous volume charge distribution, Field of a line charge, sheet of charge. Electric Flux Density, Guass’s law , Applications of Gauss law, Divergence, Maxwell’s First equation (Electrostatics), Energy expended in moving a point charge in an electric field, The line integral, Definition of potential and potential difference. The potential field of a point charge, system of charges, potential gradient, the dipole and Energy density in electrostatic field.

UNIT II

Electrostatics – II: The nature of dielectric materials, boundary conditions for perfect dielectric materials. Capacitance. Several capacitance examples. Capacitance of a two wire line. Derivations of Poisson’s and Laplace’s equations, Examples of the solution of Laplace’s equation. Current and current density, continuity of current, conductor properties and boundary conditions.

UNIT III

The Steady Magnetic Field: Biot-Savart Law, Ampere’s Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials. Magnetic Forces and Materials: Force on a moving charge, Force on a differential current element, Force between differential current elements, Force and torque on a closed circuit, the nature of magnetic materials, Magnetization and Permeability. Magnetic boundary conditions. Potential energy in magnetic fields.

UNIT IV

Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current, Maxwell's equations in point form, integral form.

The Uniform Plane Wave: Wave propagation in free space, dielectrics. Poynting theorem and wave power. Propagation in good conductors: skin effect. Wave polarization.

TEXT BOOK:

1. W H Hayt, J A Buck, J Akhtar Engineering Electromagnetics, 8th Edition McGraw Hill Education, 2014.

REFERENCE BOOKS:

1. Mathew NO Sadiku, Elements of Electromagnetics, Oxford University Press, 2003.
2. Joseph A Edminister, Theory and Problems of Electromagnetics, 2nd Edition, Schaum's Outline Series, Mc-Graw Hill International, 1993
3. EC Jordan and KG Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, Prentice Hall of India.

Digital Electronics

II B.Tech – I Semester (Code: 18EC305)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Outcomes: Students will be able to

CO1: Define the basic principles of digital circuits and different number system with its representations.

CO2: Employ Boolean expression minimizing methods for simplification, implement them using logic gates and construct combinational logic circuits.

CO3: Analyze combinational circuits like multiplexers, Encoders and sequential circuits.

CO4: Design various sequential circuits like counters, shift registers and construct various Logic gates in different logic families.

SYLLABUS

UNIT – I

Binary Systems: Complements: The r's complement, The (r-1)'s complement, subtraction using method of complements. Binary codes: Decimal codes, Reflected code, Error detecting codes, alphanumeric codes.

Sign magnitude representation: Signed Magnitude form, Signed 1's complement form, Signed 2's complement form.

Boolean Algebra and Logic Gates: Basic definitions, Axiomatic definitions of Boolean algebra, Basic Theorems and properties of Boolean algebra, Boolean functions. Canonical and standard forms, Digital Logic gates.

UNIT II

Simplification of Boolean Functions: The map method, Two-and Three-variable Maps, Four variable Maps, Five variable Maps, POS simplification, NAND and NOR implementation, Other Two-level implementations, Don't care conditions, The Tabulation Method, Determination of prime - implicants, Selection of prime – implicants.

Combinational Logic: Introduction, Design procedure, Adders, Subtractors, Code conversion, Multilevel NAND circuits, Multilevel NOR circuits, EX-OR and EX-NOR circuits.

UNIT III

Combinational Logic with MSI and LSI: Binary parallel adder, Carry propagation, Decimal adder, Magnitude comparator, Decoders, Demultiplexers, Encoders, Multiplexers.

Sequential Logic: Flip-flops, Triggering of Flip-Flops, Analysis of clocked Sequential Circuits, state reduction and assignment, Flip-Flop excitation tables, Conversions of Flip-Flops, Design of Sequential circuits.

UNIT IV

Registers, Counters and Memory Unit: Registers, shift registers, Ripple counters, Synchronous counters.

Digital Integrated Circuits: Introduction, Characteristics of logic families, RTL and DTL circuits, I2 L, TTL, MOS, CMOS Logic families. Programmable Logic Devices: PLA, PAL, ROM.

TEXT BOOK:

1. Digital Logic and Computer Design, **M Morris Mano**, PHI/Pearson Education.

REFERENCE BOOKS:

1. Digital Integrated Electronics, Taub and Schilling, Mc-Graw Hill.
2. Fundamental of Digital Circuits, A.Anand Kumar, Pearson Education, 4th Edition.

Technical English

II B.Tech (Theory) 18EL002

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Outcomes: Students will be able to

CO1: Make use of contextual clues to infer meanings of unfamiliar words from context.

CO2: Understand how to apply technical information and knowledge in practical documents for a variety of purposes.

CO3: Analyze the content of the text in writing use grammatical, stylistic, and mechanical formats and conventions appropriate to various audiences and disciplines.

CO4: Build confidence to participate actively in writing activities (individually and in collaboration) that model effective technical communication in the workplace

SYLLABUS

UNIT-I

1.1 Vocabulary Development: Familiarising Idioms & Phrases
1.2 Grammar for Academic Writing: Making Requests
1.3 Language Development: Using Transition & Link words
1.4 Technical Writing: Letter Writing & Email Writing

UNIT-II

2.1 Vocabulary Development: Analogous words, Gender Sensitive language
2.2 Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The Future: Predicting & Proposing
2.3 Language Development: Cloze tests
2.4 Technical Writing: Technical Reports

UNIT-III

3.1 Vocabulary Development: Abbreviations& Acronyms
3.2 Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival & Adverbial groups
3.3 Language Development: Transcoding (Channel conversion from chart to text)
3.4 Technical Writing: Circular, Memos, Minutes of Meeting

UNIT-IV

4.1 Vocabulary Development: Corporate vocabulary
4.2 Grammar for Academic Writing: Inversions & Emphasis
4.3 Language Development: Reading Comprehension
4.4 Technical Writing: Resume Preparation

Reference Books

1. Communication Skills, Sanjay Kumar &PushpaLatha. Oxford University Press: 2011.
2. Technical Communication Principles and Practice. Oxford University Press: 2014.
3. Advanced Language Practice, Michael Vince. MacMilan Publishers: 2003.
4. Objective English (Third Edition), Edgar Thorpe &Showick. Pearson Education: 2009
5. English Grammar: A University Course (Second Edition), Angela Downing & Philip Locke, Routledge Taylor & Francis Group: 2016

DATA STRUCTURES USING PYTHON LAB

II B.Tech (Lab) 18ECL 31

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

CO1: Implement various Searching and Sorting Techniques.
CO2: Implement linear and non-linear data structures.
CO3: Identify suitable data structure to solve various computing problems

List of Lab Programs

1. Python program to implement bubble sort, selection sort, insertion sort.
2. Python program to implement merge sort, quick sort
3. Python program on linear search and binary search.
4. Python program to implement Singly Linked List
5. Python program to implement Doubly Linked List
6. Python program to implement Circular Linked List
7. Python programs to implement stacks using arrays and linked lists.
8. Python programs to implement queues using arrays and linked lists.
9. Python program to perform Binary Tree traversal operations.
10. Python programs to perform Binary search tree operations.
11. Python program to Travers in a graph using Depth first search.
12. Python program to Travers in a graph using breadth first search.

Electronic Devices and Digital Electronics Lab

II B.Tech (Lab) 18ECL32

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: to learn

1. To study basic electronic components
2. To observe characteristics of electronic devices
3. To know the concepts of Combinational Logic circuits.
4. To understand the concepts of Sequential Logic circuits

Course Outcomes: student will be able to learn

1. Analyze the characteristics of different electronic devices such as diodes, transistors, etc., and simple circuits like rectifiers, amplifiers oscillator.
2. Construct basic combinational circuits and verify their functionalities.
3. Apply the design procedures to design basic sequential circuits like counters shift registers.

List of Lab Experiments:

Cycle 1:

1. Show that how Zener diode acts as voltage regulator
2. Characteristics of Common Emitter Configuration
3. Characteristics of JFET
4. Design and verification of self-bias circuit
5. Characteristics of Silicon Controlled Rectifier
6. Characteristics of UJT
7. Design and Verification of Collector to Base bias circuit Characteristics of BJT

Cycle 2 :

8. Design of Combinational Logic Circuits like Half-Adder, Full-Adder, Half- Subtractor and Full-Subtractor
9. Design Gray to Binary and Binary to Gray code converter.
10. Design 4-bit Magnitude comparator
11. Design of Multiplexers/De Multiplexer
12. Observe the functionality of various flipflops
13. Design of Shift register (To verify Serial to Parallel, Parallel to Serial ,Serial to Serial and Parallel to Parallel Converters) using Flip-Flops
14. Design of Binary/Decade Counter.
15. Design Asynchronous Counter, Mod Counter, Up Counter, Down Counter and Up/Down Counter.

PSPICE Lab

II B.Tech (Theory) **18ECL33**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

CO1: Understand the netlist from the given circuit, simulate and observe the DC operating point and DC analysis.
CO2: Analyze the frequency response of various amplifier circuits with ac analysis.
CO3: Obtain the transient response of nonlinear wave shaping circuits.
CO4: Verify the truth tables of different logic gates

List of Lab Programs:

1. PSPICE Simulation of Nodal Analysis for DC Circuits.
2. PSPICE Simulation for finding DC voltages and currents.
3. PSPICE Simulation for finding resonant frequency of series RLC circuit.
4. Verification of Low pass and High pass Filters using PSPICE
5. Verification of Half–Wave and Full-Wave Rectifier
6. VI Characteristics of PN Diode
7. Frequency Response of CE Amplifier
8. Verification of Clippers
9. Verification of Clampers
10. Design and Verification of Logic Gates

Complex Analysis and Special functions

II B.Tech, II Semester (Code: 18MA004)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

CO1: Solve problems of Fourier series and Fourier transformation.
CO2: Apply the knowledge of distribution function to find probability.
CO3: Solve partial differential equation by separation of variable method.
CO4: Solve ordinary differential equation using series solution and special function.

SYLLABUS

UNIT – I

Complex Numbers and functions: Complex Numbers; Geometric Representation of Imaginary numbers; Roots of a complex number; Complex function; Real and imaginary parts of circular and hyperbolic functions; **Calculus of complex functions:** Introduction; Limit of a complex function; Derivative of f(z); Analytic functions; Harmonic functions; Complex integration; Cauchy's theorem; Cauchy's integral formula.

[Sections: 19.1; 19.2; 19.5; 19.7; 19.12; 20.1; 20.2; 20.3; 20.4; 20.5;20.12; 20.13; 20.14] [12 Hours]

UNIT – II

Calculus of complex functions: Series of complex terms; Taylor series; Laurent's series; Zeros of an analytic function; Singularities of an analytic function; Residues; Residue theorem; Calculation of residues; Evaluation of real definite integrals: Evaluation around the unit circle, Evaluation around a small semi-circle.

[Sections: 20.16.1; 20.16.2; 20.16.3; 20.17.1; 20.17.2; 20.18.1; 20.18.2; 20.19; 20.20] [12 Hours]

UNIT – III

Fourier transforms: Introduction; Definition; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier integral representation of a function; Fourier transforms ; Properties of Fourier transforms; Convolution theorem(without proof); Fourier transforms of the derivative of a function.[Sections: 22.1; 22.2; 22.3.1; 22.3.3; 22.3.4; 22.4; 22.5; 22.6.2; 22.9] [12 Hours]

UNIT – IV

Series Solution of Differential Equations and Special Functions: Introduction; Validity of series solution; Series solution when $x = 0$ is ordinary point of the equation; Frobenius method; Bessel's function; recurrence formula for $J_n(x)$; expansions for J_0 and J_1; value of $J_{1/2}$; generating function for $J_n(x)$; orthogonality of Bessel functions.[Sections: 16.1;16.2;16.3;16.4;16.;,16.6;16.7;16.8;16.9;16.11] [12 Hours]

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", 44th edition, Khanna publishers, 2017.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics", Laxmi publications,2010.

ELECTRONIC CIRCUIT ANALYSIS

II B.Tech.–II Semester (Code: 18EC402)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Electronic Devices and circuits

Course Objectives: The objective of this course is to

CO 1: Understand the behavior of the various amplifier circuits at Low frequencies.

CO 2: Design and analyze single stage and multistage Amplifiers

CO 3: Understand the concept of power amplifier and identify different power amplifiers.

CO 4: Interpret the concept of feedback and classify various types of feedback amplifiers and oscillators.

Course Outcomes: Students will be able to

1. Analyze single stage amplifiers using BJT and FET at Low frequencies.
2. Analyze multistage amplifiers using BJT.
3. Design and analyze power amplifiers.
4. Design and analyze Feedback amplifiers & Oscillators.

SYLLABUS

UNIT – I

BJT at low frequency: Transistor Hybrid model, determination of h parameters from characteristics, analysis of transistor amplifier using h-parameter model, emitter follower, Millers theorem and its dual, cascading transistor amplifiers, simplified CE & CC Hybrid models, high input resistance circuits – Darlington pair, boot strapped Darlington pair.

FET at low frequency: FET small signal model, CS/CD/CG configurations at low frequencies.

UNIT-II

Multistage amplifiers: Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, bode plots, band pass of cascaded stages, RC-coupled amplifier, low frequency response of an RC-coupled stage, effect of emitter bypass capacitor on low-frequency response.

Power amplifiers: Class-A large-signal amplifier, second-harmonic distortion, higher-order harmonic distortion, transformer coupled audio power amplifier, efficiency, push-pull amplifiers, class-B amplifier, class-AB operation.

UNIT – III

Feedback amplifiers: Classification of amplifiers, feedback concept, transfer gain with feedback, negative feedback amplifiers and their characteristics, input & output resistance, method of analysis of a feedback amplifier, voltage-series feedback,, current- series feedback, current- shunt feedback, voltage-shunt feedback.

UNIT – IV

Oscillators: Barkhausen criterion for sinusoidal oscillators, RC-phase shift oscillator using FET and BJT, resonant circuit oscillators, general form of oscillator, Wien bridge, Hartley, Colpitts oscillators using BJT, crystal oscillators, frequency stability criterion for oscillators.

TEXT BOOKS:

1. Integrated Electronics: Analog and Digital Circuits and Systems, Jacob Millman and Christos C Halkias, Tata McGraw-Hill Education, 2003.

REFERENCE BOOKS:

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshrestha and S.C. Gupta, TTTI Series, Tata McGraw-Hill Education, 2003.
2. Electronic Devices and Circuits by S. Salivahanan and N. Suresh Kumar, 3rd Edition, Tata McGraw-Hill Education, 2012.

EM waves and Transmission Lines

II B.Tech – II Semester (18EC403)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Electromagnetic field theory

Course Objectives: To learn

CO1: The concepts related reflections and transmission of plane wave at different interfaces

CO2: The fundamentals of different types of transmission lines and impedance matching techniques using smith chart

CO3: The theory of waveguides and power transmission & losses different modes of propagation of the wave in rectangular waveguide.

CO4: The analysis of waveguides and excitation of different modes of propagation of the wave in circular waveguide.

Course Outcomes: Students will be able to

CLO-1: Solve problems related to waves crossing interface formed by different media

CLO-2: Analyze the different types of transmission lines and understand impedance matching using smith chart

CLO-3: Derive wave equations for different modes of propagation in rectangular waveguides

CLO-4: Field analysis different modes of propagation in circular waveguides

SYLLABUS

UNIT – I

Reflection and Refraction of Plane Waves: Reflection by a perfect conductor-Normal incidence, Reflection by a perfect conductor-oblique incidence, Reflection by a perfect dielectric-Normal incidence, Reflection by a perfect insulator-oblique incidence, Reflection at the surface of a conductive medium, surface impedance.

UNIT II

Microwave Transmission Lines: Introduction, transmission line equations and solutions, reflection coefficient and transmission coefficient, standing wave and standing wave ratio, line impedance and admittance, smith chart, impedance matching-single stub matching.

UNIT III

Rectangular Waveguides: Solutions of wave equations in rectangular coordinates, TE modes in rectangular waveguides, TM modes in rectangular waveguides, power transmission in rectangular waveguides, power losses in rectangular waveguides, excitations of modes in rectangular waveguides, characteristics of standard rectangular waveguides.

UNIT IV

Circular Waveguides: Solutions of wave equations in cylindrical coordinates, TE modes in circular waveguides, TM modes in circular waveguides, TEM modes in circular waveguides, power transmission in circular waveguides or coaxial lines, power losses in circular waveguides, excitations of modes in circular waveguides, characteristics of standard circular waveguides.

Text Books:

1. Electromagnetic Waves and Radiating Systems, Edward C. Jordan, Keith G. Balmain,2nd edition, PHI India.(Unit I)
2. Microwave Devices &Circuits, Samuel Y Liao,, 3rd edition, PHI India (Unit II,III,IV)

Reference Books:

1. Electromagnetic waves by R.K.Shevgaonkar , Tata McGraw Hill.
2. P A Rizzi, Micro Wave Engineering: Passive Circuits, PHI, 2002

SIGNALS & SYSTEMS

II B.Tech – IV Semester (Code: 18EC404)

Lectures	4	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Linear Algebra and ODE

Course Objectives: To learn

CO1: Describe the signals mathematically and understand how to perform mathematical operations on signals.

CO2: Understand system properties and model it mathematically.

CO3: Understand the process of convolution between signals and its implication for analysis of LTI systems. Understand the notion of an impulse response.

CO4: Develop trigonometric& exponential fourier series representations.

CO5: Understanding of the Nyquist sampling theorem and the process of converting continous time signals to its samples.

Course Outcomes: Students will be able to

CLO-1: Perform basic mathematical operations on basic signals and classifying the systems

CLO-2: Analyze the LTI system, Can evaluate systems response and Represent a continuous time periodic signal as a Fourier series and determine response of the LTI system to any input signal

CLO-3: Use the Fourier transform to analyze continuous time signals and systems

CLO-4: Perform sampling of low pass signals; verify correlation and computation of spectral densities.

SYLLABUS

UNIT-I

Introduction: Signals and systems defined types of signals, systems.

Mathematical description of Continuous–Time Signals: Functions and functional notation, signal functions, scaling and shifting, differentiation and integration, even and odd functions, periodic functions, signal energy and power.

Properties of Continuous –Time systems: Block diagram and system terminology, system modeling, system properties.

UNIT-II

Time-Domain Analysis of Continuous-Time Systems: The convolution integral, block diagram realization of differential equations.

The Continuous-Time Fourier Systems: Periodic excitation and response of LTI systems, Basic concepts and development of the Fourier series, Numerical computation of the Fourier series, convergence of the Fourier series, properties of the Fourier series, band limited signals, responses of LTI systems with periodic excitation.

UNIT-III

The Continuous-Time Fourier Transform: Aperiodic excitation and response of LTI systems, Basic concepts and development of the Fourier transform, Convergence and the generalized Fourier transform, Numerical computation of the Fourier transform, Properties of the continuous time Fourier transform.

Continuous-Time Fourier Transform analysis of signals and systems: Frequency response, Ideal filters, Practical passive filters.

UNIT-IV

Sampling: Representing a continuous time signal by samples, Impulse sampling.
Correlation, Energy Spectral Density and Power Spectral Density: correlation and the correlogram, autocorrelation, cross correlation, correlations and the Fourier series, energy spectral density, power spectral density.

TEXT BOOK:

1. Fundamentals of Signals and Systems, 2nd Edition, Michael J Roberts, Govind Sharma, Tata McGraw Hill, 2010.

REFERENCE BOOKS:

1. Signals and Systems, Simon Haykin, John Wiley, 2004.
2. Signals and Systems, A V Oppenheim, A S Wilsky& IT Young, PHI/ Pearson, 2003.
3. Signals, Systems and Communications, B P Lathi, BSP, 2003.

Digital Design using HDL

II B.Tech – VI Semester (Code: 18EC405)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50		Semester End Examination (3 Hours)	:	50	

Prerequisites: Digital Electronics

Course Objectives:

CO1: To learn verilog HDL concepts in detail.

CO2: To enable the student to gain experience by designing, modeling, implementing and verifying several digital circuits using verilog HDL.

Course Outcomes: Students will be able to

CLO-1: understand fundamentals of verilog HDL

CLO-2: Design of digital circuits using gate level and data flow modelling.

CLO-3: Design of digital circuits using behavioral modelling

CLO-4: Understanding advanced verilog concepts

SYLLABUS

UNIT – I

Overview of Digital Design with Verilog HDL: Evolution of CAD, emergence of HDLs, typical HDL-based design flow, importance of HDL.

Hierarchical Modelling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, components of a simulation, design block, stimulus block.

Basic Concepts: Lexical conventions, data types, system tasks, compiler directives

Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing.

UNIT II

Gate-Level Modelling: Modelling using basic Verilog gate primitives, description of and/or and buf/not type gates, rise, fall and turn-off delays, min, max, and typical delays, Examples

Dataflow Modelling: Continuous assignments, delay specification, expressions, operators, operands, operator types, Examples.

UNIT III

Behavioural Modeling: Structured procedures, initial and always, Procedural Assignments, timing controls, conditional statements, multiway branching, loops, sequential and parallel blocks, Examples.

Tasks and Functions: Differences between tasks and functions, declaration, invocation, automatic tasks and functions.

UNIT IV

Useful Modelling Techniques: Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

Timing and delays: delay models, path delay modelling, inside specify blocks, time in checks.

User defined primitives: basics, combinational UDPs and examples, sequential UDPs and examples.

TEXT BOOK:

1. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, Second Edition, Prentice Hall PTR, 2003

REFERENCE BOOKS:

1. T.R. Padmanabhan, B. Bala Tripura Sundari , Design through Verilog HDL –, Wiley, 2009.
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2nd Edition

Professional ethics and human values

II B.Tech – II Semester (Code: 18EC406)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives:

1. To create awareness on professional ethics and Human Values.
2. To create awareness on Engineering Ethics providing basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
3. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards
4. To inculcate knowledge and exposure on Safety and Risk, Risk Benefit
5. Analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights
6. To have an adequate knowledge about MNCS, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

Course Outcomes:

1. Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.
2. Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
3. Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
4. Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
5. Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

SYLLABUS

UNIT – I

HUMAN VALUES: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self Confidence, Character, Spirituality.

UNIT – II

ENGINEERING ETHICS: Senses of 'Engineering Ethics', Variety of model issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory, Consensus and Controversy, Professions and Professionalism, Professional Ideals and Virtues, Theories about right action, Self-interest, customs and Religion, Uses of Ethical Theories.

UNIT – III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law. Safety, Responsibility and Rights: Safety and Risk-Assessment of Safety and Risk, risk Benefit analysis and reducing risk. Collegiality and Loyalty , Respect for Authority , Collective Bargaining, Confidentiality , Conflicts of Interest , Occupational Crime , Professional Rights ,employee Rights , Intellectual Property Rights (IIPR) , Discrimination.

UNIT – IV

GLOBAL ISSUES: Multinational Corporations , Environmental Ethics, Computer Ethics, Weapons Development , Engineers as Managers , consulting Engineering, Engineers as Expert Witnesses and Advisors, Moral Leadership, Sample Code of Ethics like ASME, ASCE, IEEE, Institution of engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE), India, etc.

TEXT BOOKS:

1. R. Subramanian, Professional ethics, Oxford higher Education, 2013.
2. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, NewYork 1996.

REFERENCE BOOK:

1. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Engineering Ethics, PHI, 2004.

Electronic Circuits Lab

II B.Tech – II Semester (Code: 18ECL41)

Lectures		Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Electronic devices and circuits lab

Course Objectives: To learn

CO1: Design and test rectifiers.
CO2: Design, test and evaluate BJT amplifiers in CE configuration.
CO3: Design and test a power amplifiers.
CO4: Design and test various types of oscillators
CO5: Design and test JFET amplifiers.

Course Outcomes: Students will be able to

CLO-1: Acquire a basic knowledge in solid state electronics including diodes, JFET and BJT
CLO-2: Develop the ability to analyze and design analog electronic circuits using discrete components.
CLO-3: Observe the amplitude and frequency responses of common amplification circuits.
CLO- 4: Know about the multistage amplifier using BJT determine frequency response and concept of voltage gain.
CLO- 5: Design, construct, and take measurement of various analog circuits to compare experimental results in the laboratory with theoretical analysis.

LIST OF EXPERIMENTS:

1. Full Wave Rectifier with Centre tapped Transformer.

2. Full Wave Rectifier Bridge Circuit

3. Frequency Response of Common Emitter Amplifier.

4. Frequency Response of Common Source Amplifier.

5. Obtain the bandwidth of Two Stage RC-Coupled Amplifier.

6. Design of Voltage Shunt Feedback Amplifier.

7 . Class-A Power Amplifier.

8. Complementary Symmetry Push-pull amplifier.

9. RC Phase Shift Oscillator.

10. Colpitt's Oscillator.

11. BJT Darlington Emitter Follower

12. BJT Boot Strapped Darlington Pair

13. Hartley / Crystal Oscillator.

14. Voltage Series Feedback Amplifier.

15. BJT Voltage Series Regulator/ Voltage Shunt Regulator

NOTE: A minimum of 10 (Ten) programs are to be executed and recorded to attain eligibility for Semester End Examination.

TEXT BOOK:

1. Electronic devices and circuit theory", Robert L. Boylestad and Louis Nashelsky.

REFERENCE BOOKS:

1. Microelectronic Circuits, 7th Edition, Sedra/Smith, Oxford University Press, 2010.
2. "Integrated electronics", Jacob Millman and Christos C Halkias.

HDL Lab

II B.Tech – II Semester (Code: 18ECL42)

Lectures	4	Tutorial	1	Practical	0	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course objectives

1. Describe the importance of modern programmable logic devices
2. Demonstrate different styles of writing HDL code
3. Use vivado tools in digital circuits modeling, simulation, functional verification in Verilog
4. Validate and synthesize a digital circuit to FPGA board using Verilog HDL

Course outcomes

CO1. Apply EDA tools for simulation, verification and synthesis of digital design
CO2. Develop Verilog RTL code for combinational digital circuits.
CO3.Develop Verilog RTL code for sequential digital circuits
CO4.Implement digital systems by programmable devices, such as FPGA

LIST OF PROGRAMS

1. Logic Gates.
2. Multiplexers/ De-Multiplexers.
3. Encoders/ Decoders.
4. Comparators.
5. Adders/ Subtractors.
6. Multipliers.
7. Parity Generators.
8. Design of ALU.
9. Latches.
10. Flip-Flops.
11. Synchronous Counters.
12. Asynchronous Counters.
13. Shift Registers.
14. Memories.
15. CMOS Circuits.

NOTE: A minimum of 10 (Ten) programs are to be executed and recorded to attain eligibility for Semester End Examination.

SIGNALS & SYSTEMS LAB

II B.Tech – IV Semester (Code: 18ECL43)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: To learn

CO1: Describe the signals mathematically and understand how to perform mathematicaloperations on signals.
CO2: Understand system properties and model it mathematically.
CO3: Understand the process of convolution between signals and its implication for analysis of LTI systems. Understand the notion of an impulse response.
CO4: Develop trigonometric& exponential fourier series representations.
CO5: Understanding of the Nyquist sampling theorem and the process of converting continous time signals to its samples.

Course Outcomes: Students will be able to

CLO-1: Perform basic mathematical operations on basic signals and classifying the systems
CLO-2: Analyze the LTI system, Can evaluate systems response and Represent a continuous time periodic signal as a Fourier series and determine response of the LTI system to any input signal
CLO-3: Use the Fourier transform to analyze continuous time signals and systems
CLO-4: Perform sampling of low pass signals; verify correlation and computation of spectral densities.

LIST OF LAB PROGRAMS

1. Basic Operations on Matrices.
2. Generation of basic continuous time signals namely unit impulse, step, ramp, exponential and Sinusoidal signals.
3. Generation of basic discrete time signals namely unit impulse, step, ramp, exponential and Sinusoidal signals.
4. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
5. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of Signal.
6. Verification of linearity and time invariance properties of a given continuous /discrete system.
7. Convolution between Signals and Sequences.
8. Autocorrelation and Cross correlation between Signals and Sequences.
9. Verification of Linearity and Time Invariance Properties of a Given Continuous/Discrete system.
10. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the Given LTI System and Verifying its Physical Realizability and Stability Properties.
11. Finding the Trigonometric Fourier Series of a given Signal.
12. Finding the Fourier Transform of a given Signal and plotting its Magnitude and Phase spectrum.

13. Sampling Theorem Verification.
14. Program to find frequency response of analog LP/HP/BP/BS filters.
15. Program to find the impulse response of a system defined by a difference equation.

NOTE: A minimum of 10 (Ten) Programs have to be performed and recorded by the candidateto attain eligibility for Semester End Examination.

Linear Integrated Circuits
III B.Tech – I **Semester (Code: 18EC501)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Digital Electronics & Electronic Circuits

Course Objectives: To learn

CO1: To understand the basic concepts of operational amplifier and its various applications.
CO2: To Apply the techniques for the design of various Oscillators and Comparators.
CO3: To Analyze Nonlinear Wave shaping circuits and different A/D and D/A Convertors.
CO4: To Analyze the Filters and understand the functioning of different ICs and their Applications.

Course Outcomes: Students will be able to

CLO1.1: Illustrate the block diagram, classifications and characteristics of Op-Amp.
CLO1.2: Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.
CLO1.3: Analyze and Design Linear and Non Linear applications.
CLO2.1: Analyze the applications of Oscillators and Comparators.
CLO3.1:Design Nonlinear wave shaping circuits and understand the classifications, Characteristics and need of data converters.
CLO4.1: Design various active filter configurations based on frequency response using IC741 Op-amp.
CLO4.2: Design different Multivibrator using IC 555 timer and study their applications.
CLO4.3: Determine the lock range and capture range of PLL and use in various applications of Communications.

SYLLABUS

UNIT – I

OPERATIONAL AMPLIFIERS: Operational amplifier and block diagram representation, op-amp with negative feedback. Block diagram representation of feedback configurations, voltage series feedback amplifier, voltage shunt feedback amplifier, differential amplifier with one op-amp, input offset voltage, input bias current, input offset current, total output offset voltage, frequency response of op-amp, stability, slew rate.

OP-AMP APPLICATIONS: The summing amplifier, Differential and instrumentation amplifiers, Voltage to current and current to voltage conversion, The Op-amp with complex impedances, Differentiators and integrators, Non Linear Op Amp circuits, Precision rectifiers.

UNIT – II

OSCILLATORS& COMPARATORS: Oscillator principles, Oscillator types, Frequency stability, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square-wave generator, Triangular wave generator, Saw tooth wave generator, and Voltage controlled oscillator. Introduction to comparator, Basic comparator, Zero-crossing detector, Schmitt Trigger, Comparator characteristics, Limitations of Op-Amps as comparators, Voltage limiters.

UNIT – III

CLIPPERS, CLAMPERS & CONVERTERS: Positive and negative clippers, Positive & negative clampers, Absolute value output circuit, Peak detector, S/H circuit. D/A conversion fundamentals, weighted resistor summing, R-2R Ladder D/A converters, A/D conversion: Ramp type, Successive Approximation, Dual slope converters, Parallel & Tracking A/D converters.

UNIT – IV

APPLICATIONS OF SPECIAL ICS & ACTIVE FILTERS: The 555 timer, 555 as Monostable and AstableMultivibrator and applications. Phase Locked Loops, Operating principles, Monolithic PLLs, 565 PLL applications, A 723 Voltage Regulator and its design. Active LP and HP filters, Band pass filters: Wideband, Narrow Band pass filters, Band stop filters, State variable filters, and All pass filters.

TEXT BOOKS:

1. Rama Kant A. Gayakwad, Op-Amps& Linear Integrated Circuits, 4th Edition, PHI/ PearsonEducation, 2003.
2. D.Roy and Choudhury, ShailB.Jain, Linear Integrated Circuits, 2nd Edition, New Age International, 2003.

REFERENCE BOOKS:

1. Microelectronics: Circuit Analysis and Design, Donald A. Neamen, 4th Edition,McGrawHill, 2010.
2. Microelectronic Circuits, 7th Edition, Sedra Smith, Oxford University Press, 2010.

Linear Control System
III B.Tech – I **Semester (Code: 18EC502)**

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: Types of control systems and evaluation of Transfer functions from Block Diagram reduction techniques and from Mason's gain formula.

CO2: The Behavior of control systems for standard test signals, to know the time domain Parameters of a control system and also the error constants

CO3: The differences between frequency and time domain parameters. To know the stability concepts of control systems by R-H Criterion, Root Locus Techniques and also by frequency plots (Graphical methods) like Polar, Bode and Nyquist Criterion.

CO4: The state space model concept of control system

Course Outcomes: Students will be able to

CLO1: Know different types feedback systems and solve problems to find transfer functions using Block diagram reduction Techniques and Mason's gain formulas.

CLO2: Analyze the effect of controls system for various test signals and also able to find the time domain parameters and Error constants.

CLO3: Identifies the differences between frequency and time domain parameters. Evaluate the stability of the open loop and closed loop control systems stability mathematically by Routh – Hurwitz criterion, Root Locus Technique and also by drawing frequency response plots like Polar, Bode and Nyquist plots.

CLO4: Know the State space modeling, solution of state equations and the Concepts of Controllability and Observability of a given control system

SYLLABUS

UNIT – I

INTRODUCTION: Basic concept of simple control system, open loop – closed loop control systems. Effect of feedback on overall gain – stability sensitivity and external noise. Types of feedback control systems – Linear time invariant, time variant systems.

MATHEMATICAL MODELS AND TRANSFER FUNCTIONS OF PHYSICAL SYSTEMS: Differential equations – impulse response and transfer functions – translational and rotational mechanical systems. Transfer functions and open-loop and closed-loop systems.

Block diagram representation of control systems – block diagram algebra – signal flow graph – Mason's gain formula

UNIT – II

TIME DOMAIN ANALYSIS: Standard test signals – step, ramp, parabolic and impulse response function – characteristic polynomial and characteristic equations of feedback systems – transient response of first order and second order systems to standard test signals.

Time domain specifications – steady state response – steady state error and error constants. Effect of adding poles and zeros on over shoot, rise time, band width – dominant poles of transfer functions.

STABILITY ANALYSIS IN THE COMPLEX PLANE: Absolute, relative, conditional, bounded input – bounded output, zero input stability, conditions for stability, Routh – Hurwitz criterion.

UNIT – III

FREQUENCY DOMAIN ANALYSIS: Introduction – frequency domain specifications – correlation between time and frequency responses.

Polar plots – Bode plots – Nyquist stability criterion – Nyquist plots. Assessment of relative stability using Nyquist criterion – closed loop frequency response.

UNIT – IV

Root LOCUS TECHNIQUE: Introduction – stability from root locus – construction of root loci.

STATE SPACE ANALYSIS: Concepts of stat, state variables and state models – digitalization – solution of state equations – state models for LTI systems. Concepts of controllability and Observability.

TEXT BOOKS:

1. B.C. Kuo, Automatic control systems, 9th edition, PHI.
2. I. J. Nagrath& M Gopal, Control Systems Engineering, 3rd edition, New Age International.

REFERENCE BOOKS:

1. Schaum Series, Feedback and Control Systems, TMH.
2. M. Gopal, Control Systems Principles and Design, TMH.
3. John Van de Vegta, Feedback Control Systems, 3rd edition, Prentice Hall, 1993.
4. K. Ogata, Modern Control Engineering, 3rd edition, PHI.
5. Control Systems Engineering, Norman S. Nise, 6th edition, Wiley, 2011.
6. Modern Control Systems,Richard C. Dorf and Robert H. Bishop,12th Edition, Prentice Hall,2011.

Micro Processors and Micro Controllers
III B.Tech – I **Semester (Code: 18EC503)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Digital Electronics

Course Objectives: The course should enable the students to:

CO1: Illustrate the architecture of 8051 and 8086 microprocessors.
CO2: Introduce the programming and interfacing techniques of 8086 microprocessor.
CO3: Understand the interfacing circuits for various applications of 8051 microcontroller.
CO4: Analyze the basic concepts and programming of 8051 microcontroller.

Course Outcomes: Students will be able to
CLO1: Describe the architecture and addressing modes of 8086.
CLO2: Develop 8086 programming skills in assembly language.
CLO3: Explain the need for different interfacing devices.
CLO4: Understand the fundamentals of microcontroller systems and interface, and have the ability to program 8051 using proper simulation tools.

SYLLABUS

UNIT – I

MICROPROCESSOR: introduction to microcomputers and microprocessors, introduction and architecture of 8086 family, addressing modes, instruction description and assembler directives of 8086 microprocessors.

UNIT – II

8086 PROGRAMMING AND SYSTEM CONNECTIONS: Program development steps, writing programs for use with an assembler, assembly language program development tools, writing and using procedures and assembler macros. 8086 interrupts and interrupt responses.

UNIT – III

DIGITAL INTERFACING: Programmable parallel ports, handshake IO, 8255 programmable peripheral interface. Interfacing microprocessor to keyboards.
ANALOG INTERFACING: DAC principle of operation and interfacing.
PROGRAMMABLE DEVICES: Introduction to Programmable peripheral devices 8254, 8259, 8251, DMA data transfer, 8237 DMA controller, RS232 communication standard and maximum mode of 8086 operation.

UNIT – IV

INTRODUCTION TO MICROCONTROLLERS: comparing microprocessors and microcontrollers, Architecture of 8051, pin configuration of 8051microcontroller, hardware input pins, output pins ports and external memory, counters and timers, serial data input and output and interrupts. Programming & interfacing 8051:- Addressing modes of 8051 microcontroller, Instruction set of 8051 microcontroller, simple programs using 8051 microcontroller. Interfacing a stepper motor, ADC.

TEXT BOOKS:

1. Duglus V. Hall, Microprocessor and Interfacing, Revised 2nd Edition, TMH, 2006.
2. Mohammed Ari Mazidi and JanciGillispie, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi.

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals AK Ray and KM Bhurchandi 2nd Edition, TMH.
2. The 8051 Microcontroller, 3rd Edition, Kenneth Ayala, Cengage Learning

Digital Signal Processing
III B.Tech – I **Semester (Code: 18EC504)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn
CO1: Various types of Digital signals and systems in time and frequency domain (Z - domain).
CO2: The concept of DFT and importance and implementation of FFT.
CO3: The designingand realization ofan IIR Digital Filters through Approximation Procedures.
CO4: The designingand realization ofa FIR Digital Filters through Different Techniques.

Course Outcomes: Students will be able to
CLO-1: Analyze various types of Digital signals and systems in time and frequency domain.
CLO-2: Understand and determine the DFT of a given signal.
CLO-3: Construct an IIRDigital Filter for given specifications.
CLO-4: Construct a FIR Digital Filter for given specifications.

SYLLABUS

UNIT – I

INTRODUCTION: Signals, Systems and Signal Processing, classification of signals, the concept of frequency in Continuous - Time and Discrete – Time signals.
DISCRETE-TIME SIGNALS AND SYSTEMS: Discrete-Time Signals, Discrete-Time Systems, Analysis of Discrete-Time Linear Time-Invariant Systems, Discrete-Time Systems Described by Difference Equations, Recursive and Non-recursive Discrete-Time Systems.
THE Z-TRANSFORM AND ITS APPLICATION TO THE ANALYSS OF LTI SYSTEMS: The Z Transform, Properties of the Z Transform, Rational Z Transforms, Inversion of the Z Transform, Analysis of Linear Time-Invariant Systems in the Z Domain, the One-sided Z Transform.

UNIT – II

THE DISCRETE FOURIER TRANSFORM: ITS PROPERTIES AND APPLICATIONS: Frequency Domain Sampling: The Discrete Fourier Transform, Properties of the DFT.
EFFICIENT COMPUTATION OF THE DFT: FAST FOURIER TRANSFORM ALGORITHMS: Efficient Computation of the DFT FFT Algorithms, Applications of FFT Algorithms.

UNIT – III

DESIGN OF DIGITAL FILTERS: General Considerations, Design of IIR Filters from Analog Filters, Frequency Transformations.
IMPLEMENTATION OF DISCRETE- TIME SYSTEMS: Structures for the Realization of Discrete-Time Systems, Structures for IIR Systems.

UNIT – IV

DESIGN OF DIGITAL FILTERS: Design of FIR Filters, Symmetric and Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method.

IMPLEMENTATION OF DISCRETE- TIME SYSTEMS: Structures for FIR Systems.

TEXT BOOK:

1. John G. Proakis, Dimitris G Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications," 4th Edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. Sanjit K Mitra, "Digital Signal Processing: A Computer Based Approach," 3rdEdition, TMH, SIE, 2008.
2. Lonnie C Ludeman, "Fundamentals of Digital Signal Processing," John Wiley & Sons, 2009. Alan V Oppenheim and Ronald W Schafer, Discrete Time Signal Processing, Pearson Education, 2007.
3. Andreas Antoniou, "Digital Signal Processing", Tata Mc Graw Hill, 2006.

Analog and Digital Communications
III B.Tech – I **Semester (Code: 18EC505)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Signals & Systems [18EC404]

Course Objectives: The objective of this course is to:

CO1: Study of amplitude modulation and demodulation techniques.
CO2: Understand the basic principles of angle modulation and demodulation techniques.
CO3: Explore the various pulse analog and pulse digital modulation and demodulation techniques.
CO4: Describe some important digital band-pass modulation techniques used in practice.

Course Outcomes: Students will be able to:
CLO1: Understand the basic principles of amplitude modulation and demodulation techniques.
CLO2: Analysis of angle modulation and demodulation techniques.
CLO3: Analyze the pulse modulation and demodulation techniques.
CLO4: Understand and analyze the digital band-pass modulation techniques.

SYLLABUS

UNIT – I

AMPLITUDE MODULATION: Introduction to Continuous-wave Modulation, Need for Modulation.Amplitude Modulation, Virtues, Limitations, and Modifications of Amplitude Modulation, Double Sideband- Suppressed Carrier Modulation, Coherent detection, Costas Receiver, Quadrature Carrier Multiplexing, Single-Sideband Modulation, Vestigial Sideband Modulation, AM Transmitters and Receivers.

UNIT – II

ANGLE MODULATION: Basic Definitions, Properties of Angle Modulated Waves, Relationship between PM and FM waves, Narrow-Band Frequency Modulation, Wide-Band Frequency Modulation, Transmission Bandwidth of FM waves, Generation of FM waves, Demodulation of FM signals. Pre-emphasis and De-emphasis in FM, FM Transmitters and Receivers. Noise in Analog Communication (SNR calculations)

UNIT – III

PULSE MODULATION: Sampling Process (ideal and flat-top), Pulse-Amplitude Modulation, Pulse-Position Modulation, Quantization Process, Quantization Noise, Pulse Code Modulation: Encoding, Regeneration, Decoding, Delta Modulation, Differential Pulse Code Modulation, Line Codes.

UNIT – IV

DIGITAL BAND-PASS MODULATION TECHNIQUES: Introduction, Pass band transmission model, Matched filter Receiver, Binary Amplitude-Shift Keying (BASK), Phase-Shift Keying (BPSK, QPSK), Frequency-Shift Keying (BFSK, MSK),Noncoherent Digital

Modulation Schemes (BASK, BFSK, DPSK),M-ary Digital Modulation Schemes (M-ary PSK, M-ary QAM, M-ary FSK), SNR calculations with Matched filter, BER calculations for Digital Modulations.

TEXT BOOK:

1. Simon Haykin and Michael Moher, "An Introduction to Analog & Digital Communications",2nd Ed., Wiley, 2007.

REFERENCE BOOKS:

1. H Taub& D. Schilling, GautamSahe, "Principles of Communication Systems", TMH, 3rdEdition, 2007.
2. Sam Shanmugam, "Analog and Digital Communication Systems", John Wiley and Sons, 1992.

COMPUTER ORGANIZATION & ARCHITECTURE

III B.Tech – I **Semester (Code: 18ECD11)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Digital Electronics, Basic Programming

Course Objectives:

CO1: To understand the basic structure and operation of a digital computer.

CO2: To understand the operation of the arithmetic unit including the algorithms and implementation of fixed point and floating point addition, subtraction, multiplication and division.

CO3: To know the concept of pipelining and memory system including cache memories and virtual memory.

CO4: To study the different ways of communicating with I/O devices and standard I/O Interfaces.

Course Outcomes: Students will be able to

CLO1: Understand basic units and operations of digital computer.

CLO2: Understand the Hardware implementation of processing unit and Arithmetic units.

CLO3: Understand the concept of memory system and fast execution using pipelining.

CLO4: Understand various paths of communicating with I/O devices through different standard interfaces.

SYLLABUS

UNIT – I

BASIC STRUCTURE OF COMPUTERS: Computer types, Functional Unit, Basic operational concepts, Bus structures, Performance, multiprocessors and multicomputers.

MACHINE INSTRUCTIONS AND PROGRAMS: Numbers, Arithmetic operations and characters, Memory location and addresses , Memory operations, Instructions and instruction sequencing ,Addressing modes, Basic Input and Output operations,Stacks and Queues, Subroutines, Additional instructions.

UNIT – II

BASIC PROCESSING UNIT: Some fundamental concepts, Execution of a complete Instruction, Multiple-Bus organization, Hardwired control, Micro programmed control, Microinstructions.

Arithmetic: Addition and subtraction of signed numbers, Design of fast adders,Multiplication of positive numbers, Signed operand multiplication, Fast multiplication, Integer division.

UNIT – III

PIPELINING: Basic concepts, Data hazards, Instruction hazards, Influence of instruction sets, Data path and control considerations, Superscalar operation.

THE MEMORY SYSTEM: Some basic concepts, Semiconductor RAM memories-Internal Organization of memory chips, Read only memories, Speed, size and cost,Cache memories, Performance considerations, Virtual memories.

UNIT – IV

INPUT/OUTPUT ORGANIZATION: Accessing I/O devices, Interrupts, Direct memory access, Standard I/O interfaces: PCI, SCSI, and USB.

TEXT BOOK:

1. Computer Organization Carl Hamacher, ZvonkoVranesic, SafwatZaky, Fifth Edition, McGraw Hill.

REFERENCE BOOKS:

1. Computer Architecture and Organization-John P. Hayes, Third Edition, McGraw Hill.
2. Computer Organization and Architecture William Stallings, Sixth Edition, Pearson/PHI.
3. Computer Systems Architecture M. Moris Mano, Third Edition, Pearson/PHI.

DATA COMMUNICATION AND COMPUTER NETWORKS
III B.Tech – I **Semester (Code: 18ECD12)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Basics of Computer hardware and software

Course Objectives: To learn
CO1: To learn various protocols, Network hardware, Network software.
CO2: To gain knowledge about functionality of each layer in OSI, TCP/IP protocols.
CO3: Understand basics and challenges of network communication.
CO4: Interpret the operation of the protocols that are used inside the Internet.

Course Outcomes: Students will be able to
CLO1: Independently understand basic computer network technology.
CLO2: Understand and explain Data Communications System and its components.
CLO3: Identify the different types of network topologies and protocols.
CLO4:Understand and building the skills of subnetting and routing mechanisms.

SYLLABUS

UNIT – I
Introduction to Data Communication and Networking: Uses of Computer Networks, Network Hardware, Network Software Internet Reference Models (OSI and TCP/IP).
Physical Layer: Basis for Data Communication, Guided Transmission Media, Wireless Transmission Medium, Circuit Switching and Telephone Network, High Speed Digital Access.

UNIT – II
Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Data Link Control and Protocols, Example Data Link Protocol.
Medium Access Layer: Channel Allocation Problem, Multiple Access, CSMA, CSMA/CD, CSMA/CA.

UNIT – III
Local Area Network:Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN, Blue tooth, Connecting devices:-Repeaters, Hub, Bridges, Switch, Router, Gateways, Virtual LAN,
Network Layer:Network Layer Design Issues, Routing Algorithms Congestion control Algorithms,

UNIT – IV
Transport layer:Transport Layer Service, Elements of Transport protocols, Internet protocols (UDP and TCP)
Application Layer:DNS- Domain Name System, Electronic Mail, World Wide Web, Multimedia (Audio Compression, Streaming Audio, Voice over IP, Video Compression, Video on Demand).

TEXT BOOKS:
1. Andrew S. Tanenbaum, David.J.Wetherall, “ComputerNetworks”, Prentice-Hall, 5th Edition, 2010.

2. Behrouz A. Foruzan, Data communication andNetworking, 4thEdition,TMH, 2004.

REFERENCE BOOKS:

1. W.Tomasi,"Introduction to Data Communications and Networking" Pearson education.
2. G.S.Hura and M.Singhal,"Data and Computer Communications",CRCPress,Taylor and Francis Group.
3. S.Keshav,"An Engineering Approach to CoputerNetworks",Pearson Eduction,2nd Edition.

PROGRAMMING WITH JAVA

III B.Tech – I **Semester (Code: 18ECD13)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Programming with C++

Course Objectives: To learn

CO1: Understand the different java programming concepts
CO2: impart the concepts of Classes and Objects
CO3: Understand the concepts of inheritance, packages and interfaces.
CO4: Implementation of Exception handling and multithreading using java programs

Course Outcomes: Students will be able to

CLO1: Understand the concepts of object oriented programming to implement java programs
CLO2: Develop the java applications using the concepts of Classes and Objects
CLO3: Apply the concepts of inheritance, packages and interfaces to implement java programs.
CLO4: Analyze and Implement the role of exception handling and multithreading in program design using JAVA

UNIT-I

INTRODUCTION: Creation of Java, importance of Java to internet, byte code, Java buzzwords, OOP Principles, Encapsulation, Inheritance and Polymorphism, data types, variables, declaring variables, dynamic initialization, scope and life time of variables, arrays, operators, control statements, type conversion and casting, compiling and running of simple Java program.

UNIT-II

CLASSES AND OBJECTS: Concepts of classes and objects, class fundamentals, declaring objects, assigning object reference variables, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, garbage collection, overloading methods and constructors, parameter passing - call by value, recursion, nested classes and inner classes, exploring the String class.

UNIT-III

INHERITANCE: Basic concepts, member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance, the Object class.

PACKAGES AND INTERFACES: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-IV

EXCEPTION HANDLING AND MULTITHREADING: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes, Concepts of Multithreading, differences between process and thread, thread life cycle, creating multiple threads using Thread class, Runnable interface, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

TEXT BOOKS:

1. The Complete Reference Java J2SE 7th Edition by Herbert Schildt, McGraw-Hill Companies.

2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons.

REFERENCE BOOKS:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.

Pulse and Switching Circuits

III B.Tech – I **Semester (Code: 18ECD14)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Electronic Devices

Course Objectives: To learn
CO1: Analyze RC circuits for low pass and high pass filtering.
CO2: Design different clipper and clamper circuits.
CO3: Design Bistable, Monostable and AstableMultivibrators using discrete components.
CO4: Analyze voltage and current sweep circuits and identify methods to mitigate sweep errors.

Course Outcomes: Students will be able to
CLO1: Analyze the response of low pass and high pass circuits for different waveforms.
CLO2:Know the Application of diode as clippers, clamper circuits.
CLO3: Design Multivibrator for various applications.
CLO4:Undestand the Operation of Time base generators.

SYLLABUS

UNIT – I

LINEAR WAVE SHAPING: The high- pass RC circuit, Response of RC high- pass circuit to sinusoidal, step, pulse, square wave, exponential and ramp input, The high-pass RC circuit as a differentiator, Double differentiation, low-pass RC circuit, Response of RC low-pass circuit to sinusoidal, step, pulse, square-wave, exponential and Ramp inputs, The low-pass RC circuit as an integrator, Attenuators.

UNIT – II

NON-LINEAR WAVE SHAPING:
Clipping (Limiting) circuits, Diode clippers, Clipping at two independent levels, Comparators, Diode-differentiator comparator, Applications of voltage comparators, the clamping operation, Positive clamper, Negative clamper, a clamping circuit theorem, Transistor as a switch.

UNIT – III

BISTABLE MULTIVIBRATORS : The stable states of a binary, A fixed bias transistor binary, A self-biased transistor binary, Commutating capacitors, Methods of improving resolution, Unsymmetrical triggering of the binary, Triggering Unsymmetrically through a unilateral device, Symmetrical triggering, Direct –connected binary circuit, Schmitt Trigger circuit, Emitter-coupled binary.
MONOSTABLE AND ASTABLE MULTIVIBRATORS: The Monostable Multivibrator, Gate width of a collector-coupled Monostable Multivibrator, Waveforms of the collector-coupled Monostable Multivibrator, Triggering of the Monostable Multivibrator, Astable collector-coupled Multivibrator.

UNIT – IV

VOLTAGE TIME BASE GENERATORS: General features of a time- base signal, Exponential sweep circuit, Miller and Bootstrap Sweep circuits.

CURRENT TIME-BASE GENERATORS: A simple current sweep, Linearity correction through adjustment of driving waveform, a transistor current time -base generator.

TEXT BOOK:

1. J Millman and H Taub, Pulse, Digital and Switching Circuits, TMH, 2003.

REFERENCE BOOKS:

1. J Millman and H Taub, Mothiki S. Prakash Rao, Pulse Digital & Switching Waveforms, 2nd Edition, TMH.
2. David A Bell, Solid State Pulse Circuits, 4th Edition, PHI 2003.

Micro Processors and Micro Controllers Programming Lab
III B.Tech – I **Semester (Code: 18ECL51)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: The course should enable the students to:
CO1: Introduce the programming and interfacing techniques of 8086 microprocessor.
CO2: Analyze the basic concepts and programming of 8051 microcontroller.

Course Outcomes: Students will be able to
CLO1: Develop 8086 programming skills in assembly language.
CLO2: Understand the instruction set of 8051 microcontroller, and have the ability to program 8051 using proper simulation tools.

LIST OF LAB EXPERIMENTS

Experiments Based on ALP (8086)

1. Programs on Data Transfer Instructions.
2. Programs on Arithmetic and Logical Instructions.
3. Programs on Branch Instructions.
4. Programs on Subroutines.
5. Sorting of an Array.
6. Programs on Interrupts (Software and Hardware).
7. 8086 Programs using DOS and BIOS Interrupts.

Experiments Based on Interfacing & Microcontroller (8051)

8. DAC Interface-Waveform generations.
9. Stepper Motor Control.
10. Keyboard Interface / LCD Interface.
11. Data Transfer between two PCs using RS.232 C Serial Port
12. Programs on Data Transfer Instructions using 8051 Microcontroller.
13. Programs on Arithmetic and Logical Instructions using 8051 Microcontroller.
14. Applications with Microcontroller 8051.

NOTE: A minimum of 10(Ten) experiments, choosing 5 (Five) from each part, have to be Performed and recorded by the candidate to attain eligibility for Semester End Examination.

Linear Integrated Circuits Lab
III B.Tech – I **Semester (Code: 18ECL52)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Digital Electronics and Electronic Circuits

Course Objectives: To learn
CO1: To understand the basic concepts of operational amplifier and its various applications.
CO2: To Apply the techniques for the design of various Oscillators and Comparators.
CO3: To Analyze Non-linear Wave shaping circuits and different A/D and D/A Convertors.
CO4: To Analyze the Filters and understand the functioning of different ICs and their applications.

Course Outcomes: Students will be able to
CLO1: Understand the various applications of linear IC's like 741 and 555 timer
CLO2: Define significance of Op Amps and their importance.
CLO3: Build circuits using Analog IC's.
CLO4: In-depth knowledge of applying the concepts in real time applications.
CLO5: Analyze and Design Linear and Non Linear applications.
CLO6: Analyze and Design the applications of Oscillators and Comparators.
CLO7: Design Non-linear wave shaping circuits and understand the classifications, Characteristics and need of data converters.
CLO8: Able to use OP Amp as analog to digital and digital to analog converter.
CLO9: Design various active filter configurations based on frequency response using IC741 Op-amp.
CLO10: Design different multivibrators using IC 555 timer and study their applications.
CLO11: Determine the lock range and capture range of PLL and use in various applications of Communications.
CLO12: Design the applications of IC 566 and IC 723.

LIST OF LAB EXPERIMENTS

1. Measurement of Op-amp Parameters.
2. Applications of Op-amp (Adder, Subtractor, Integrator, Differentiator).
3. Design of Full Wave Rectifier using Op-Amp.
4. Design of Low Frequency Oscillators using Op-Amp (Wein Bridge & RC Phase Shift Oscillators).
5. Waveform Generation using Op-amp (Square, Triangular).
6. Instrumentation Amplifier using Op-AmpIC741.
7. Design and Verification of Schmitt Trigger using Op-AmpIC741.
8. Design of Active Filters (First Order LPF&HPF).
9. Design of State Variable Filter using Op-Amps.
10. Applications of 555 Timer ICs (Astable, Monostable, Schmitt Trigger).
11. PLL using IC 556.
12. Design of Fixed Voltage Regulators.

13. Design of Variable Voltage Regulator using IC 723.
14. Design of VCO using IC 566.
15. Design of 3 bit DAC using R-2R Ladder Network.

NOTE: A minimum of 10(Ten) experiments have to be Performed and recorded by the candidate to attain eligibility for Semester End Examination.

Analog and Digital Communications Lab
III B.Tech – I **Semester (Code: 18ECL53)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Signals & Systems [18EC404]

Course Objectives: The objective of this course is to:
CO1: Study of amplitude modulation and demodulation techniques.
CO2: Understand the basic principles of angle modulation and demodulation techniques.
CO3: Explore the various pulse analog and pulse digital modulation and demodulation techniques.
CO4: Describe some important digital band-pass modulation techniques used in practice.

Course Outcomes: Students will be able to:
CLO-1: Understand the basic principles of amplitude modulation and demodulation techniques.
CLO-2: Analysis of angle modulation and demodulation techniques.
CLO-3: Analyze the pulse modulation and demodulation techniques.
CLO-4: Understand and analyze the digital band-pass modulation techniques.

LIST OF EXPERIMENTS

1. Amplitude Modulation and Demodulation.
2. DSB SC Modulation and Demodulation.
3. SSB SC Modulation and Demodulation.
4. Frequency Modulation and Demodulation.
5. Pre-Emphasis and De-Emphasis Circuits.
6. Frequency Demodulation using Phase Locked Loop.
7. PAM Generation and Reconstruction.
8. PWM and PPM: Generation and Reconstruction.
9. Generation and Detection of PCM.
10. Generation and Detection of FSK.
11. Generation and Detection of PSK.
12. Write a program to generate digital modulation (Binary and M-ary) and demodulation scheme.
13. Synchronous Detector.
14. Verification of Sampling theorem.
15. Delta Modulation and Demodulation.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by thecandidateto attain eligibility for Semester End Examination.

TEXT BOOK:

1. Simon Haykin and Michael Moher, "An Introduction to Analog & Digital Communications",2nd Ed., Wiley, (2007).

REFERENCE BOOKS:

1. H Taub& D. Schilling, GautamSahe, "Principles of Communication Systems", TMH, 3rd Edition, (2007).
2. Sam Shanmugam, "Analog and Digital Communication Systems", John Wiley and Sons, 1992.

CONSTITUTION OF INDIA
VI – Semester (Code: 18EC601)

Lectures	4	Tutorial	0	Practical	0	Credits	0
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None.

Course Educational Objective:
The objective of the course is how to deal and adjust in the society under government regulations. Constitution is the highest law of the land and every department owes its origin to its laws. To make governance better an engineer must conduce to E-governance through computers and knowledge of cyber laws. An engineer must know the limits of state action and regulations by acquainting himself with the laws that applied by the bureaucrats.
Since an engineer works at different places and sights, he must have the basic knowledge of centre – state relations with reference to policy of financing the key projects.

Course Outcomes (COs): At the end of the course, students will be able to
CLO1:Understand Constitution of India.
CLO2: Understand the union government and its administration and rules to follow.
CLO3: To understand state government and its administration policies to follow.
CLO4: Analyze various local administration and election commission rules to follow.

SYLLABUS

UNIT – I
INTRODUCTION: Constitution' meaning of the term, Indian Constitution:Sources and constitutional history, Features: Citizenship,Preamble, Fundamental Rights and Duties, DirectivePrinciples of State Policy.

UNIT – II
UNION GOVERNMENT AND ITS ADMINISTRATION: Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM andCouncil of ministers, Cabinet and Central secretariat, LokSabha, Rajya Sabha.

UNIT – III
STATE GOVERNMENT AND ITS ADMINISTRATION: Governor: Role and Position, CM and Council ofministers, State Secretariat: Organisation, Structure and Functions

UNIT – IV
LOCAL ADMINISTRATION: District's Administration head: Role and Importance,Municipalities: Introduction, Mayor and role of ElectedRepresentative, CEO of Municipal Corporation, Pachayatiraj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Blocklevel: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials,Importance of grass root democracy.
ELECTION COMMISSION: Election Commission: Role and Functioning, ChiefElection commissioner and Election Commissioners, StateElection Commission: Role and Functioning, Institute andBodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. 'Indian Polity' by Laxmikanth-6th edition-Mcgraw-hillindia
2. 'constitution of india'-Dr. P.K. AgrawalDr. K.N. Chaturvedi -Kindle Edition
3. 'Indian Constitution' by D.D. Basu-24th edition-lexis nexis publishers
4. 'Indian Administration' by Avasti and Avasti-Lakshmi Narain Agarwal Educational Publishers

REFERENCE BOOKS:

1. G. Austin (2004) Working of a Democratic Constitution of India, New Delhi: Oxford University Press.
2. Basu, D.D (2005), An Introduction to the Constitution of India, New Delhi, Prentice Hall.
3. N. Chandhoke&Priyadarshini (eds) (2009) Contemporary India: Economy, Society, Politics, New Delhi: Oxford University Press.

INTERNET OF THINGS

III B.Tech – II Semester **(Code: 18EC602)**

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Problem Solving with Programming, Data Structures using Python and Microprocessors and Microcontrollers

Course Objectives (COs):

The main objectives of this course are:

CO1: To impart fundamental knowledge and programming of edge devices like Arduino, Raspberry Pi & Node MCU.

CO2: Aware on basics of IOT, communication protocols & applicability of IOT.

Course Outcomes (CLOs): On successful completion of this course students will be able to:

CLO1: Program open source Edge devices like Arduino, Raspberry Pi., Node MCU

CLO2: Select appropriate IOT technologies, Service providers & various cloud services for IOT applications.

CLO3: Analyze the different communication and IOT protocols.

CLO4: Understand various IOT implementations in different domains.

SYLLABUS

UNIT – I

ARDUINO, RASPBERRY PI & OTHER DEVICES

Introduction to Arduino: Introduction to Arduino Uno, Features, Pin functionality, Basic Arduino Programming: Interfacing LEDs, Switches using Digital I/O Read/Write, Acquiring and generating signals using Analog I/O Read/Write, Serial functions.

Introduction to Raspberry Pi: Introduction to Raspberry Pi, Pin functionality, Revision of Python Programming; Raspberry Pi commands, GPIO programming.

Other Open Source Devices: Features and pin functions of NodeMCU.

UNIT - II

INTRODUCTION TO IOT & CLOUDS

Introduction to IOT: Terms and definitions, Logical design of IoT, IOT Reference Model;

IoT and M2M: Introduction to M2M, Difference between IoT and M2M and other types;

IoT Servers and Cloud Offerings: IoT enabling technologies – Cloud Computing; Introduction to Cloud Storage/Services: Amazon Web services for IOT & equivalent features of Google, Microsoft Azure, IBM, Setting up to write using Thingspeak;

UNIT – III

IOT & COMMUNICATION PROTOCOLS,

Serial –RS 485, IEEE1394 Firewire, I2C, SPI, USB, CAN; Wireless sensor networks and its technologies, IOT Protocols.

UNIT – IV

DOMAIN SPECIFIC IOT APPLICATIONS & CASE STUDIES:

IOT Application & case studies for Agriculture, Smart Cities & Transport, Home Automation, Environment, Retail, Logistics, Health, Life style, Industry – Energy;

TEXT BOOKS:

1. Srinivasa K G, Siddesh G M, Hanumantha Raju R, Internet of Things, Cengage, 2019.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014.

REFERENCE BOOKS:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, Introduction to IoT, Cambridge University Press, 1st edition, Nov, 2020.
2. Jeremy Blum, Exploring Arduino: Tools and Techniques for Engineering Wizardry, Wiley, 2013.
3. Simon Monk, Raspberry Pi Cookbook, O'Reilly 3rd Edition, 2019
4. Michael Margolis, Arduino Cookbook, 2nd Edition, December 2011, O'Reilly Media, Inc.
5. Rahul Dubey, An Introduction to Internet of Things – Connecting Devices, Edge Gateway, and Cloud with Applications, Cengage, 2019.

Online Sources:

1. https://nptel.ac.in/courses/106/105/106105166/
2. http://www.nptelvideos.in/2012/11/embedded-systems.html
3. https://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/

Digital Image Processing

III B.Tech – II Semester **(Code: 18EC603)**

Lectures	4	Tutorial		Practical	0	Credits	4
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)		:	50

Prerequisites: None

Course Objectives: This course aims to

CO1: Develop a theoretical foundation of fundamental Digital Image Processing concepts.

CO2: Provide mathematical foundations for digital manipulation of images; image acquisition;Preprocessing; segmentation; Fourier domain processing; and compression.

CO3: Gain experience and practical techniques to write programs using MATLAB language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; Morphological operations and compression.

Course Outcomes: Students will be able to

CLO1: Demonstrate knowledge of a broad range of fundamental image processing and image analysis techniques and concepts (linear and non-linear filtering, de-noising, edge detection, line finding, detection, morphological operators, compression, shape metrics and feature based recognition)

CLO2: Identify, Demonstrate and apply their knowledge by analyzing image processing problems and recognizing and employing (or proposing) effective solutions.

CLO3: Design and create practical solutions to a range of common image processing problems and to critically assess the results of their solutions, including shortcomings.

SYLLABUS

UNIT – I

INTRODUCTION: What Is Digital Image Processing? The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, An introduction to the mathematical tools used in Digital Image Processing.

UNIT – II

INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

FILTERING IN THE FREQUENCY DOMAIN: Background, Extension to Functions of two variables, Some properties of 2D Discrete Fourier Transform, The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters, Selective filtering.

UNIT – III

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter.

COLOR IMAGE PROCESSING: Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Image Segmentation based on Color, Noise in Color Images, Color Image Compression.

UNIT – IV

IMAGE COMPRESSION: Fundamentals, Some basic compression Methods, Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run length coding, Symbol based coding, Bit plane coding, Block transform coding, Predictive coding.

MORPHOLOGICAL IMAGE PROCESSING: Preliminaries, Erosion and Dilation, Opening and Closing, The Hit & Miss Transformation.

TEXT BOOK:

1. R. C. Gonzalez, R. E. Woods, Digital Image Processing 4thEdition, Pearson Education Publishers,2019.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, Mc-Grah Hill Publications, 2010.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision,Thomson learning, Second Edition, 2001.
3. S.Sridhar, Digital Image Processing, Oxford University Press, 2016.

Antennas and Wave Propagation

III B.Tech – II Semester **(Code: 18EC604)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: EMFT and EMTL

Course Objectives:

CO1: To understand the radiation phenomenon associated with various types of antennas along with emphasis on their applications.

CO2: To attain knowledge on basic parameters those are considered in the antenna design process and the analysis while designing an antenna.

CO3: To understand the radiation mechanisms associated with the antenna arrays.

CO4: To analyze the electric and magnetic field emissions from various antennas and mathematical formulation of the analysis.

CO5: To obtain the basic knowledge about concepts of radio wave propagation in the atmosphere.

Course Outcomes:

CLO1: Gain knowledge about the radiation pattern of various basic antennas and mechanisms associated with it.

CLO2: Understand the basic parameters that are important in the design of antennas.

CLO3: Analyze the radiation patterns and other parameters of antenna arrays.

CLO4: Understand the radiation mechanisms associated of broadband antennas present.

CLO5: Recognize the importance of radio wave propagation required for communication and know how the radio waves gets effected when propagating through atmosphere.

SYLLABUS

UNIT – I

RADIATION: Radiation Mechanism, Potential functions-heuristic approach, Maxwell's equation approach, Potential functions for sinusoidal oscillations, Alternating current element, Power radiated by current element, Application to short antennas, Assumed current distribution, Radiation from quarter wave Monopole / half wave dipole, Traveling wave antennas.

UNIT – II

ANTENNA FUNDAMENTALS: Isotropic, Directional, Omni-directional patterns, Principle patterns, Field regions, Radiation density, Radiation intensity, Directive gain, Power gain, Half power Beamwidth, Antenna polarization, Power loss factor, Radiation efficiency, Effective aperture of antenna, Relation between maximum effective aperture and directivity, Friss transmission equation.

ARRAY ANTENNAS: Two element array, Uniform linear array, Side lobe level and beam width of broadside array, Beam width of end fire array, Principle of multiplication of patterns, Effect of earth on vertical patterns, Binomial array.

UNIT – III

Characteristics of typical antennas: Rhombic antennas, Folded Dipole, Loop antenna, Yagi-Uda array, Helical antenna, Log periodic antenna, Pyramidal and conical Horn antenna, Corner

reflector antenna, Parabolic reflector antennas –Paraboloid, Cassegrain system of reflectors, Basic principles of slot antennas and micro strip antennas.

UNIT – IV

RADIO WAVE PROPAGATION: Ground wave Propagation, Space-wave Propagation, Effect of curvature of an Ideal Earth, Variations of Field strength with height in space-wave Propagation, Atmospheric effects in space-wave Propagation, Radio-Horizon, Duct Propagation, Extended-range Propagation resulting from Tropospheric Scattering, lonospheric Propagation, Gyro frequency, Refraction and reflection of Sky Waves by the Ionosphere, Critical Frequency, Skip Distance, Maximum Usable Frequency.

TEXT BOOKS:

1. Edward C Jordan and Keith G Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, PHI, 2003.
2. Constantine A Balanis, Antenna Theory: Analysis and Design, Harper and Row Publishers, 2002

REFERENCE BOOKS:

1. J. D. Kraus and Ronald J Marhefka, Antennas For all Applications, TMH, 2003.
2. G. S. N. Raju, Antennas and Wave Propagation, 1st Edition, Pearson Publication.

VLSI Design

III B.Tech – II Semester **(Code: 18EC605)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives:

CO1: To understand various techniques of MOS fabrication process and basic electrical properties ofMOS and Bi CMOS circuits.

CO2: To design and analyse basic MOS circuits by using stick diagram and MOSlayout with the help technology-based design rules

CO3:To design combinational and sequential circuits using MOS technology.

CO4:To get introduced to various types of design flows like ASIC design Flow, FPGA, CPLD.

Course Outcomes: Students will be able to

CLO-1: Understand various MOS fabrication processes and basic electrical properties of MOS and BiCMOS circuits.

CLO-2:Develop stick diagrams, layout diagrams for MOS circuits using design rules. Understand basic circuit concepts..

CLO-3:Design combinational and sequential subsystems using design rules.

CLO-4:Describe VLSI design flow, ASICs , PLD's.

UNIT- I

An introduction to MOS technology: Introduction to IC technology, Basic MOS transistors, NMOS fabrication, CMOS fabrication and BICMOS technology. Basic Electrical Properties of MOS and BICMOS Circuits: I_{ds} versus V_{ds} relationships, threshold voltage V_t, Transconductance gm, Figure of merit, pass transistor, NMOS inverter, Pull-up to pull-down ratio, CMOS inverter, BICMOS inverters, Latch up in CMOS circuits.

UNIT- II

MOS and BICMOS circuit Design processes: MOS layers, Stick diagrams, Design rules and layout, Sheet resistance Rs, Standard unit of capacitance, The Delay unit, Inverter delays, Propagation delays, Wiring capacitances, Scaling models, Scaling factors for device parameters.

UNIT- III

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic, examples of Structured Design (combinational logic and sequential logic). Design of an ALU subsystem.

UNIT- IV

VLSI design flow, Introduction to ASICs, Full Custom ASICs, and standard cell based ASICs, Gate array based ASICs, Programmable logic devices, ROM, PLAs, PALs, CPLDs and FPGAs.

TEXT BOOK:

1. Douglas A. Pucknell and Kamran Eshraghian, Basic VLSI Design Third Edition , Prentice-Hall of India Pvt.Ltd
2. Neil H E Weste and David Money Harris, CMOS VLSI Design, 4TH Edition, Pearson Education, 2002.

ARTIFICIAL INTELLIGENCE

III B.Tech – II Semester **(Code: 18ECD21)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: To learn the difference between optimal reasoning vs human like reasoning

CO2: To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities

CO3: To learn different knowledge representation techniques

CO4: To understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems.

Course Outcomes: Students will be able to

CLO1:Possess the ability to formulate an efficient problem space for a problem.

CLO2:Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.

CLO3:Possess the skill for representing knowledge using the appropriate technique

CLO4:Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems.

SYLLABUS

UNIT – I

Artificial Intelligence (AI) - History And Foundation, AI Techniques, Problem Solving With AI Models, Data Acquisition And Learning Aspects In AI.

Problem Solving – Problem Solving Process, Formulating Problems, Problem Types and Characteristics, Problem Analysis and Representation, Performance Measuring, Problem Space and Search, Toy and Real-WorldProblems. General Search Algorithms, Uninformed Search.

UNIT – II

Informed Search – Best First Search, Greedy Search, A* Search, AO* Search, Local Search Algorithm and Optimization Problems.

Intelligent Agents: Rationality and Rational Agent, Performance Measure, Rationality and Performance, Flexibility and Intelligent Agents, Types of Agents.

UNIT – III

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT – IV

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

TEXT BOOKS:

1. Artificial Intelligence: Building Intelligent Systems By Parag Kulkarni and Prachi Joshi, PHI Publications.
2. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011
3. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004.

REFERENCE BOOKS:

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.
2. Introduction to Artificial Intelligence by Eugene Charniak, Pearson.
3. Introduction to Artificial Intelligence and expert systems Dan W.Patterson. PHI.
4. Artificial Intelligence by George Flugerrearson fifth edition.

INFORMATION THEOREY AND CODING

III B.Tech – II Semester **(Code: 18ECD22)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: Understand mathematical theory related to Information

CO2: Understand error control coding

CO3: Understand encoding and decoding of digital data streams

CO4: Be familiar with the methods for the generation of these codes and their decoding techniques

Course Outcomes: Students will be able to

CLO1: Evaluate different parameters related to information theory.

CLO2: To design and analyze data compression techniques with varying efficiencies as per requirements.

CLO3: To prepare encoder for various coding scheme used.

CLO4: To design an optimum decoder for various coding schemes used.

SYLLABUS

UNIT – I

SOURCE CODING: Mathematical models of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, coding for discrete memory less Sources, Properties of Codes, Huffman Code, Run Length Codes.

UNIT – II

CHANNEL CODING : Introduction to Linear Block Codes, Generated Matrix, Systematic Linear Block Codes, Encoder Implementation of Linear Block Codes, Parity Check Matrix, Syndrome Testing, Error Detecting and Correcting Capability of Linear Block Codes, Hamming Codes.

UNIT – III

CYCLIC CODES: Algebraic Structure of Cyclic Codes, Binary Cyclic Code Properties, Encoding in Systematic Form, Syndrome Computation and Error Detection, Decoding of Cyclic Codes, Cyclic Hamming Codes

UNIT – IV

CONVOLUTIONAL CODES: Encoding of Convolutional Codes, Structural Properties of Convolutional Codes, State Diagram, Tree Diagram, Trellis Diagram, Maximum, Likelihood Decoding of Convolutional Codes, Viterbi Algorithm.

TEXT BOOKS:

1. "Error Control Coding – Fundamentals and Applications," by SHU LIN and Daniel J. Costello, JR., Prentice Hall Inc.
2. "Communication Systems," Simon Haykin 4th edition.

REFERENCE BOOKS:

1. "Digital Communications – Fundamentals and Applications" by Bernard Sklar, Pearson Education Asis, 2003.
2. "Digital Communications – John G. Proakis, McGraw Hill Publications.
3. "Principles of Digital Communication" J. Das, Sk. Mallik, PK Chattergee – NAI (P) Ltd, 2000.

EMBEDDED SYSTEM DESIGN

III B.Tech – II Semester **(Code: 18ECD23)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Problem Solving with Programming, Microprocessors and Microcontrollers.

Course Objectives (COs):

The main objectives of this course are:

CO1: To impart basic concepts of Embedded & Real Time Operating Systems.

CO2: To provide fundamentals of prevalent IP-Core: ARM Cortex M3/M4 & design of embedded systems using TIVA C Microcontroller.

Course Outcomes (CLOs): On successful completion of this course students will be able to:

CLO1: Have basic understanding of different methodologies and approaches in the design of embedded systems.

CLO2: Analyze the features and instruction set architecture to select appropriate instructions & program ARM Cortex M3/M4 using Assembly programming.

CLO3: Understand the requirements, concepts of Real Time Operating systems for real time task processing.

CLO4: Apply the RTOS concepts in understanding the advanced instructions of ARM Cortex M3/M4 & configure TIVA C to communicate with external devices using communication protocols for design of embedded systems & IOT applications.

SYLLABUS

UNIT - I

Embedded Systems Design: Introduction to Embedded systems, Design Metrics; Processor technology, IC technology, Design Technology, Custom Single purpose processor Design – GCD Designing Controller/Data path

UNIT - II

ARM Cortex M3/M4: Introduction to ARM family, Cortex M3 fundamentals - Pipeline, Registers, States, Operation modes, Access Levels, Memory Map, Introduction of Memory attributes & Exception Types; Cortex M3 Instruction Set, Basic Assembly programming, ARM Mode & Thumb State Switching.

UNIT - III

RTOS Concepts: Architecture of the Kernel, Tasks and Task scheduler, Types of real time tasks, Task periodicity, Task scheduling, Classification of scheduling algorithms: Clock driven Scheduling, Event driven Scheduling; Resource sharing, Priority inversion problem, Memory Management, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes;

UNIT – IV

Advanced ARM Instructions: Semaphore, State Change, Hint, Barrier instructions;

TIVA C - TM4C123G: Introduction - Features, Block Diagram, GPIO Programming, Timer, PWM, I2C & SPI programming. CC3100 and basic IOT application,

TEXT BOOK:

1.Frank Vahid / Tony Givargis, "Embedded System Design A unified Hardware / Software Introduction" John Wiley & Sons, Inc.
2. Santanu Chattopadyay, Embedded System Design, PHI, 2010.
3. Joseph Yiu, The Definitive Guide to the ARM Cortex-M3 & M4, Elsevier, 3rd Edition, 2013.

REFERENCE BOOKS:

1. KVKK Prasad, Embedded/Real Time Systems, Dreamtech Press, 2005.
2. Muhammad Ali Mazidi, Shujen Chen, Naimi, TI TIVA ARM Programming for Embedded Systems: Programming ARM Cortex M3 TM4C123G with C: Volume 2 (Mazidi & Naimi), Microdigitaled, 1st Edition, 2017.
3. Jonathan W Valvano, Embedded Systems: Real-Time Operating Systems for ARM Corte-M Microcontrollers, CreateSpace, Volume 3, 5th Edition, 2019.
4. Jonathan W Valvano, Embedded Systems: Introduction to ARM Cortex-M Microcontrollers, CreateSpace, Volume 1, 5th Edition 2019.
5. Jonathan W Valvano, Embedded Systems: Real Time Interfacing to ARM Cortex-M Microcontrollers, Createspace, Volume 2, 5th Edition, 2017.
6. Layla B Das, Architecture, Programming, and Interfacing of Low-Power Processors – ARM 7, Cortex-M, Cengage, 2017.

Online Sources:

1. http://users.ece.utexas.edu/~valvano/
2. https://www.cse.iitb.ac.in/~erts/html_pages/Resources/Tiva/TM4C123G_LaunchPad_Workshop_Workbook.pdf
3. http://www.nptelvideos.in/2012/11/embedded-systems.html
4. https://developer.arm.com/ip-products/processors/cortex-m/cortex-m3
5. http://esd.cs.ucr.edu/

Telecommunication Switching Systems and Networks

III B.Tech – II Semester **(Code: 18ECD24)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Analog and Digital Communications.

Course Objectives:

CO1: Fundamentals of telecommunication systems.
CO2:Working principle of various switching systems in Telecommunication.
CO3: Basics of Modern digital telecommunication switching and networks like PSTN, LAN, MAN etc.
CO4:Comparison of telephone network, data network and integrated service digital network.

Course Outcomes: Students will be able to

CLO1: Describe the fundamentals of telecommunication systems.
CLO2: Explain the working principle of various switching systems in Telecommunication.
CLO3: Discuss data networks
CLO4: Recognize differences among telephone network, data network and ISDN.

SYLLABUS

UNIT – I

INTRODUCTION: Evolution of Telecommunications, Simple telephone communication, Basics of a switching system,Manual Switching System, Major Telecommunication Networks.
ELECTRONIC SPACE DIVISION SWITCHING: Stored Program Control, Centralized SPC, Distributed SPC, Two stage networks, Three stage networks, n stage networks.

UNIT – II

TIME DIVISION SWITCHING: Basic time division space switching, Basic time division time switching, Combination switching, Three stage combination switching, n stage combination switching.
TELEPHONENETWORKS: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony.

UNIT – III

DATA NETWORKS:Data Transmission in PSTNs, Switching techniques for Data Transmission,Data Communication Architecture,Link-to-Link Layers, End-to-End Layers, Satellite based Data Networks, Local Area Networks, Metropolitan Area Networks,Fibre Optic Networks,Data Network Standards,Protocol Stacks,Internetworking.

UNIT – IV

Integrated Services Digital Network: Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signaling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration.

TEXT BOOK:

1. T Viswanathan, “Telecommunication Switching Systems and Networks”, PHI, 2004.

REFERENCE BOOKS:

1. “Digital Telephony”- J. Bellamy, 2nd Edition, 2001, John Wiley.
2. “Data Communications and Networks”- Achyut S. Godbole, 2004, TMH.
3. “Principles of Communication Ststems”- H. Taub& D. Schilling, 2nd Edition, 2003, TMH.
4. “Data Communication & Networking”- B. A. Forouzan, 3rd Edition, 2004, TMH.
5. “Telecommunication System Engineering”– Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

SIGNAL AND IMAGE PROCESSING USING SCILAB

III B.Tech – II Semester **(Code: 18ECL61)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn
CO1: The implementation aspects of basic operations on signals (1D, 2D, 3D).
CO2: Development of algorithms using SCI-Lab.

Course Outcomes: Students will be able to
CLO1: Implement the basic operations on various signals (1D, 2D, 3D).
CLO2:Write a program for an algorithm using SCI-Lab.

LIST OF PROGRAMS

1. Amplitude Modulation.
2. Frequency Modulation.
3. Linear and Circular Convolution of two discrete time signals.
4. Histogram and histogram equalization of an image.
5. Kernel processing on images leading to Color image enhancement.
6. Color image histogram manipulation.
7. Display of 2D filters frequency responses and processing the images using these filters.
8. Implementation of arithmetic coding for images.
9. Basic JPEG algorithm implementation.
10. Simple image watermarking algorithms using LSB substitution.
11. Simple content based image retrieval using various distance metrics.
12. Color images manipulations, reading and writing of color images.
13. Special effects implementation on grey and color images.
14. LOG Masks implementation for gray and color images.
15. Simple video reading and writing .avi formats and manipulation of video frames.

NOTE: A minimum of 10 (Ten) programs are to be executed and recorded to attain eligibility for Semester End Examination.

INTERNET OF THINGS LAB

III B.Tech – II Semester **(Code: 18ECL62)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Problem Solving with Programming, Data Structures using Python and Microprocessors and Microcontrollers

Course Objectives (COs):

The main objectives of this course are:

CO1: To impart skills in programming edge devices like Arduino, Raspberry Pi & Node MCU.

CO2: To impart Design & Interfacing skills using Edge Devices, communication protocols, sensors, actuators etc for IOT applications.

Course Outcomes (CLOs): On successful completion of this course students will be able to:

CLO1: Apply & program edge devices like Arduino, Raspberry Pi., Node MCU.

CLO2: Select appropriate IOT technologies, Service providers & various cloud services for IOT applications.

CLO3: Interface IOT components using appropriate communication interfaces, IDEs for automation.

CLO4: Design & develop IOT applications and solutions using latest controllers, mobile application development and protocols.

LIST OF EXPERIMENTS

Design, Develop and implement Embedded and IOT applications using the following.
Software: Arduino IDE; TinkerCAD; Raspbian OS and other Open Source Software.
Hardware: Arduino, Raspberry Pi, Node MCU and other Latest Controller boards.

Minimum of 10 experiments to be completed

Arduino/Raspberry Pi Basic (Optional – Study Experiments)

a) Interface Digital I/O –Switch - LED – Turn ON LED for 1 Sec after 2 Sec.
b) Interface Analog I/O – Potentiometer.

Using Arduino/Raspberry Pi

1. Display entered keypad message in Serial Monitor
2. Acquired Analog Sensor signal data (Ex: LDR/LM35) and display on LCD;
3. Data log acquired signal, display; entered data into an Micro SD Card.
4. Automatic Identification using (Ex:IR, Ultrasonic, RFID tags etc).
5. Automation of actuators based on sensor signals for specific application.

Using NodeMCU

6. Interface Node MCU with display device (Ex: RGB LED) to convey signal information (ON/OFF, Different colors) etc for specific durations (Ex: 2, 3 sec.)
7. Android Application Development – Android Studio or MIT App Inventor

Wireless/Internet/Cloud Connectivity using Arduino/Raspberry Pi/NodeMCU

8. Program to send or receive SMS using any MC.
9. Web Server: Control Motor using Relay, ON/OFF switch button over server web page.
10. Measure/Retrieve Sensor data and upload to Thingspeak.
11. Monitor or Control IOT application for Sending & Receiving data using a Mobile App.
12. Machine-to-Machine (M2M) Protocol; Publish/subscribe sensor data using MQTT broker.
13. Demonstration of any of the protocols (Ex: Zigbee, Bluetooth, RF, LoRa, or CAN).

IOT Design & User interface Development using Latest Controller Boards & Software:

- TIVA C/ MSP430/ MSP432 with CC3100/CC3200;
- PIC-IOT WA,WG/AVR-IOT WA, STM32, Beaglebone,
- Matlab, LabVIEW & myRIO

14. GPIO Programming, Sensor/Actuator Interfacing – 1
15. GPIO Programming, Sensor/Actuator Interfacing - 2
16. Upload/Read data to or from Cloud – 1 (Google, AWS, IBM, Microsoft Azure)
17. Upload/Read data to or from Cloud – 2 (Google, AWS, IBM, Microsoft Azure)
18. Setup myRIO as a standalone device and data logging to Pen Drive.
19. Connect myRIO over a network and Upload/Read data to or from the cloud.
20. Demonstration of IOT setup for Matlab

SOFT SKILLS LABORATORY

III B.Tech – II Semester **(Code: 18ELL02)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

LIST OF EXPERIMENTS

1. Body Language & Identity Management

a. Facial Expressions – Kinesics - Occulesics
b. Haptics - Proxemics
c. Para Linguistics
d. Appearance
e. Identity Management Communication

2. Emotional Intelligence & Life Skills

a. Self-Awareness through Johari Window and SWOC analysis
b. Self Motivation
c. Empathy
d. Assertiveness& Managing Stress
e. Positive Attitude
f. Time Management
g. Goal Setting: Short term, Long Term, Vision, Mission.

3.Business Presentations

a. Preparing effective Presentations Power Point Presentations
b. Power Point Presentations
c. Using Visual Aids
d. Mock Presentations

4.Employability Skills

a. Group Discussion
b. Team Building and Leadership Qualities
c. Interview Skills

Reference Books:

1. Personality Development and Soft skills (Second Edition), Barun K. Mithra. Oxford University Press: 2016
2. The Definitive Book of Body Language, Allan & Barbara. Pease International:2004
3. Working with Emotional Intelligence, Daniel Goleman. Bloomsbury:1998
4. English for Jobseekers, Lina Mukhopadhyay. Cambridge University Press:2013
5. The 7 Habits of Highly Effective People, Stephen R.Covey. St. Martin's Press:2014

INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT

IV B.Tech- I SEMESTER (**CODE: 18ME002)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50		Semester End Examination (3 Hours)		:	50

Prerequisites: None

Course Objectives:

1. To provide students an insight into the concepts of General & Scientific management and various forms of business organizations
2. To Provide an understanding of human resource management, and to impart the knowledge of marketing management to the students
3. To enable the students to understand the inventory control concept, Total quality management and supply chain management
4. To make the students to learn various financial aspects of the business, and to know the importance of Entrepreneurship

Course Outcomes: After completion of the course the student must be able to

1. Describe the roles & responsibilities and various functions of the management and learn various forms of business organizations and its dynamics
2. Understand how resources to be planned and also understand various motivation theories, leadership styles and develop ability to understand various marketing strategies to enhance sales promotion
3. Develop knowledge about inventory control, Total quality management and Supply Chain Management
4. Gain complete knowledge of capital and importance of entrepreneurship and its prerequisites

SYLLABUS

UNIT – I

General Management: Management definition, Functions of Management and Principles of Management.

Scientific Management: Definition, Principles of Scientific Management.

Forms of Business Organization: Choice of form of organization, Salient features of Sole Proprietorship, Partnership, Joint Stock Company: Private Limited and Public Limited companies; Cooperative societies, Public sector organizations, State ownership, Public corporation, Merits and demerits of above types.

Introduction to Strategic Management

UNIT – II

Human Resource Management: Functions of HR management, human resource planning, recruitment, selection, placement, training & development and performance appraisal, Motivation theories, leadership styles.

Marketing Management: Concepts of Selling and Marketing, Functions of Marketing, Marketing mix (4 Ps); Advertising and sales promotion; Product life cycle; distribution channels

UNIT – III

Materials Management: Inventory Control, Inventory costs, Basic EOQ model, Model with Price breaks, ABC analysis, FSN Analysis, VED Analysis.

Total Quality Management: Importance of quality, Difference between Inspection and Quality control, Components of total quality, Quality Function Deployment

Introduction to Supply Chain Management

UNIT – IV

Financial Management: Functions of finance, Types of Capital-Fixed and Working Capital, Break Even Analysis.

Entrepreneurship Development: Introduction, Entrepreneurial characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship; Role of communication in entrepreneurship; Entrepreneurial development-Objectives, Need of Training for enterprises; Finance for the enterprises.

TEXT BOOKS:

1. Essentials of Management /Koontz and Heinz Weihrich/ Tata-McGraw-Hill 10th Ed.
2. Manufacturing Organization and Management / Amrine / Pearson Education
3. Management Science, A. R. Aryasri.

REFERENCE BOOKS:

1. Operations Management, Joseph G Monks.
2. Marketing Management, Philip Kotler.
3. Entrepreneurship, Robert D Hisrich, Michael P Peters, Mathew Manimala and Dean A.
4. Shepherd-McGraw Hill, India-2014 (9th Edition)–ISBN: 9789339205386

Microwave and Radar Engineering

IV B. Tech – I Semester (Code: 18EC701)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: EM Waves and Transmission Lines, Antennas and wave Propagation, Analog Communications

Course Objectives: To learn

CO1: Principles of different microwave amplifiers and oscillators.
CO2: To use S-parameter terminology to describe various microwave circuits.
CO3: The concept of RADAR block diagram, Radar range equation.
CO4: The concept of Doppler Effect, CW and Frequency Modulated Radar.
CO5: The functions of various blocks of MTI Radar.

Course Outcomes: Students will be able to

CLO-1: To design various microwave components.
CLO-2: Comprehend the design aspects of O type tubes and M-type tubes and its characteristics
CLO-3: Understand about radar fundamentals.
CLO-4: Analyze the working principle of CW and Frequency Modulated Radar.
CLO-5: Discuss the operation of MTI.

SYLLABUS

UNIT I

Microwave Frequency Band Designations, Advantages and Applications of Microwaves.

MICROWAVE TUBES: Limitations of Conventional tubes at Microwave frequencies, Linear Beam (O Type) tubes- Two cavity Klystron amplifier- Operation and Performance characteristics, Reflex Klystron-Construction, operation and operating Characteristics, Travelling Wave Tube- Constructional features of TWT and its Operation M-Type Tubes- Eight cavity Magnetron Operation.

SOLID STATE MICROWAVE DEVICES: Construction and working of PIN diode, Crystal diode, Tunnel diode, Gunn diode, IMPATT diode

UNIT – II

MICROWAVE COMPONENTS: E-plane Tee, H-plane Tee, Magic Tee, Applications of magic Tee, Directional Couplers- Two-Hole Directional Couplers, Applications of Directional Couplers, Faraday Rotation Based Isolator and Circulator, Properties of a Scattering matrix, scattering matrix Calculations for E-plane Tee, H-plane Tee, Magic Tee, Directional Coupler, Circulator and Isolator.

MICROWAVE MEASUREMENTS: Microwave bench general measurement set up, measurement of power, measurement of VSWR, measurement of Impedance

UNIT-III

Introduction to Radar, The simple form of the Radar equation, Radar block diagram and operation, The Doppler Effect, Simple CW Radar Block Diagram, Block diagram of CW doppler radar with nonzero IF receiver, Applications of CW radar, Block Diagram of Frequency Modulated CW Radar.

UNIT-IV

MTI and Pulse Doppler radar: Introduction: Description of operation, Block Diagram of MTI Radar with Power Amplifier Transmitter, Block Diagram of MTI Radar with Power Oscillator Transmitter, Delay line cancellers: Filter Characteristics of delay line canceller, Blind speeds, Double cancellation, Limitations to MTI Performance, Pulse Doppler radar

TEXT BOOKS:

1. "Microwave and Radar Engineering by Dr.M. Kulkarni", UmeshPublications,fifth edition New Delhi, 2009.
2. "Introduction to Radar Systems", Merrill I Skolnik, 2nd Edition, TMH, 2007.

REFERENCE BOOKS:

1. "Foundations for Microwave Engineering", by RE Collin IEEE Press Series, 2003.
2. "Microwave Devices and Circuits", by Samuel Y Liao 3rd Edition, Pearson Education, 2003.
3. "Microwave Engineering", by "ML Sisodia and V.L.Gupta, New Age International, 2005.
4. "Microwave and Radar Engineering", by GottapuSasiBhushana Rao, Pearson Publications, 2014.
5. "Fundamentals of RADAR, Sonar and Navigation Engineering", KK Sharma, SK Kataria&Sons, Fourth Edition,2014.

WIRELESS AND MOBILE COMMUNICATIONS

IV B. Tech – I Semester **(CODE: 18EC702)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course objectives:

1. To understand the examples and fundamental concepts of wireless cellular communication systems.
2. To learn the basic signal propagation mechanisms and practical link budget design using path loss models.
3. To know the role of equalization in mobile communication and to study different types of equalizers and diversity techniques.
4. To study the different wireless communication systems and their standards (1G to 4G).

Course Outcomes:

1. Understand the fundamental concepts of wireless cellular communication systems.
2. Illustrate the basic signal propagation mechanisms and practical link budget design using path loss models.
3. Understand the need of equalization and analyze the different diversity techniques.
4. Contrast the different wireless communication systems and their standards (1G to 4G).

SYLLABUS

UNIT-I

Cellular Mobile Communication Concepts: Examples of wireless communication systems, Frequency reuse, Channel assignment strategies, Handoff strategies: types, prioritizing handoff, practical handoff considerations; Interference and system capacity: co-channel and adjacent channel interference, power control for reducing interference; Grade of service: definition, standards; Improving coverage and capacity in cellular systems: cell splitting, sectoring, repeaters for range extension, a microcell zone concept.

UNIT-II

Mobile Radio Propagation: Large-Scale Path Loss (Fading): Free space propagation model, The Three basic propagation mechanisms: Reflection, ground reflection (Two-Ray) model, diffraction, scattering; Practical link budget design using path loss models.

Small Scale Fading and Multipath: Small-scale multipath propagation, Parameters of mobile multipath channels, Types of small-scale fading: Fading effects due to multipath time delay spread, Fading effects due to Doppler spread.

UNIT-III

Equalization: Fundamentals of equalization, Training a generic adaptive equalizer, Equalizers in a communication receiver, survey of equalization techniques, Linear equalizers, Nonlinear equalization: Decision feedback equalization (DFE), Maximum likelihood sequence estimation (MLSE) equalizer.

Diversity Techniques: Practical space diversity considerations: Selection diversity, feedback or scanning diversity, maximum ratio combining (MRC), equal gain combining (EGC), Polarization diversity, Frequency diversity, Time diversity, Rake receiver.

UNIT – IV

Evolution of Cellular Technologies: First generation cellular systems, 2G Digital cellular systems, 3G Broadband wireless systems, Beyond 3G: HSPA+, WiMAX, and LTE.

LTE: Demand drivers for LTE, Key requirements of LTE design, LTE Network architecture, Future of mobile broadband-Beyond LTE.

TEXT BOOKS:

1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd Edition, Pearson Education, 2003. (UNIT I, II, III)
2. Arunabha Ghosh, Jan Zhang, Jefferey Andrews, Riaz Mohammed, Fundamentals of LTE, Pearson Education, 2011. (UNIT IV)

REFERENCE BOOKS:

1. Yi-BingLin, Imrich Chlamtac, Wireless and Mobile Network architectures, Wiley, 2001.
2. W.C.Y. Lee, Mobile Cellular Communications, 2nd Edition, Mc-Graw Hill, 1995.
3. G Sasibhusan Rao, Mobile Cellular Communications, Pearson Education, 2013.

FIBRE OPTIC COMMUNICATIONS

IV B.Tech – I Semester (Code: 18EC703)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Analog and Digital Communications

Course Objectives:

CO1: To learn basic elements of optical fiber transmission link, modes configurations & structures.

CO2: To understand the different kind of losses, signal distortion, SM fibers.

CO3: To learn the various optical sources, materials and fiber splicing

CO4: To learn the fiber optical receivers and noise performance in photo detector and also analyze link power and rise time budgets, WDM, OTDM & OTDR

Course Outcomes: After completion of the course, the student is able to

CLO1: Understand the basic principles of optics and different types of fibers

CLO2: Analyzing various losses and Dispersion in optical communications

CLO3: Explain the construction and working of Optical sources and Detectors

CLO4: Explain the construction optical communication system and also measurement of various losses

SYLLABUS

UNIT – I

INTRODUCTION: Historical development, The general system, Advantages of Optical Fiber communications, OPTICAL FIBER WAVEGUIDES: Introduction, RAY THEORY TRANSMISSION: Total internal reflection, Acceptance angle, Numerical Aperture, Skew rays. CYLINDRICAL FIBER: Modes, Mode coupling, Step index fibers, Graded index fibers, Fiber materials.

UNIT – II

TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS: Introduction, Attenuation, Material absorption losses in silica glass fibers, Linear scattering losses, Non-Linear scattering losses, Fiber bend losses, Dispersion, Intramodal dispersion, Intermodal dispersion. OPTICAL FIBER CONNECTION: JOINTS AND COUPLERS: Introduction, Fiber alignment and joint loss, Fiber splices, Fiber Connectors, Expanded beam connectors, Fiber Optic couplers.

UNIT – III

OPTICAL SOURCES1: THE LASER: Introduction, Basic concepts, Optical emission from semiconductors, Some injection laser structures, Injection laser characteristics, DH Laser, Stripe Geometry Laser, DFB and DBR Lasers.

OPTICAL SOURCES2: THE LIGHT EMITTIMG DIODE: Introduction, LED power and efficiency. LED STRUCTURES: Planar LED, Dome LED, Surface emitter LEDs, Edge emitter LEDs, Super luminescent LEDs,LED characteristics. OPTICAL DETECTORS: Introduction, device types, optical detection principles,. SEMICONDUCTOR PHOTO DIODES WITHOUT

INTERNAL GAIN: PN, P-I-N Photodiode, SEMICONDUCTOR PHOTO DIODES WITH INTERNAL GAIN: Avalanche Photodiode, Optical Power Budgeting Schemes.

UNIT – IV

OPTICAL FIBER SYSTEMS1: INTENSITY MODULATION/DIRECT DETECTION: Introduction, THE OPTICAL TRANSMITTER CIRCUIT: Source limitations, LED drive circuits. The Optical Receiver circuit: The preamplifier, AGC, ADVANCED MULTIPLEXING STRATEGIES: Optical time division multiplexing (OTDM), Wavelength division multiplexing (WDM). OPTICAL FIBER MEASUREMENTS: Optical Time Domain Reflectometry (OTDR).

TEXT BOOK:

1. John M Senior, Optical Fiber Communications: Principles and Practice, 2nd Edition, PHI, 2005.

REFERENCE BOOKS:

1. Henry Zanger and Cynthia Zanger, Fiber Optics: Communication and other Applications, Maxwell Macmillan Edition.
2. JC Palais, Fiber Optic Communications, 2nd Edition, PHI, 2001.
3. W.Tomasi, Advanced Electronic Communication Systems, Pearson Education, 2002.

Introduction to Nanoscience and Nanotechnology

IV B.Tech – I Semester (Code: 18ECD31)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Engineering Physics

Course Objectives: To

CO1: Learn Quantum aspects in relation to nano structures

CO2: Learn various techniques useful for preparation of nanomaterials

CO3: Explore the various characterization techniques to observe nanoparticles and composition

CO4: Device the nano electronic components suitable to various industries

Course Outcomes: Students will be able to

CLO-1: Apply Quantum theory to understand nano structures.

CLO-2: Scale up synthesis of nanomaterials

CLO-3: Know the characterization techniques of nanomaterials

CLO-4: Know the usage of nanoparticles in electronics and medicine.

SYLLABUS

UNIT-I

Introduction:

Introduction to Nanotechnology; Definitions of terms related to Nano science /Nano technology: (i) Nano Science (ii) Nanotechnology (iii) Nano materials (iv) Nanoparticles; Application areas of Nanotechnology.

Quantum Nano-engineering:

Particle in a Box, Quantum Limit: From 3D to 0D, Quantum Confinement in Semiconductors, 3D Density of States, 2D Model, 1D Model, Q0D Model

UNIT – II

Synthesis of Nano-materials:

Top-down and Bottom-up approaches; Ball milling, Physical Vapor Deposition, Electro deposition, Chemical Vapor Deposition, Atomic Layer Deposition (ALD), Sol–Gel techniques, Introduction to lithography, X-ray lithography, Electron beam lithography, Ion-beam lithography

UNIT – III

Characterization of Nano-materials:

X-ray Diffraction, Scanning Electron Microscopy, Scanning tunneling Microscopy, UV-Visible Spectroscopy

UNIT – IV

Carbon Nano materials:

Carbon Nanotubes (CNT), Properties and applications of CNT, Fullerenes, Graphene, Importance of Graphene, and Applications of Graphene

Applications of Nano materials:

Quantum electronic devices: CNFETS, CNFEDS; Biological applications: Bio-Chemical sensor

TEXT BOOKS:

1. “Introduction to Nano Basics to Nanoscience and Nanotechnology”, AmretashisSengupta andChandan Kumar Sarkar Editors:Springer-Verlag Berlin Heidelberg 2015.
2. “Engineering Physics” D.K.Bhattacharya and Poonam Tandom, Oxford university Press 2015

REFERENCE BOOKS:

1. “Introduction To Nanoscience And Nanotechnology”,Chris Binns 2010 by John Wiley & Sons, Inc..
2. “An Introduction to Nanoscience and Nanotechnology”, Alain Nouailhat2008 by ISTE Ltd and John Wiley & Sons, Inc..

Machine Learning

IV B.Tech – I Semester (Code: 18ECD32)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: In this course, students will learn the following topics

CO1: Certain fundamental concepts and applications of machine learning.
CO2: Statistical Machine Learning theory concepts
CO3: Concepts of Support Vector Machine for regression, binary and multiclass problems
CO4: Various data transformations and clustering techniques.

Course Outcomes: Students will be able to

CLO1: Understanding the basics of machine learning and applications of machine learning and how they work and the difference between supervised and un supervised learning
CLO2: Know the role of statistical principles in machine learning theory and the difference between classification and regression.
CLO3: Understanding the importance of Support Vector Machine in classification and regression.
CLO4: Learn various techniques of data clustering.

SYLLABUS

Unit I

Introduction: Towards Intelligent Machines, Well-Posed Machine Learning Problems, Examples of Applications in Diverse Fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured/Unstructured, Forms of Learning, Machine Learning and Data Mining

Supervised Learning: Rationale and Basics, Learning from Observations, Bias and Variance, Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Overfitting Avoidance, Heuristic Search in Inductive Learning, Estimating Generalization Errors, Metrics for Assessing Regression (Numeric Prediction) Accuracy, Metrics for Assessing Classification (Pattern Recognition) Accuracy, An Overview of the Design Cycle and Issues in Machine Learning

Unit - II

Statistical Learning, Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in Learning Techniques, Bayesian Reasoning: A Probabilistic Approach to Inference, k-Nearest Neighbor (k-NN) Classifier, Discriminant Functions and Regression Functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification Minimum Description Length Principle.

Unit III

Learning With Support Vector Machines (SVM), Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Linear Maximal Margin Classifier for Linearly

Separable Data, Linear Soft Margin Classifier for Overlapping Classes, Kernel-Induced Feature Spaces, Nonlinear Classifier, Regression by Support Vector Machines, Linear Regression, Nonlinear Regression, Decomposing Multiclass Classification Problem Into Binary Classification Tasks, One-Against-All (OAA), One-Against-One (OAO), Variants of Basic SVM Techniques.

Unit IV

Data Clustering and Data Transformations, Unsupervised Learning, Clustering, Engineering the Data, Overview of Basic Clustering Methods, Partitional Clustering, Hierarchical Clustering, Spectral Clustering, Clustering using Self-Organizing Maps, K-Means Clustering, Expectation-Maximization (EM) Algorithm and Gaussian Mixtures Clustering, Some Useful Data Transformations, Entropy-Based Method for Attribute Discretization, Principal Components Analysis (PCA) for Attribute Reduction. Decision Tree Learning, Introduction, Example of a Classification Decision Tree.

Text Book:

1. Applied Machine Learning , M.Gopal, McGraw Hill Education, 1 Edition , 2018, ISBN-13:978-93-5316-025-8.

Reference Books:

1. Machine Learning by Tom Mitchell, Mc Graw Hill 1997, 1st edition
2. Pattern Recognition and Machine Learning by Bishop, 2006 1st edition , ISBN: 978-0-387-31073-2

Bio-Medical Instrumentation

IV B.Tech – I Semester (Code: 18ECD32)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

1. To deal with various types of physiological systems of the human body, and Biopotentials related to the human body
2. To deal with devices used to pick up the bio-signals of the body such as ECG, EEG, EMG.
3. To deal with the measurement techniques of Cardiovascular parameters such as blood pressure, blood flow, cardiac output and heart sounds
4. To deal with the types medical instruments and modern technologies in medical field.
5. To deal with various types of physiological systems of the human body, and Biopotentials related to the human body.
6. To deal with devices used to pick up the bio-signals of the body such as ECG, EEG, EMG.
7. To deal with the measurement techniques of Cardiovascular parameters such as blood pressure, blood flow, cardiac output and heart sounds

Course Outcomes:

CO1: Understand the physiological nature of biological systems and bio-electric potentials in medical field

CO2: Have a detailed understanding about the various bio-electric signals of the body

CO3: Gain the knowledge on the measurement of non-electrical parameters in the human body

CO4: Understand medical assisting and therapy equipments, clinical instruments such as pacemakers, defibrillators, blood gas analyzers, CT scanner, MRI Scanner, USG…etc.

Syllabus

UNIT – I

Introduction: Introduction to Bio-Medical Engineering field, Components of Man- Instrument system, problems encountered in measuring a living system

Physiological systems of the Body: Basic Features of cardiovascular system, Nervous system, muscular system, respiratory system.

Resting potential & action potential concepts: Resting potential concept, characteristics of resting potential, action potential concept, propagation of action potential.

Bio-electric potentials: Definition for Bio-electric Potential, Typical Examples of Bio-Electric Potential with important features.

UNIT – II

Bio-Medical Electrodes: Introduction to Bio-Medical Electrodes, Various types of Bio-Medical Electrodes: surface electrodes, micro electrodes, needle electrodes depth electrodes.

Electro Cardiograhphy (ECG): Introduction to electro cardiography, ECG LEAD Concept, various types of ECG Lead configurations, typical ECG waveform details, ECG recording, Analysis of Recorded ECG waveform.
Electro Encephalography (EEG): Introduction to Electro Encephalography, EEG Recording EEG in diagnostics
Electro Myography: Introduction to Electro-Myography, EMG Recording, EMG Applications.

UNIT-III
Cardiovascular Measurements: Introduction to various cardiovascular parameters: Blood Pressure Blood flow, cardiac output, Heart sounds. Blood Pressure Measurement techniques: Direct methods & In-direct Methods.
Blood flow measurement techniques: Electro Magnetic Blood flow meter, ultrasonic Blood flow meter, Thermal convection method. Cardiac output Measurement techniques: Fick's technique, Indicator dillution method, thermal dilution method, Impedance change method. Phono cardiography: Heart sounds Recording.

UNIT- IV
Therapeutic Instruments: Cardiac Pacemakers, Types of pacemakers: External pace makers, Internal Pacemakers, Pacing modes, lead wires & Electrodes for internal pacemakers, power sources for implantable cardiac pacemakers, hemdialysis. Cardiac defibrillators, defibrillator electrodes, Introduction to diathermy. Various diathermy apparatus: surgical, shortwave, microwave.
Instruments for clinical laboratory: Introduction to Bio-Chemical electrodes, Types of Bio-Chemical electrodes for measurement of various Blood gas parameters such as Blood PH, PO2PCO2 Blood gas analyzer, Blood cell counters.
Modern technologies in Bio-Medical field: Use of X-Rays in medicine, CT scan, ultrasound applications in medicine, MRI scan.

Text Books:

1. Leslie Cromwell, Fred J. Weibell and Erich A,Pleiffer, " Biomedical instrumentation and Measurements", IInd ed, Prentice Hall of India,2004
2. R.S Kandpur. " Handbook of Biomedical Instrumentation, IInd ed, Tata McGraw Hill, 2011

Reference Books:

1. Webster, Medical Instrumentation Application&Design, John Wiley& sons
2. Jog: Electronics in Medicine and Biomedical Instrumentation, Prentice Hall of India,2006
3. Dr.M.Armugam,"Biomedical Instrumentation" IInd ed, Anuradha Publications,2009

E-resources and others :
[1] www.iannauniversity.com/2012/07/ei2311-biomedical-instrumentation.html
[2] www.eeeuniversity.com/2013/08/ei2311-biomedical-instrumentation.html
[3] https:// www.scribid.com/doc/.../biomedical-instrumentation-tic-801

Pattern Recognition and Application

IV B.Tech – I Semester (Code: 18ECD34)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives:

CO1: Learn about pattern recognition and its broad applications in various aspects of our day to day life.

CO2: Understand the algorithms used in various phases of pattern recognition systems.

CO3: Understand the techniques used recognize patterns, such as statistical approaches, data clustering, neural networks, etc.

CO4: Knowledge of various applications of pattern recognition in real life, this includes reading research papers and preparing presentations by the students.

Course Outcomes: Students will be able to

CLO-1: Identify areas where Pattern Recognition can offer a solution.

CLO-2: Describe the strength and limitations of some techniques used in computational Machine Learning for classification, regression and density estimation problems.

CLO-3: Describe genetic algorithms, validation methods and sampling techniques.

CLO-4: Describe and model data to solve problems in regression and classification

SYLLABUS

UNIT-I

Introduction: Importance of pattern recognition, Features, Feature Vectors, and Classifiers, Supervised, Unsupervised, and Semi-supervised learning, Introduction to Bayes Decision Theory, Discriminant Functions and Decision Surfaces, Gaussian PDF and Bayesian Classification for Normal Distributions.

UNIT-II

Data Transformation and Dimensionality Reduction: Introduction, Basis Vectors, The Karhunen Loeve (KL) Transformation, Singular Value Decomposition, Independent Component Analysis (Introduction only). Nonlinear Dimensionality Reduction, Kernel PCA.

UNIT-III

Estimation of Unknown Probability Density Functions: Maximum Likelihood Parameter Estimation, Maximum a Posteriori Probability estimation, Bayesian Interference, Maximum Entropy Estimation, Mixture Models, Naive-Bayes Classifier, The Nearest Neighbor Rule.

UNIT-IV

Linear & Non linear Classifiers: Introduction, Linear Discriminant Functions and Decision Hyperplanes, The Perceptron Algorithm, Mean Square Error Estimate, Stochastic Approximation of LMS Algorithm, Sum of Error Estimate. The XOR Problem, The two Layer Perceptron, Three Layer Perceptron, Back propagation Algorithm, Basic Concepts of Clustering, Introduction to Clustering , Proximity Measures.

Text Book:

1. Pattern Recognition: Sergios Theodoridis, Konstantinos Koutroumbas, Elsevier India Pvt. Ltd (Paper Back), 4th edition.

Reference Books:

1. The Elements of Statistical Learning: Trevor Hastie, Springer-Verlag New York, LLC (Paper Back), 2009.
2. Pattern Classification: Richard O. Duda, Peter E. Hart, David G. Stork. John Wiley & Sons, 2012.
3. Pattern Recognition and Image Analysis Earl Gose: Richard Johnsonbaugh, Steve Jost, ePub eBook.

FIBER OPTIC AND MICROWAVE ENGINEERING LAB

IV B.Tech – I Semester (CODE: 18ECL71)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

LIST OF EXPERIMENTS

Based on Optical Communication

1. Fiber Optics Cable: Numerical Aperture Measurement.
2. Measurement of Coupling and Bending Losses of a Fiber.
3. Analog Link set up using a Fiber.
4. Digital Link set up using a Fiber.
5. Set up of Time Division Multiplexing using Fiber Optics

Based on Microwave Engineering

6. Characteristics of Reflex Klystron

7. Verification of the Expression $1/\lambda_0^2=1/\lambda_g^2+1/\lambda_c^2$
8. Measurement of VSWR using Microwave Bench.
9. Determination of Characteristics of a Given Directional Coupler.
10. Measurement of gain of given horn Antenna

Based on Software Defined Radio

11. FM Transmitter design.
12. FM Receiver design.
13. Pulse Shaping Using USRP.
14. Voice Transmission.
15. Equalizer design

NOTE: A minimum of 10(Ten) experiments, choosing a minimum of 3 (Three) from each part, have to be performed and recorded by the candidate to attain eligibility for Semester End Examination.

WIRELESS AND MOBILE COMMUNICATIONS LAB

IV B.Tech – I Semester (**Code: 18ECL72)**

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Digital signal processing.

Course Objectives: The objective of this course is to:
CO1: To design fading channel models.
CO2: To implement DSSS.
CO3: To design OFDM and MIMO systems

Course Outcomes: Students will be able to:
CLO-1: Understand and analyze fading channel models
CLO-2: Understand DSSS modulation technique.
CLO-3: Design and analyze OFDM and MIMO systems

LIST OF EXPERIMENTS

The following experiments can be performed using Matlab/Simulink/Scilab/Virtual Labs.

1. Simulation of Friss Transmission equation.
2. Simulation of Rayleigh fading Channel model.
3. Calculate the probability that the received signal level crosses a certain sensitivity level.
4. Study the outage probability, LCR & ADF in SISO for Selection Combining and MRC.
5. Study the effect of handover threshold and margin on SINR and call drop probability and handover probability.
6. Study the effect of delay spread on frequency selectivity.
7. Plot BER-SNR and Bit Rate-SNR graphs for different types of fading channel
    i. No Fading
    ii. Flat Fading
    iii. Dispersive Fading
8. Simulation of Okumura Outdoor Propagation Model.
9. Simulation of log normal shadowing radio propagation model.
10. Simulation of Walsh Hadamard Code.
11. Study distribution of downlink C/I due to different parameters.
12. Implement Direct Sequence Spread Spectrum modulation technique.
13. Design OFDM based Transmitter and Receiver for different channel environments.
14. Design OFDM system with 2x2, 2x4, 4x4 MIMO systems.
15. Simulate MIMO Channel and estimate BER & SNR.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Semester End Examination.

Text Books:

2. Digital signal processing for wireless communication using MATLAB, 1st ed. 2016 Edition, Kindle Edition, E.S. Gopi.

References:

1. "Simulation Of Digital Communication Systems Using Matlab",2 edition, Mathuranathan Viswanathan.
2. http://fcmcvlab.iitkgp.ac.in

WIRELESS AD HOC AND SENSOR NETWORKS

IV B.Tech – II Semester **(Code: 18ECD41)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives:

CO1: To understand basic concepts of ad hoc wireless networks.

CO2: To study issues in designing and understanding the types of MAC protocols in Ad Hoc Wireless Networks.

CO3: To have in depth understanding about routing protocols in Ad Hoc Wireless networks

CO4: To study the architecture and development of wireless sensor networks.

Course Outcomes: Students will be able to

CLO-1: Exemplify the unique issues in ad-hoc/sensor networks.

CLO-2: Confer the challenges in designing MAC protocols in wireless ad hoc networks.

CLO-3: Familiarize with current technology trends for the implementation of different types of ad hoc routing protocols.

CLO-4: Understand the architecture and design principles of wireless sensor networks.

SYLLABUS

UNIT-I

Ad hoc Wireless Networks – What is an Ad Hoc Network? Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Ad hoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Ad hoc Mobile Networks – Ad hoc wireless Internet.

UNIT-II

Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks – Classifications of MAC Protocol . MACAW – FAMA – BTMA – DPRMA – Real-Time MAC protocol – Multichannel protocols – Power aware MAC Routing Protocols for AD HOC Networks.

UNIT-III

Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols -Table-driven protocols – DSDV – WRP – CGSR – On-Demand protocols – DSR – AODV – TORA – LAR – ABR – Zone Routing Protocol – Power Aware Routing protocols. Issues in Designing a Multicast Routing Protocol – Operation of Multicast Routing Protocols – An Architecture Reference Model for Multicast Routing Protocols.

UNIT-IV

Sensor Networks – Architecture : Single node architecture – Hardware components, energy consumption of sensor nodes, Network architecture – Sensor network scenarios, types of sources

and sinks, single hop versus multi-hop networks, multiple sinks and sources, design principles, Development of wireless sensor networks .

TEXT BOOKS:

1. 1. C. Siva Ram Murthy and B. S. Manoj, ―Ad Hoc Wireless Networks Architectures and Protocols, Pearson, 2008.
2. 2. C. K. Toh, - Ad Hoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall, 2001.

REFERENCE BOOKS:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication – 2002.
3. A Course in Electrical and Electronics Measurements and Instrumentation by Sawhney. A.K, 18th Edition, DhanpatRai& Company Private Limited, 2007.
4. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005.

E-RESOURCES:

1. https://nptel.ac.in/courses/106/105/106105160/

ROBOTICS

IV B.Tech – II Semester **(Code: 18ECD42)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

COURSE OBJECTIVES:

CO1: To understand the basic concepts associated with the design and functioning and applications of Robots

CO2: To study about the drives and sensors used in Robots

CO3: To learn about analyzing robot kinematics and robot programming

COURSE OUTCOMES:

CLO1: Understand the concepts of robot and its applications.

CLO2: Design robot with various links, mechanisms and effectors.

CLO3: Study various sensors and its applications.

CLO4: Develop student skills in perform kinematic analysis of robot system and programming.

SYLLABUS

UNIT I

FUNDAMENTALS OF ROBOT

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Functions – Need for Robots – Different Applications

UNIT II

ROBOT DRIVE SYSTEMS AND END EFFECTORS

Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of Drives End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered andThree Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations

UNIT III

SENSORS AND MACHINE VISION

Requirements of a sensor, Principles and Applications of the following types of sensors – Position of sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors. Camera, Frame Grabber, Sensing and Digitizing Image Data – Signal Conversion, Image Storage, Lighting Techniques. Image Processing and Analysis – Data Reduction: Edge detection, Segmentation Feature Extraction and Object Recognition - Algorithms. Applications – Inspection, Identification, Visual Serving and Navigation.

UNIT IV

ROBOT KINEMATICS AND ROBOT PROGRAMMING

Forward Kinematics, Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – Deviations and Problems. Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effecter commands, and Simple programs

TEXT BOOK:

1. M.P.Groover, "Industrial Robotics – Technology, Programming and Applications", McGraw-Hill, 2001

REFERENCES:

1. Fu.K.S. Gonzalz.R.C., and Lee C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw-Hill Book Co., 1987
2. Yoram Koren, "Robotics for Engineers", McGraw-Hill Book Co., 1992
3. Janakiraman.P.A., "Robotics and Image Processing", Tata McGraw-Hill, 1995

INTRODUCTION TO MEMS

IV B.Tech – II Semester **(Code: 18ECD43)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

SYLLABUS

UNIT-1

Historical Background: Silicon Pressure sensors, Micromachining, Micro Electro Mechanical Systems.; Microfabrication and Micromachining: Integrated Circuit Processes, Bulk Micromachining: Isotropic Etching and Anisotropic Etching, Wafer Bonding, High Aspect-Ratio Processes (LIGA).;

UNIT-2

Physical Microsensors : Classification of physical sensors, Integrated, Intelligent, or Smart sensors, Sensor Principles and Examples : Thermal sensors, Electrical Sensors, Mechanical Sensors, Chemical and Biosensors.;Microactuators : Electromagnetic and Thermal microactuation, Mechanical design of microactuators, Microactuator examples, microvalves, micropumps, micromotors-Microactuator systems : Success Stories, Ink-Jet printer heads, Micro-mirror TV Projector.;

UNIT-3

Surface Micromachining: One or two sacrificial layer processes, Surface micromachining requirements, Polysilicon surface micromachining, Other compatible materials, Silicon Dioxide, Silicon Nitride, Piezoelectric materials, Surface Micromachined Systems : Success Stories, Micromotors, Gear trains, Mechanisms.;

UNIT-4

Application Areas: All-mechanical miniature devices, 3-D electromagnetic actuators and sensors, RF/Electronics devices, Optical/Photonic devices, Medical devices e.g. DNA-chip, micro-arrays.;Lab/Design:(two groups will work on one of the following design project as a part of the course).;RF/Electronics device/system, Optical/Photonic device/system, Medical device e.g. DNA-chip, micro-arrays.

Text Books /References

1. Stephen D. Senturia, "Microsystem Design" by, Kluwer Academic Publishers, 2001.
2. Marc Madou “fundamentals of microfabrication”,
3. Fundamentals of Microfabrication by, CRC Press, 1997.Gregory Kovacs, Micromachined Transducers Sourcebook WCB McGraw-Hill, Boston, 1998.
4. M.-H. Bao, Micromechanical Transducers: Pressure sensors, accelrometers, and gyroscopes by Elsevier, New York, 2000.

SATELLITE COMMUNICATIONS

IV B.Tech – II Semester **(Code: 18ECD34)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: To get knowledge of every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite.

CO2: To explain the tools necessary for the calculation of basic parameters in a satellite communication system.

CO3: To produce graduates who understand how to analyze and manipulate digital signals and to determine the orbital issues to have the fundamental knowledge to do so, for navigation and GPS.

Course Outcomes: Students will be able to

CLO-1: Understands the Fundamental Concepts of Satellite Communication, Orbital mechanism and Computes look angles.

CLO-2: Studies the Satellite subsystems and their effective working and also satellite Link design Models.

CLO-3: Understands and Examine the multiple access techniques (FDMA, TDMA, CDMA) used for Satellite Communication.

CLO-4: Describes the VSAT systems used and its applications

CLO-5: Understands the principles of Global Positioning System (GPS) and working

SYLLABUS

UNIT – I

Introduction: A brief history of Satellite communications, Orbital Mechanics and Launchers: Orbital mechanics, Look angle determination, Orbital perturbations, Orbit determination, Launch and Launch vehicles, Orbital effects in Communication System performance.

UNIT II

Satellites: Satellite sub systems, Attitude and Orbit Control system (AOCS), Telemetry, Tracking, Command & Monitoring, Power Systems, Communication subsystems, satellite antennas.

Satellite Link Design: Introduction, Basic transmission theory, System noise temperature and G/T ratio. Design of Downlinks, Satellite systems using small earth stations, Uplink Design.

Design for specified C/N: Combining C/N and C/I values in satellite links.

UNIT III

Multiple Access: Introduction, FDMA, TDMA, Demand Access Multiple Access (DAMA), Random Access, CDMA.

VSAT systems: Introduction, Overview of VSAT systems, Network Architectures, Access control Protocols, Basic techniques, VSAT Earth Station Engineering.

UNIT IV

Satellite Navigation and Global positioning System: Introduction, Radio and satellite Navigation, GPS position location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation, GPS C/A code Accuracy, Differential GPS.

TEXT BOOK:

1. "Satellite Communications", Timothy Pratt, Charles Bostian, Jeremy Allnutt, 2nd Edition John Wiley India, 2006.

REFERENCE BOOKS:

1. "Satellite Communications", by Dennis Roddy, McGraw-Hill International Edition.
2. "Advanced Electronic Communication Systems", by W Tomasi, Pearson Education.

ADVANCED DIGITAL SIGNAL PROCESSING

IV B.Tech – II Semester **(Code: 18ECD51)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Courses on Signals and Systems, Digital Signal Processing

Course Objectives: To learn

CO1: Basics of Multirate system components, Polyphase decomposition of Digital filter banks.
CO2: Various types of Multirate Filter banks, Perfect Reconstruction of the filter banks.
CO3: Fundamental of Continuous Wavelets, STFT and the properties of Wavelets used in it.
CO4: The concept of Digital Wavelet Transform and signal spaces and properties of it.

Course Outcomes: Students will be able to

CLO1: Analyze various types of Multirate components and sampling rate conversions in digital systems.
CLO2: Construction of Two-Channel, L-Channel QMF and Cosine Modulated Filter Banks.
CLO3: Understand the importance and properties of the Continuous Wavelet Transforms and know the difference between continuous and discrete wavelet transform.
CLO4: Know about the discrete wavelet transforms, scaling functions, function spaces, nested spaces and standard notations used in it.

SYLLABUS

UNIT-I

Basic sample rate alteration devices, Filters in sampling rate alteration systems, Multistage design of decimator and interpolator, Polyphase decomposition, Arbitrary-Rate sampling rate converters, Digital filter banks, Nyquist filters.

UNIT-II

Two-Channel Quadrature –Mirror Filter banks, Perfect reconstruction Two-Channel FIR Filter banks, L-Channel QMF banks, Cosine-Modulated L-Channel Filter banks, Multilevel Filter banks, Problems on each model.

UNIT – III

Continuous wavelet and Short Time Fourier Transform: Introduction, Wavelet Transform, Mathematical Preliminaries, Continuous Time-frequency representation of signals, Windowed Fourier Transform (STFT), Uncertainty principle and Time-Frequency tiling, Properties of Wavelets used in Continuous Wavelets Transforms, Continuous versus Discrete Wavelet Transform.

UNIT – IV

Discrete Wavelet Transform: Introduction, Haar Scaling functions and Function spaces, Nested Spaces, Haar Wavelet Function, Orthogonality, Normalization of Haar bases at different scales, standardizing the Notations, Refinement relation with respect to Normalized bases, Support of a wavelet system, Daubechies Wavelets.

TEXT BOOKS:

1. Digital Signal Processing, A computer Based Approach by Sanjit K Mitra, Tata Mc Graw Hill Publishing.

2. Insight into Wavelets from Theory to Practice by K.P. Soman, K.I. Ramachandran, N.G. Reshmi, PHI Publications, Third Edition, 2010.

REFERENCE BOOKS:

1. Multirate Systems and Filter Banks, P.P.Vaidyanathan, Pearson Education, Low Priced Edition, 2006.
2. Wavelet Transforms - Introduction to Theory and Applications, Raghuveer M. Rao, Ajit opardikar, Pearson Education, Asia

Artificial Neural Networks

IV B.Tech – II Semester **(Code: 18ECD52)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: Certain fundamental concepts of artificial neural networks.

CO2: Basic elementary patterns classifying neural nets and the fundamental ideas of pattern association.

CO3: Basic concepts of competitive networks and brief descriptions of certain competitive Networks.

CO4: Various applications of Neural networks in different domains.

Course Outcomes: Students will be able to

CLO1: Understanding the functionality of Artificial Neural Model and implementation of different digital logics using various neural models.

CLO2: Analyze the given pattern to one already stored in memory

CLO3: Understanding A multilayer feedforward neural net with one or more hidden layers can learn any continuous mapping to an arbitrary accuracy.

MCLO4: Learn various applications of Neural networks.

SYLLABUS

UNIT – I

ARTIFICIAL NEURAL NETWORKS: **BASIC CONCEPTS**

Introduction, Computation in terms of patterns, The McCulloch-Pitts Neural Model, The Perceptron, Neural Network Architectures, Activation Functions, Learning by Neural Nets

UNIT – II

PATTERN CLASSIFIERS

Hebb Nets, Perceptrons, Adaline, Madaline.

PATERN ASSOCIATORS

Auto-associative Nets, Hetero-Associative Nets, Hopfield Networks, Bi-directional Associative Memory.

UNIT – III

COMPETITIVE NEURAL NETS

The MAXNET, Kohonen's Self Organizing Map (SOM), Learning Vector Quantization (LVQ), Adaptive Resonance Theory(ART)

BACKPROPAGATION

Multilayer Feed forward Net, The Generalized Delta Rule, The Back propagation Algorithm.

UNIT – IV

APPLICATIONS OF NEURAL NETWORKS

Applications of Neural Networks in Forecasting, Applications of Neural Networks in Healthcare, Applications of Neural Networks in Business, Applications of Neural Networks in image processing and compression, Applications of Neural Networks in control systems, Applications of Neural Networks in pattern recognition.

TEXT BOOKS

1. Introduction to SOFT COMPUTING by Samir Roy and Udit Chakraborty,Pearson Publishing,2013. (Unit I,II, III)
2. Introduction to Neural Networks using Matlab 6.0 by S N Sivanandam,S Sumathi, S N Deepa, Tata McGraw Hill Publishing,7th Reprint, 2008(Unit IV)

REFERENCE BOOKS:

1. Jang J.S.R., Sun C.T., Mizutani E., "Neuro-Fuzzy and Soft Computing", Prentice Hall, 1997
2. Hertz J., "Introduction to the Theory of Neural Computing", Addison-Wesley, 1991

Software Defined Radio (18ECD53)

IV B.Tech – II Semester **(Code: 18ECD52)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: Communication Systems

Course Objectives:

CO1 To attain knowledge on basic software and hardware architecture of Software Defined Radio.

CO2 To understand the development of Software Defined Radios.

CO3 To analyze the Available Technologies of Software Defined Radios

CO4 To obtain the basic knowledge about concepts of Spectrum Sensing techniques and applications of SDR.

Course Outcomes:

CLO1 Understand the software and hardware architecture of on Software Defined Radio.

CLO2 Understand the Essential Functionalities and requirements in development of Software Defined Radios and their usage for Cognitive Radio.

CLO3 Identify the Cognitive Radio Available Technologies and research fields.

CLO4 Understand the concepts of Spectrum Sensing techniques for Cognitive Radio Applications.

SYLLABUS

UNIT I

Software Defined Radio Basic SDR– Software and Hardware Architecture of an SDR – Spectrum Management–Managing unlicensed spectrum–Noise Aggregation.

UNIT II

SDR AS PLATFORM FOR COGNITIVE RADIO Introduction – Hardware and Software architecture – SDR development process and Design – Application software – Component development – Waveform development–cognitive waveform development.

UNIT III

Cognitive Radio Technology Introduction – Radio flexibility and capability – Aware – Adaptive – Comparison of Radio capabilities and Properties – Available Technologies – Funding and Research in CRs.

UNIT – IV

Spectrum Sensing For Cognitive Radio Applications Introduction - Challenges- Spectrum Sensing Methods for Cognitive RadioCooperative Sensing- External Sensing- Statistical Approaches and PredictionSensing Frequency- Hardware Requirements and Approaches- Multidimensional Spectrum Awareness- Spectrum Sensing in Current Wireless Standards.

Text Books:

1. Bruce A Fette, “Cognitive Radio Technology”, 2nd edition Academic Press, 2009.
2. HuseyinArslan, “Cognitive Radio, Software Defined Radio and Adaptive wireless system, Springer, 2007.

Reference Books:

1. .Mitola, J. and J. Maguire, G. Q., "Cognitive radio: making software radios more personal," IEEE Personal Commun. Mag., vol. 6, no. 4, pp. 13–18, Aug. 1999.
2. TevfikY¨ucek and H¨useyinArslan, "A Survey of Spectrum Sensing Algorithms for Cognitive Radio Applications" , IEEE Communications Surveys & Tutorials, Vol. 11, No.1, First Quarter 2009, Pp 116-130.

FPGA Design for Embedded Systems

IV B.Tech – II Semester **(Code: 18ECD54)**

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: None

Course Objectives: To learn

CO1: Understand Digital system design using HDL.
CO2: Know FPGA architecture, interconnect and technologies.
CO3: Know different FPGA's and implementation methodologies.
CO4: Understand configuring and implementing digital embedded system, microcontrollers, microprocessors, DSP algorithm on FPGA.

Course Outcomes: Students will be able to

CLO-1: Design reconfigurable digital systems
CLO-2: Demonstrate and Debug the embedded systems before the actual product is developed.
CLO-3: Design finite state machines for various applications.
CLO-4: Design dynamic architectures using FPGA's.
CLO-5: Implement, Design and develop embedded system using EDA tools

SYLLABUS

UNIT – I

INTRODUCTION

Digital system design options and tradeoffs, Design methodology and technology overview, High Level System Architecture and Specification: Behavioral modelling and simulation, Hardware description languages, combinational and sequential design, state machine design, synthesis issues, test benches.

UNIT II

OVERVIEW OF FPGA ARCHITECTURES AND TECHNOLOGIES

FPGA Architectural options, granularity of function and wiring resources, coarse V/s fine grained, vendor specific issues (emphasis on Xilinx and Altera), Logic block architecture: FPGA logic cells, timing models ,power dissipation I/O block architecture: Input and Output cell characteristics, clock input, Timing, Power dissipation.

UNIT III

PLACEMENT AND ROUTING

Programmable interconnect - Partitioning and Placement, Routing resources, delays; Applications - Embedded system design using FPGAs, DSP using FPGAs, Dynamic architecture using FPGAs, reconfigurable systems, application case studies.

UNIT IV

APPLICATIONS

Simulation/implementation exercises of combinational, sequential and DSP kernels on Xilinx/Altera boards.

TEXT BOOKS:

1. M.J.S. Smith, “Application Specific Integrated Circuits”, Pearson, 2000.
2. Peter Ashenden, “Digital Design using VHDL”, Elsevier, 2007.
3. Peter Ashenden, “Digital Design using Verilog”, Elsevier, 2007.
4. W.Wolf, “FPGA based system design”, Pearson, 2004.
5. Clive Maxfield, “The Design Warriors’s Guide to FPGAs”, Elsevier, 2004.

Institution Elective - I
AIR POLLUTION & CONTROL
IV B.Tech – I Semester (Code: 18CE101)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. To take up the basic concepts of sources and effects of Air Pollution
2. The contents involved the knowledge of the effect of metrological parameters on air pollution
3. The contents involved the knowledge of the control of air pollution from particulates
4. To develop skills relevant to control of gaseous pollution and also introduce about Air Quality Management

Course Outcomes: On the completion of the course, one should be able to understand:

1. The concepts of sources of air pollution and effects of air pollutants on man, materials and plants
2. Be able to understand the effect of air pollution with meteorological parameters
3. The knowledge about particulate control by different devices
4. Be able to develop gaseous pollution control technologies and estimate the quality monitoring of air pollutants

UNIT –I

Air Pollution –Definitions, Air Pollutants–Classifications –Natural and Artificial– Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources.

Effects of Air pollutants on man, material land vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains and Ozone Holes etc.

UNIT –II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomenon Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Theory and problem related to Gaussian dispersion model.

Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's–Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOx and Sox emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management–Monitoring of SPM, SO;NO and CO Emission Standards.

TEXTBOOKS:

1. AirpollutionByM.N.RaoandH.V.N.Rao –Tata Mc.GrawHillCompany.
2. AirpollutionbyWarkand Warner. –Harper & Row, NewYork.

REFERENCE BOOK:

1. An introduction to Air pollution by R.K.Trivedy and P.K.Goel, B.S.Publications

Institution Elective - I
RURAL WATER SUPPLY AND ENVIRONMENT SANITATION
IV B.Tech – I Semester (Code: 18CE102)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. Apply knowledge of basic sciences and engineering to analyze water resources systems for socio-economic development.
2. Identify the sources of water and their characteristics.
3. Identify and select criteria for the selection of sanitation technology
4. To learn about analytical & design methods for environmental systems.

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

1. Identify problems pertaining to rural water supply and sanitation.
2. Design water supply and sanitation system for rural community.
3. Design low-cost waste management systems for rural areas.
4. Plan and design an effluent disposal mechanism.

UNIT - I

WATER SUPPLY: Issues of rural water supply –Various techniques for rural water supply- merits- National rural drinking water program- rural water quality monitoring and surveillance- operation and maintenance of rural water supplies

UNIT - II

LOW-COST WATER TREATMENT: Introduction – Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

UNIT - III

RURAL SANITATION: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas stabilization ponds - septic tanks - Imhoff tank- soak pits- low-cost excreta disposal systems Effluent disposal.

UNIT - IV

INDUSTRIAL HYGIENE AND SANITATION: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation. SOLID WASTE MANAGEMENT: Disposal of Solid Wastes- Composting- land filling incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

TEXT BOOKS:

1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6th Ed., McGraw Hill Book Company, 1965.
2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, BanarsidasBhanot, 1972

REFERENCE BOOKS:

1. Wright, F.B., Rural Water Supply and Sanitation, E. Robert Krieger Publishing Company, Huntington, New York, 1977.
2. Juuti, P., Tapio S. K., and Vuorinen H., Environmental History of Water: Global Views

Institution Elective - II

DISASTER MANAGEMENT

IV B.Tech – II Semester (Code: 18CE103)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives: The subject provides

1. Clear knowledge of Disaster, Hazards and Vulnerabilities.
2. Knowledge of Mechanism of Disaster Management.
3. Clear idea of Capacity Building.
4. Explains how to do the planning for disaster management.

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

1. Understands Disaster, Man-made Hazards and Vulnerabilities.
2. Understands Disaster Management Mechanism
3. Understands Capacity Building Concepts
4. Understands Planning of Disaster Managements

UNIT-I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards.

UNIT-II

Disaster Management Mechanism: Concepts of risk management and crisis managements -Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief.

UNIT-III

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels

UNIT-IV

Coping with Disaster: Coping Strategies; alternative adjustment processes – Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits -Mass media and disaster management.

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India -Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by MrinaliniPandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015.

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

Institution Elective - II

REMOTE SENSING &GIS

IV B.Tech – II Semester (Code: 18CE104)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. Learn basic concepts of Aerial Photographs.
2. Learn basic concepts of remote sensing and its characteristics, satellite sensors and platforms.
3. Know about satellite digital image processing and classification techniques.
4. Understand the basic concepts GIS, spatial data and analysis
5. Applications of GPS in surveying.
6. Know various remote sensing and GIS applications in civil engineering

Course Outcomes:

1. Interpret Information from Aerial Photographs.
2. Exposure on Basics of Remote Sensing, Satellite Sensors and Platforms, Practical Knowledge on Satellite Image Classification.
3. Know Basics of GIS And Map Making. Exposure about Spatial Analysis Using Overlay Tools.
4. Geo-Tag Assets Using GPS And Add Attribute & Meta-Data.
5. Get the Knowledge on Various Remote Sensing and GIS Applications in Civil Engineering.

UNIT- I

PHOTOGRAMMETRY: Fundamentals of Photogrammetry and Photo interpretation – types of photographs; Vertical photographs – principal point; scale; Stereoscopy; Overlap, side lap and flight planning.

UNIT – II

REMOTE SENSING:

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques. Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Introduction, key components, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster Vs Vector, advantages and disadvantages of Raster & Vector network analysis - concept and types, Data storage-vector data storage, attribute data storage.

UNIT - IV

GLOBAL POSITIONING SYSTEM (GPS)&RS AND GISAPPLICATIONS:

GPS definition, components of GPS, GPS receivers. Space, Control and User segments of GPS. Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS.

Applications: Photogrammetry, Remote Sensing and Geographical information Systems

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill.

3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
5. Parkinson, B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA

REFERENCE BOOKS:

1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013.
3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Inter science
6. Burrough, P. P. & McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

JAVA PROGRAMMING IV B. Tech. – VII Semester (Code: 18CSI01)					
Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives:

CO1	Understand the concepts of Data Types, Variables, Arrays, Operators, control Statements, Classes and Objects.
CO2	Understand Inheritance, Interfaces, Packages and Strings.
CO3	Understand and write programs on Exception Handling and I/O.
CO4	Understand the concepts of Event Handling, Applets and Swings.

Course Outcomes: Students will be able to:

CLO-1	Understand basic Java language syntax and semantics to write Java programs, use concepts such as variables, conditional and iterative execution methods etc. And use the Java SDK environment to create, debug and run Java programs
CLO-2	Identify classes, objects, members of a class and relationships among them needed for a specific problem and Write Java application programs using OOP principles and proper program structuring
CLO-3	Demonstrate the concepts of polymorphism, inheritance, packages and interfaces.
CLO-4	Write Java programs to implement error handling techniques using exception handling

UNIT-1	(13 Periods)

The History and Evolution of Java, An Overview of Java, Data Types, Variables and Arrays, Operators, Control Statements, Introducing Classes A Closer Look at Methods and Classes.

UNIT-2	(13 Periods)

Inheritance, Packages and Interfaces.

Strings: String Constructors, Program using 10 String methods, String Buffer class, Program using 10 String Buffer methods Introducing String Builder class.

UNIT-3	(12 Periods)

Exception Handling

I/O: I/O Basics, Reading Console Input, Writing Console Output, The Print Writer class, Reading and Writing Files, Automatically Closing a File.

UNIT-4	(12 Periods)

The Applet Class: Applet Architecture, An Applet Skeleton, Applet program to draw shapes, setting Color, Font using Graphicsclass **Event Handling, GUI Programming with Swing:** The Origins of Swing, Advantages of Swing over AWT, The MVC Connection, Program using Swing Components JLabel, JText Field, JText Area, JCheck box, JButton, JTabbed Pane, JTable, JTree, JCombo Box.	
Text Books :	1. Java The Complete Reference, 9th Edition, Herbert Schildt, TMH Publishing Company Ltd.
References :	1. Java: A Beginner's Guide, Eighth Edition, Herbert Schildt, TMH Publishing Company Ltd. 2. Head First Java, Second Edition, O′Reilly

DATABASE MANAGEMENT SYSTEM

IV B.Tech- VII Semester (Code: **18CSI02**)

Lectures:	4 periods/week	Continuous Internal Assessment:	50 marks
Final Exam:	3 Hours	Semester End Exam:	50 marks

Course Objectives:

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

1. Familiarize with fundamental concepts of database and various database architectures and Design relations for Relational databases using conceptual data modeling. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
2. Implement formal relational operations in relational algebra and SQL.
3. Identify the Indexing types and normalization process for relational databases
4. Use mechanisms for the development of multi user database applications

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Ability to apply knowledge of database design methodology which give a good formal foundation in relational data model and Understand and apply the principles of data modeling using ER Model.
2. Familiar with relational DB theory and will able to write relational algebra expressions, Relational Calculus and SQL.
3. Design database schema and Identify and solve the redundancy problem in database tables using normalization.
4. Understand transaction processing and concurrency control techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	2	2		2				3			2		3
CO2	3	3	2	2						3			3	3	3
CO3	3	3	3	3						3			3	3	3
CO4		3	3	3		3				3			2	3	3

UNIT-I — 16 Periods

Databases and Database Users: Introduction - An Example - Characteristics of the Database Approach–Actors on the Scene- Workers behind the Scene-Advantages of Using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas, and Instances- Three-Schema Architecture and Data Independence- Database Languages and Interfaces- The Database System Environment -Centralized and Client/Server Architectures for DBMSs.

Data Modeling Using the Entity-Relationship(ER)Model: Using High-Level Conceptual Data Models for Database Design-An Example Database Application-Entity Types, Entity Sets, Attributes, and Keys-Relationship Types, Relationship Sets, Roles, and Structural Constraints-Weak Entity Types-Refining the ER Design for the COMPANY Database-ER Diagrams, Naming Conventions, and Design Issues

UNIT-II — 16 Periods

The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT - Relational Algebra Operations from Set Theory-Binary Relational Operations: JOIN and DIVISION–Additional Relational Operations-The Tuple Relational Calculus-The Domain Relational Calculus

Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types –Specifying Constraints in SQL-Schema Change Statements in SQL-Basic Queries in SQL – More Complex SQL Queries-INSERT, DELETE, and UPDATE Statements in SQL- Views (Virtual Tables) in SQL

UNIT-III — 14 Periods

Introduction to Schema Refinement: Problems Caused by Redundancy, Decompositions–ProblemRelated to Decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms, FIRST, SECOND, THIRD Normal Forms, BCNF, Properties of Decompositions, Loss Less- Join Decomposition, Dependency Preserving Decomposition, Schema Refinement in Database Design – Multivalued Dependencies FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT-IV	14 Periods
Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing-Transaction and System Concepts-Desirable Properties of Transactions- Characterizing Schedules Based on Recoverability –Characterizing Schedules Based on Serializability **Concurrency Control Techniques:** Two-Phase Locking Techniques for Concurrency Control –Concurrency Control Based on Time stamp Ordering– Multi version Concurrency Control Techniques-Validation(Optimistic) Concurrency Control Techniques-Granularity of Data Items and Multiple Granularity Locking	
Text Book(s) :	Fundamentals of Database Systems, RamezElmasri and Navathe Pearson Education, 6thedition
References :	1. Introduction to Database Systems, C.J. Date Pearson Education 2. Database Management Systems, Raghu Rama krishnan, Johannes Gehrke, TATA McGraw Hill3rdEdition 3. Database System Concepts, Silberschatz, Korth, McGraw hill,5thedition

PYTHON PROGRAMMING

IV B. Tech. – VIII Semester (Code: 18CSI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives:

CO1	Understand and write code using the basics of Python, Statements, Expressions, Conditional Executions, and Functions.
CO2	Write code for Iteration, Strings, File I/O.
CO3	Write code in creating, usage of Lists, Dictionaries, and Tuples.
CO4	Understand the concepts of Object Orientation, Databases and write code implementing them.

Course Outcomes: Students will be able to:

CLO-1	Understanding of scripting and the contributions of python language.
CLO-2	Understanding of Python especially the object-oriented concepts, using databases.
CLO-3	Able to design and implement machine learning solutions to classification, regression.
CLO-4	Able to design and implement machine learning solutions to clustering problems and features of various data.

UNIT-1 (12 Periods)

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.

Conditional execution: Boolean expressions, logical operators, conditional execution, Alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, short-circuit evaluation of logical expressions.

Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.

UNIT-2 (12 Periods)

Functions: function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

Strings: string is a sequence, getting the length of a string using len, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.

FileI/O: persistence, opening files, text files and lines, reading files, searching through a file, letting the user choose the file name, using try except and open, writing files.

UNIT-3 (12 Periods)

Lists: a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments.

Tuples: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignmentwith dictionaries, the most common words, using tuples as keys in dictionaries, sequences.

Sets: Introduction, access set items, add set items, remove set items, loop sets, join sets, set methods.
Dictionaries: Dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.

UNIT-4	(12 Periods)

Regular Expressions: Character matching in regular expressions, Extracting data using regular expressions, Combining searching and extracting, Escape character**.**
Object-Oriented Programming: Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem–Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances.

Using Databases and SQL: Database concepts, Database Browser for SQLite, creating a database table, Structured Query Language summary, Basic data modeling, Programming with multiple tables, three kinds of keys, Using JOIN to retrieve data.

Text Books :	1. Python for Everybody, Charles Severance
References :	1. W3Schools - https://www.w3schools.com/python/ 2. A Python Book: Beginning Python, Advanced Python, and Python Exercises, Dave Kuhlman, Open Source MIT License.

COMPUTER NETWORKS

IV B.Tech- VIII Semester (Code: **18CSI04**)

Lectures:	4 periods/week	Continuous Internal Assessment:	50 marks
Final Exam:	3 Hours	Semester End Exam:	50 marks

Course Objectives:

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

5. Build an understanding of the fundamental concepts of computer networking.
6. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
7. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
8. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

5. Understand and explain Data Communications System and its components and Identify the different types of network topologies and protocols.
6. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
7. Understand and building the skills of subnetting and routing mechanisms.
8. Familiarity with the application layer protocols of computer networks, and how they can be used to assist in network implementation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2		2				3			2		3
CO2	2	3	2	2						3			3	3	3
CO3		3	3	3						3			3	3	3
CO4		2	3	3		3				3			2	3	3

UNIT-I — 14 Periods

Data Communications & Networking Overview: A Communications Model, Data Communications, Data Communication Networking.

Protocol Architecture: The Need for Protocol Architecture, A Simple Protocol Architecture, OSI, The TCP /IP Protocol Architecture.

Digital Data Communication Techniques: Asynchronous & Synchronous Transmission, Types of Errors, Error Detection, Error Correction.

UNIT-II — 16 Periods

Data Link Control: Flow Control, Error Control.

Network Layer:

Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit & Datagram Subnets.

Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control.

UNIT-III — 16 Periods

Quality of Service: Requirements, Techniques for Achieving Good Quality of Service The **Network Layer in the Internet:** The IP Protocol, IP Addresses, Internet Control Protocols.

The Transport Layer: The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley sockets

Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery.

UNIT-IV	14 Periods
The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol. **The Internet Transport Protocols (TCP):** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management. **Application Layer: The Domain Name System (DNS):** The DNS Name Space, Resource Records, Name Servers.	
Text Book(s) :	1. BehrouzA.Forouzan, ―Data Communications and Networking‖, 4th edition, TMH. 87 2. Tanenbaum, ―Computer Networks‖, 4th Edition, (Pearson Education / PHI).
References :	1. Wayne Tomasi, ―Introduction to Data Communications and Networking‖, PHI. 2. GodBole, ―Data Communications & Networking‖, TMH. 3. Nader F.Mir, ―Computer and Communication Networks‖, PHI

Digital Image Processing
VII – Semester (Code: 18ECI01)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)		:	50

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: Recall and summarize the digital image fundamentals and to be exposed to basic image processing techniques.

CO2: Be familiar with image restoration, segmentation and compression techniques.

CO3: Illustrate the representation of monochrome and color images in the form of features and descriptors

CO4: Give the students a taste of the applications of the theories taught in the subject. This willbe achieved through the project and some selected lab sessions.Develop a theoretical foundation of fundamental Digital Image Processing concepts.

Course Outcomes: Students will be able to

CLO1: Explain the digital image fundamentals and basic image processing techniques

CLO2: Apply appropriate technique for image enhancement both in spatial and frequency domains

CLO3: Analyze the need for image restoration and color image processing and illustrate various restoration and color image processing techniques.

CLO4: Evaluate various segmentation, representation and description techniques on digital images

UNIT – I

INTRODUCTION: What Is Digital Image Processing? The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels.

UNIT – II

SPATIAL AND FREQUENCY DOMAIN FILTERING: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, Sharpening Spatial Filter. The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters.

IMAGE COMPRESSION: Fundamentals – Image Compression models – Error Free Compression, Lossy Compression

UNIT – III

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering.

COLOR IMAGE PROCESSING: Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Image Segmentation based on Color.

UNIT – IV

IMAGE SEGMENTATION: Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation

IMAGE REPRESENTATION AND DESCRIPTION: Representation schemes, Boundary Descriptors, Regional Descriptors.

TEXT BOOK:

1. R. C. Gonzalez, R. E. Woods, Digital Image Processing 4thEdition, Pearson Education Publishers, 2019.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, Mc-Grah Hill Publications, 2010.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.
3. S.Sridhar, Digital Image Processing, Oxford University Press, 2016.

EMBEDDED SYSTEMS
VII – Semester (Code: 18ECI02)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Pre-requisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: On typical embedded system design methodologies, characteristics and design metrics.

CO2: To know different core manufacturing models, importance of synchronization among processes and need for communication interfaces in wired and wireless.

CO3: Illustrate the kernel architecture and kernel objects, different task schedulers with their applications.

CO4: Real time OS, synthesis and simulation tools at different obstruction levels along with hw/sw co-design.

Course Outcomes: Students will be able to

CLO1: Understand different design methodologies for embedded systemdesign.

CLO2: Understand different core manufacturing models, importance of synchronization among processes and need for communication interfaces in wired and wireless

CLO3: Know kernel architecture and kernel objects, different task schedulers with their applications.

CLO4: Know the embedded and real time OS, synthesis and simulation tools at different obstruction levels along with hw /sw co-design

SYLLABUS

UNIT – I

Introduction to embedded systems: Design challenges, processor technology, IC technology, design technology, tradeoffs, single purpose processor, RT level combinational logic, sequential logic (RT level) custom single purpose processor design, General purpose processors: basic architecture, pipelining, programmers view, development environment, ASIPS, microcontrollers and digital signal processors.

UNIT – II

STATE MACHINE AND CONCURRENT PROCESS MODELS: models vs. languages, FSMD, using state machines, PSMM, concurrent process model, concurrent processes, communication and synchronization among processes, data flow model and real-time systems. Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Bluetooth.

UNIT - III

EMBEDDED SYSTEM AND RTOS CONCEPTS: Architecture of kernel, tasks and task scheduler, interrupt service routines, semaphores, mutex. Mail boxes, message queues, event registers, pipes and signals.

UNIT – IV

EMBEDDEDSYSTEM AND RTOS CONCEPTS: Timers, memory management, priority inversion problem, embedded OS and real-time OS, RTLinux, and Handheld OS. Design technology: Introduction, automation, synthesis, parallel evolution of compilation and synthesis, logic synthesis, RT synthesis, behavioral synthesis, system synthesis, HW/SW co-design, verification, and co-simulation.

TEXT BOOKS:

1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, John Wiley & sons 2002.

2. KVKK Prasad, Embedded and real-time systems, DreemtechPress, 2005.

REFERENCE BOOKS:

1. Raj Kamal, Embedded system architecture, programming and design, TMH edition.
2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embedded systems, Pearson edition.
3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson

Wireless Communications

VIII – Semester (Code: 18ECI03)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: Understand basic fundamentals of wireless communications.

CO2: To know the role of equalization in Mobile communication and to study different types ofEqualizers and Diversity techniques.

CO3: Differentiate various multiple access technique

CO4: Demonstrate different wireless communication systems and standards (1G to 4G)..

Course Outcomes: Students will be able to

CLO1: Understand the fundamental concepts of Cellular & Mobile communications

CLO2: Demonstrate knowledge equalization and different diversity techniques

CLO3: Compare different multiple access techniques in mobile communication.

CLO4: Demonstrate different wireless communication systems and standards (1G to 4G)

UNIT – I

Cellular Mobile Communication Concepts: Evolution of mobile radio communications, Examples of wireless communication systems, Frequency re-use and channel assignment strategies, Handoff strategies, Interference and system capacity, co-channel and adjacent channel interference,Grade of service,Coverage and capacity enhancement in cellular network, cell splitting, sectoring, repeaters, microcells.

UNIT – II

Equalization: Fundamentals of equalizers, Equalizers in a communication receiver, Linear equalizers, Nonlinear equalizers: Decision feedback equalizers, Maximumlikelihood sequence Estimation (MLSE) equalizer.

Diversity Techniques: Space diversity: Selection diversity, feedback, MRC, EGC diversity, Polarization diversity, Frequency diversity, Time diversity, Rake Receiver.

UNIT – III

Multiple Access in Wireless communications: Principle and applications ofMultiple Access Techniques-FDMA, TDMA, CDMA, Spread Spectrum Multiple Access.

UNIT – IV

Wireless Generations Technologies up to 3G:1G, TDMA-based 2G, IS-95, 2.5G, 3G development, Air interface technologies , Internet speeds of 2G, 2.5G, and 3G technologies, Limitations of 3G, Quality of services (QOS) in 3G.

4GTechnology:4G evolution, Advantages of 4G over 3G, Applications of 4G, Limitations of 4G.

TEXT BOOKS:

1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2ndEdition, Pearson Education, 2003 (UNIT I, II, III).
2. G Sasibhusan Rao, Mobile Cellular Communications, Pearson Education, 2013(UNIT IV).

REFERENCE BOOKS:

1. W.C.Y. Lee, Mobile Cellular Communications, 2nd Edition, MC Graw Hill, 1995.
2. Yi-BingLin, ImrichChlamtac, Wireless and Mobile Network architectures, Wiley, 2001.
3. KamiloFeher, Wireless Digital Communications, PHI, 2003.

Artificial Neural Networks

VIII – Semester (Code: 18ECI04)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: Certain fundamental concepts of artificial neural networks.

CO2: Basic elementary patterns classifying neural nets and the fundamental ideas of patter association.

CO3: Basic concepts of competitive networks and brief descriptions of certain competitive Networks.

CO4: Various applications of Neural networks in different domains.

Course Outcomes: Students will be able to

CLO1: Understanding the functionality of Artificial Neural Model and implementation of different digital logics using various neural models.

CLO2: Analyze the given pattern to one already stored in memory

CLO3: Understanding A multilayer feed forward neural net with one or more hidden layers can learn any continuous mapping to an arbitrary accuracy.

CLO4: Learn variousapplications of Neural networks.

SYLLABUS

UNIT – I

ARTIFICIAL NEURAL NETWORKS: **BASIC CONCEPTS**

Introduction, Computation in terms of patterns, The McCulloch-Pitts Neural Model, The Perceptron, Neural Network Architectures, Activation Functions, Learning by Neural Nets

UNIT – II

PATTERN CLASSIFIERS: Hebb Nets, Perceptrons, Adaline, Madaline.

PATERN ASSOCIATORS: Auto-associative Nets, Hetero-Associative Nets, Hopfield Networks, Bi-directional Associative Memory.

UNIT – III

COMPETITIVE NEURAL NETS: The MAXNET, Kohonen's Self Organizing Map (SOM), Learning Vector Quantization (LVQ), Adaptive Resonance Theory(ART)

BACKPROPAGATION: Multilayer Feed forward Net, The Generalized Delta Rule, The Back propagation Algorithm.

UNIT – IV

APPLICATIONS OF NEURAL NETWORKS

Applications of Neural Networks in Forecasting, Applications of Neural Networks in Healthcare, Applications of Neural Networks in Business, Applications of Neural Networks in image processing and compression, Applications of Neural Networks in control systems, Applications of Neural Networks in pattern recognition.

TEXT BOOKS

1. Introduction to SOFT COMPUTING by Samir Roy and UditChakraborty,Pearson Publishing,2013. (Unit I,II, III)
2. Introduction to Neural Networks using Matlab 6.0 by S N Sivanandam,SSumathi, S N Deepa,Tata McGraw Hill Publishing,7th Reprint, 2008(Unit IV)

REFERENCE BOOKS:

1. Jang J.S.R., Sun C.T., Mizutani E., "*Neuro-Fuzzy and Soft Computing"*, Prentice Hall, 1997
2. Hertz J., "*Introduction to the Theory of Neural Computing"*, Addison-Wesley, 1991

APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS
IVB.Tech-VII Semester (18EEI01)

Lectures	4	Tutorial	1		Practical	0	Credits	4	
Continuous Internal Assessment		:	50		Semester End Examination (3 Hours)		:	50	

Course Objectives: To make the students will be able to

CO1 Illustrate different types of wavelets and digital filtering integration
CO2 Get knowledge about the significance of Bi-orthogonal and multidimensional wavelets
CO3 Understand DWT and DTWT and their interpretation using orthonormal PRQMF filter.
CO4 Applications of wavelet transform to Engineering systems.

Course Learning outcomes: Students will be able to

CLO1 Describe scaling functions, continuous wavelet transform and different wavelet functions.
CLO2 Develop bi-orthogonal wavelet basis function and apply to two dimensional signals.
CLO3 Apply wavelet transform for image and audio compression.
CLO4 Employ wavelet transforms for different engineering applications

Course Syllabus

UNIT – I

Continuous wavelet transforms, Properties, Inverse transform, Examples of mother wavelets, Analy transform. Digital filtering interpretation, Examples of orthogonal basis –generating wavelets, i ortho normal MRAs for discrete time signals

UNIT – II

Bi-orthogonal Wavelets: Bi-orthogonal wavelet bases, Filtering relationship for bi-orthogonal filters, Examples of bi-orthogonal scaling functions and wavelets, two dimensional wavelets, Multidimensional wavelets and wavelet packets.

UNIT – III

Wavelet Transform And Data Compression: Introduction, Transform Coding, DTWT for Image Compression, Audio Compression, And Video Coding Using Multi-resolution Techniques: a Brief Introduction.

UNIT – IV

Applications of Wavelet Transforms: De-noising, Biomedical applications, Applications in communication system, Edge detection and object isolation, Image fusion, Electrical system protection

TEXT BOOKS:

1. Raghuveer M. Rao, Ajit S. Bopardikar, “Wavelet Transforms: Introduction to Theory & Applications”, Pearson Education Asia, New Delhi, 2003
2. Agostino Abbate, Casimer M. De Cusatis and Pankaj K. Das, “Wavelets and Sub-bands Fundamentals and Applications”, Pearson Education Asia, New Delhi, 2008

REFERENCE BOOKS:

1. K. P. Soman and K.L. Ramchandran, “Insight into Wavelets from theory to practice”, Eastern Economy Edition, 2008
2. Stephane G. Mallat, “A Wavelet Tour of Signal Processing”, Academic Press, Second Edition, 1999.

CO-PO mapping:

APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe scaling functions, continuous wavelet transform and different wavelet functions.	2	3	1	2	2	-	-		-	-	-	-
CO2	Develop bi-orthogonal wavelet basis function and apply to two dimensional signals.	3	3	2	1	-	-	-		-	-	-	1
CO3	Apply wavelet transform for image and audio compression.	3	2	1	1		-	-		-	-	-	1
CO4	Employ wavelet transforms for different engineering applications	2	3	2	2	2	-	-		-	-	-	2

INDUSTRIAL ELECTRICAL SYSTEMS

IVB.Tech – VII Semester (Code: 18EEI02)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: To make the students

CO1: Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
CO2: Understand various components of industrial electrical systems.
CO3: Analyze and select the proper size of various electrical system components.
CO4: Solve problems involving with different AC and DC sources in electrical circuits.

Course Outcomes: Students will be able to

CLO1: Demonstrate the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.

CLO2: Explain various components of industrial electrical systems.

CLO3: Analyze and select the proper size of various electrical system components.

CLO4: Solve problems involving with different AC and DC sources in electrical circuits.

UNIT - I

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

Residential and Commercial Electrical Systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT - II

Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT - III

Industrial Electrical Systems I: HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, single line diagram, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT – IV

Industrial Electrical Systems II: DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Industrial Electrical System Automation: Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

TEXT BOOKS:

1. H. Joshi, "Residential, "Commercial and Industrial Electrical Systems", McGraw Hill Education, 2007.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2017.
3. J. B. Gupta, "A Course in Electrical Installation Estimating and Costing", S.K. Kataria& Sons, 2013.

REFERENCE BOOKS:

1. Surjit Singh, "Electric Estimating and Costing", DhanpatRai and Co., 2016.
2. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating &Costing", Khanna publishers, 2008.

CO-PO Mapping:

Industrial Electrical Systems 18EED52		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**
CO1	Demonstrate the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.	3	2	2	-	-	2	-	-	-	-	-
CO2	Explain various components of industrial electrical systems.	3	2	2	-	-	2	-	-	-	-	-
CO3	Analyze and select the proper size of various electrical system components.	3	2	2	-	2	2	-	-	-	-	-
CO4	Solve problems involving with different AC and DC sources in electrical circuits.	3	2	2	-	2	-	-	-	-	-	-

HIGH VOLTAGE ENGINEERING

IV B.Tech – VIII Semester (Code: 18EEI03)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			50	Semester End Examination (3 Hours)			50

Pre-requisites: Physics, Circuit Theory, Power Systems-1

Course objectives: To make the students

CO1: Understand the breakdown phenomenon in solids, liquids and gases.
CO2: Understand different measuring techniques in high voltages.
CO3: Understand the testing techniques of different high voltage apparatus.
CO4: To know the protective techniques against over voltages.

Course outcomes: At the end of the course, the student will demonstrate

CLO1: Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
CLO2: Explain the generation and measurement of D. C., A.C.,& Impulse voltages.
CLO3: Describe tests on H. V. equipment and on insulating materials, as per the standards.
CLO4: Illustrate the protection against over voltages.

UNIT-I

Breakdown phenomenon of Gases,Liquids and Solids: Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge. Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT-II

Generation of High voltages: Generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-III

Measurement of high voltages and currents: Measurements of Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements.Protection against over-voltages, Surge diverters, Surge modifiers.

UNIT-IV

High voltage testing techniques: Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

TEXTBOOKS:

1. M.S.Naidu and V.Kamaraju , "High Voltage Engineering", McGraw Hill; 6thedition, 2020.

2. C. L. Wadhwa, “High Voltage Engineering”, New Age International Publishers, 2007.

REFERENCE BOOKS:

1. Kuffel and Zungel,“High Voltage Engineering fundamentals”, ELSEVIER, 2nd edition, 2008.
2. R. Arora and W. Mosch “High Voltage and Electrical Insulation Engineering”, John Wiley & Sons, 2011.
3. Wolfgang Hauschild, Eberhard Lemke, “HV Laboratory Techniques and Testing”, Springer; 2nd ed. 2019.

CO PO and PSO mapping:

High Voltage Engineering		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.	3	-	-	2	-	3	-	-	-	-	-	2
CO2	Explain the generation and measurement of D. C., A.C.,& Impulse voltages.	-	-	2	-	3	2	-	-	-	-	-	-
CO3	Describe the tests on H. V. equipment and on insulating materials, as per the standards.	3	-	-	-	-	-	-	-	-	-	-	-
CO4	Illustrate protection against over voltages.	-	-	3	-	-	-	-	2	-	-	-	-

ELECTRICAL ENERGY CONSERVATION & AUDITING

IV-B.TechVIII-Semester (Code: 18EEI04)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			50	Semester End Examination (3 Hours)			50

Course objectives: To make the students

CO1: Understand the concept of energy conservation, energy management.

CO2: Explain the energy efficient motors and its characteristics.

CO3: Understand the power factor improvement, lighting and different measuring instruments.

CO4: Explain the economic aspects of energy management.

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

CLO1: Examine the principles of Energy audit and its process in thermal power station&analyze the different aspects of energy management.

CLO2: Describe the characteristics of energy efficient motors.

CLO3: Illustrate the power factor improvement, good lighting system practice and the typesof energy instruments.

CLO4: Analyze the economic aspects of Energy Management.

UNIT-I

Basic Principles of Energy Audit: Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy saving potential, energy audit of thermal power station, building energy audit.

Energy Management: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

UNIT-II

Energy Efficient Motors: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details. Characteristics - Variable speed, variable duty cycle systems, Voltage variation -Voltage unbalance - Over motoring - Motor energy audit.

UNIT-III

Power Factor Improvement, Lighting & Energy Instruments: Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non-linearloads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit. Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLC's.

UNIT-IV

Economic Aspects and Analysis: Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS:

1. Desai, Sonal, "Handbook of Energy Audit", McGraw-Hill Education, 2015.

2. W.R. Murphy and G. Mckay. EnergyManagement. Butter worth Publications.2001.
3. John. C. Andreas, Energy Efficient ElectricMotors, Marcel Dekker Inc Ltd, 2nd Edition, 1995.

REFERENCE BOOKS:

1. Bureau of Energy Efficiency India. General Aspects of Energy Management and Energy Audit. Bureau of Energy Efficiency India, 4 th edition, 2015.
2. Bureau of Energy Efficiency India. Energy Efficiency in Electrical Utilities. Bureau of Energy Efficiency India, 4 th edition, 2015.
3. Doty, Steve, and Wayne C. Turner. Energy management handbook. Crc Press, 2004.
4. Paul O' Callaghan, "Energy Management", Mc-Graw Hill Book Company, 1st Edition, 1998.
5. S. C. Tripathy, "Utilization of Electrical Energy", Tata McGraw Hill, 1993.

CO-PO Mapping:

ELECTRICAL ENERGY CONSERVATION AND AUDITING		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**
CO1	Examine the principles of Energy audit and its process in thermal power station&analyze the different aspects of energy management	3	-	-	-	-	-	-	3	2	-	1
CO2	Describe the energy efficient motors and its characteristics.	3	-	-	-	-	2	-	-	-	-	3
CO3	Illustrate the power factor improvement, lighting and different measuring instruments.	3	-	4	-	-	2	3	-	-	-	-
CO4	Analyze the economic aspects of energy management.	3	-	-	-	-	-	-	2	3	-	1

PRINCIPLES AND APPLICATIONS OF MEMS(18EI101)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50		Semester End Examination (3 Hours): 50		

Course Objectives:

- Introduce the reader to the world of MEMS and their fabrication.
- Treatment of actuators and sensing from a generic standpoint and modelling strategies for selected MEMS
- Acquire the new skills of considering microtechnology based solutions to problems
- To know how MEMS are modeled

Course Outcomes :

CO:1 List the advantages and applications of MEMS, list various techniques for adding materials to a substrate

CO2: List various steps in photolithography and micromachining

CO3: Define a transducer and list its characteristics, state working principles of various transducers.

CO4: To model any transducer

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	2	2													
CO2:	1	1													
CO3:	2	2		1											
CO4:	3	3	2	2											

Syllabus :

UNIT-I

Introduction : What are MEMS? Why MEMS? How MEMS are made? Roadmap and perspective

The substrate and adding materials to it : Introduction, the silicon substrate, additive techniques: oxidation and physical vapour deposition, other additive techniques.

UNIT-II

Creating and transferring patterens-photolithography: Introduction, keeping it clean, photoresist, working with resist, masks, resolution, permanent resists.

Creating Structures-Micromachining : Introduction, bulk micromachining processes, surface micromachining, process integration.

UNIT-III

Modeling : what is modelling? The input output concept, physical variables and notation.

MEMS transducers : definition of transducer, distinguishing between sensors and actuators, response characteristics of transducers, MEMS sensors, MEMS actuators, signal conditioning.

Piezoresistive transducers: Introduction, modeling piezoresistive transducers, Piezoresistive pressure sensor

UNIT-IV

Capacitive transducers: Introduction, capacitor fundamentals, modelling a capacitive sensor, capacitive accelerometer.

Piezoelectric transducers: Introduction, modelling piezoelectric materials, mechanical modelling of beams and plates, cantilever piezoelectric actuator.

Thermal transducers: Introduction, Basic heat transfer, hot-arm actuator.

Text Books:

1. Thomas M. Adams, Richard A Layton : Introductory MEMS : Fabrication and applications, Springer publications

Reference Books:

1. Julian W. Gardner, Vijay K Varadan, Osama O. Awadelkarim :Microsensors, MEMS, and smart devices, John Wiley and sons.

POWER PLANT INSTRUMENTAITON (18EI102)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Compare various types of power plants used to generate electricity by using Renewable and Non- Renewable energy sources.
- Understand the operation of steam generation and its components.
- Understand the operation of various types of boilers and turbines used in power plants
- Analyze the process control operation involved in power plant instrumentation.

Course Outcomes :

CO:1 Compare various types of power plants used to generate electricity by using Renewable and Non- Renewable energy sources.
CO2: Understand the operation of steam generation and its components.
CO3: Understand the operation of various types of boilers and turbines used in power plants
CO4: Analyze the process control operation involved in power plant instrumentation.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	3		1										2	3	3
CO2:	1		2		1	1							2	2	1
CO3:	1		2		1	1							2	2	1
CO4:	1		2		3	1							2	3	1

Syllabus :

UNIT – I

AN OVERVIEW OF POWER GENERATION: Brief survey of methods of power generation Hydro, Thermal, Nuclear, Solar wind etc. Importance of instrumentation for power generation – Thermal power plants – Building Blocks Details of the Boiler process – PI diagram of Boiler.

Non electrical parameters, flow of feed water, fuel, air and strain with correction factors for temperature, pressure, temperature level –radiation detectors – smoke density measurement, dust monitor.

UNIT – II

CONTROL LOOPS AND INTERLOCKS IN BOILER: Combustion control – control of Main header pressure, air fuel ratio control, furnace draft and excessive air control, drum level, main and reheat steam temperature control, burner tilting up, bypass damper, super heater, spray and gas recirculation controls – B.F.P. recirculation control – hot well and de-aerator level control – Pulverizer control, computers in power plants.

UNIT – III

TURBINE MONITORING AND CONTROL: Condenser Vacuum Control – gland steam exhaust pressure control – speed vibration, shell temperature

monitoring and control – lubricating oil temperature control – hydrogen generator cooling system.

UNIT – IV

ANALYSERS IN POWER PLANTS: Thermal conductive type – Paramagnetic type Oxygen Analyzer, IR type and trim Analyzer – spectrum analyzer – Hydrogen purity meter – chromatography PH meter – conductivity cell – Fuel analyzer - brief survey of pollution monitoring and control equipment.

Text Books:

1. Modern Power station practice: Volume 6, Instrumentation, Controls and Testing, Pergaman Press, Oxford 1971
2. Wakil. M.M.; Power Plant Technology (McGraw Hills), 1985

Reference Books:

1. Elonka S.M. and Kohal, Standard Boiler Operations Questions and Answers, TMH, 1973

ROBOTICS AND AUTOMATION (18EII03)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- To understand the basic anatomy of robots and trajectory planning
- To enable students to understand about the work envelopes of robots and its role in automation
- To give an overview of the various methods of control of robots
- To select robots based on their applications and their related issues in industrial automation

Course Outcomes

:

CO1: Expertise in fundamentals of Robotics (Unit I)
CO2: Understand the issues related to end effectors and sensors (Unit II)
CO3: Acquire knowledge in Programming and control of Robots (Unit III)
CO4: Understand the issues related to implementation of Industrial Automation with Robot Applications

CO-PO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	3	2	2						2	1	2	3	2		
CO2:	2	2	3	1	2				2	2	1	1	3		
CO3:	3	3	3	1	3				2	2	2	1		2	
CO4:	2	2	2	2	2		2		3	2	2	1		3	

Syllabus :

UNIT–I

Fundamentals of Robots: Definition –Historical background- Robot Anatomy : Polar, Cylindrical, Cartesian coordinate, Joint-arm configuration–Work volume– Robot Drive System : Hydraulic, Electric, Pneumatic – Control System: Limited sequence, Play back with point to point and Continuous path control Intelligent Robots- Dynamic performance: Speed of response and Stability - Precision of movement: Spatial Resolution, Accuracy, Repeatability and Compliance – Introduction to End effectors, Robotic Sensors, Robot Programming and work cell control.

UNIT–II

Robot End Effectors, Sensors, End Effectors: Types-Mechanical grippers-Magnetic grippers, Vacuum cups, Adhesive gripper, Hooks and Scoops- Tools as end effectors - Robot/ End-effectors, interface- Consideration in Gripper selection and Design.
Sensors: Transducers and Sensors – Sensors in Robotics: Tactile, Proximity, and Range Sensors, Miscellaneous sensors and sensor based systems- Machine Vision System.

UNIT–III

Programming and Control of Robots :Robot Programming: Methods of Programming-: Lead through Methods, Robot program as a path in space- Motion interpolation, WAIT,

SIGNAL and DELAY Commands, Branching, Capabilities and limitations of Lead through Methods-

Textual Robot Programming- structure, Motion, End effectors and Sensor commands, Program control communication, Monitor mode commands Robot Control: Open and Closed loop control- control Problem- Linear control Schemes- Design of Partitioned PD, PID and Adaptive Controllers for Linear Second order SISO Model of robot and their Block schematic representation- Control of Industrial Robots Using PLCs.

UNIT–IV

Automation: Factory Automation: Fixed Automation, Flexible Automation and Programmable Automation. Intelligent Industrial Automation, Industrial

Networking, Bus Standards Automatic Feeders, Automatic Storage and Retrieval Systems (AS/RS), Transfer Lines, Automatic Inspection Systems Applications of Robots, Factors influencing the selection of Robots – Robots for Welding, Painting, Assembly, Nuclear, Thermal and Chemical Plants.

Introduction to Mobile Robots, Legged Robots and Remote Controlled Robots, Automated Guided Robots, Micro Robots – Control and Safety Issues.

Text Books:

1. Groover, M.P., Weiss, M., Nagel, R.N., Odrey, N.G., Industrial Robots: Technology, Programming and Applications, McGraw-Hill Book Company, 2012.
2. Mittal R K, Nagrath I J, “Robotics and control”, Tata McGraw Hill, 2010.

Reference Books:

1. Groover, M.P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice-Hall of India Private Limited, New Delhi, 2007
2. S.R.Deb, “Robotics Technology and Flexible Automation”, Tata McGraw Hill, 1994
3. YoranKoren, Robotics for Engineers, McGraw Hill, 1980.
4. Saeed B. Niku, An Introduction to Robotics- Analysis, Systems, Applications, Second Edition, John Wiley & Sons Inc., 2010.
5. Wesley, E. Sryda, “Industrial Robots: Computer interfacing and Control” PHI, 1985.

SENSORS AND SIGNAL CONDITIONING (18EI104)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Describe the basics of sensors, their static and dynamic characteristics, primary sensors for common quantities, working principles of resistive sensors and various methods of signal condition of resistive sensors.
- Study various reactive variation sensors and design of signal condition circuits for these sensors
- Know various self generating sensors and design of signal condition circuits for these sensors
- Understand the working principles of various digital and Intelligent sensors

Course Outcomes :

CO:1 List the characteristics of sensors and their significance

CO2: State applications of resistive sensors and design a signal conditioning circuit for a given resistive sensor.

CO3: State the working principles of self generating sensors, their applications design a signal conditioning circuit for a given self generating sensor

CO4: List various digital sensors and their applications

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1:	2														
CO2:	3	3	3	2	3										
CO3:	3	3	3	2	3										
CO4:	2	2													

Syllabus :

UNIT-I

Introduction to sensor-based measurement systems: General concepts and terminology, sensor classification, general input-output configuration, static and dynamic characteristics of measurement systems, primary sensors.

Resistive sensors : potentiometers, strain gauges, resistive temperature detectors, thermistors.

Signal conditioning for resistive sensors: Measurement of resistance, voltage dividers, Wheatstone bridge-balance measurements, Wheatstone bridge-deflection measurements, differential and instrumentation amplifiers, interference.

UNIT-II

Reactance variation and electromagnetic sensors: capacitive sensors, inductive sensors-variable reluctance sensors, eddy current sensors, linear variable differential transformer, electromagnetic sensors.

Signal conditioning for reactance variation sensors: problems and alternatives, ac bridges, carrier amplifiers and coherent detection, specific signal conditioning for capacitive sensors.

UNIT-III

Self generating Sensors: thermocouples, piezoelectric sensors, photovoltaic sensors, electrochemical sensors.

Signal conditioning for self-generating sensors: Chopper and low-drift amplifiers, electrometer and transimpedance amplifiers, charge amplifiers, noise in amplifiers, noise and drift in resistors.

UNIT-IV

Digital and Intelligent sensors: Position encoders, resonant sensors, variable oscillators, conversion to frequency, period or time duration, direct sensor-microcontroller interfacing, communication systems for sensors, intelligent sensors.

Text Books:

1. Raman Pallas – Areny, John G. Webster :Sensors and signal conditioning, second edition, John Wiley and sons.

Reference Books:

1. Walt Kester : Practical design techniques for sensor signal conditioning, Analog devices and Prentice Hall.

Introduction to Data Analytics
IVB.Tech – VIII Semester (18IT101)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites:

Course Objectives: Students will be able to:

COB 1: Understand the use of R, Basics of R, Advanced data structures, reading/writing data into R.
COB 2: Understand the basic & advanced data management, manipulate data using SQL statements and visualization of data using different plots.
COB 3: Understand the normal, binomial distributions, correlation and covariance, T-test, ANOVA, Manipulation string, and Linear models.
COB 4: Understand the cluster analysis and classification.
Course Outcomes: After the course the students are expected to be able to:

CO 1: Import, review, manipulate and summarize data-sets in R.
CO 2: Understand advanced data structures like vectors, lists, matrices, arrays and data frame.
CO 3: Understand normal and binomial distributions and apply basic and advanced statistical tools.
CO 4: Understand the difference between Supervised and Un-supervised Machine Learning Algorithms.
Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2						1					
CO 2				3	2							
CO 3				3	2							
CO 4				3	2							

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1		1	2
CO 2		1	2
CO 3		1	2
CO 4		1	2

Syllabus:

UNIT – I (14 Periods)

Introduction to R - Why use R?, Obtaining and installing R, The R Environment - Command line interface, RStudio, R Packages - Installing packages, loading packages, Building packages, Basics of R - basic Math, variables, Data types, vectors, calling function, function documentation, missing data. Advanced Data Structures- data.Frames, Lists, Matrices, Arrays, Reading Data into R-Reading CSVs, Excel data, reading from databases.

UNIT – II (14 Periods)

Basic Data Management - A working example, creating new variables, recoding variables, renaming variables, missing values, date values, type conversion, sorting data, merging data set, sub-setting datasets, Using SQL statement to manipulate data.

UNIT – III (14 Periods)

Normal distribution, binomial distribution, summary statistics, correlation and covariance, T-test, ANOVA, paste, sprintf, extracting text, regular expression, Simple linear regression, multiple linear regressions.

UNIT – IV (14 Periods)

Cluster Analysis-common steps in cluster analysis, calculating distances, Hierarchical cluster analysis, Partitioning cluster analysis, avoiding nonexistence clusters, Preparing the data, logistic regression, decision trees, random forests, support vector machines, choosing a best predictive solution.

TEXT BOOK:

1. R for Every One, Advanced analytics and graphics by Jared P Lander, Addison Wisley Data and Analytics series, 2017, 2nd edition.
2. R in Action, Data Analysis and graphics with R, Robert L Kaacoff, Manning Publisher,2015, 2nd edition.

REFERENCE BOOKS:

1. Beginning R by Dr.Mark Gardener, Wrox publisher, 2012, 1st edition.
2. Associate Analytics Facilitator Guide provided by NASSCOM.

http://183.82.43.252/~gopam/html/NASSCOM.

CYBER SECURITY
IV B.Tech – VII Semester (18IT102)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites:

Course Objectives: Students will be able to:
COB 1: understand about Security basics and Cryptographic algorithms.
COB 2: understand how to secure computer system with Cryptographic algorithms and data integrity.
COB 3: identify hacking basics information and privacy concepts.
COB 4: gather the matter about Security in the networks & analyze, and various types of attacks in the computer system.

Course Outcomes: After the course the students are expected to be able to:

CO 1: Use basic security information and cryptographic algorithms.
CO 2: Explain principles of operation of Asymmetric Encryption techniques and integrity algorithms.
CO 3: analyze hacking techniques and privacy concepts.
CO 4: Add security feature to computer networks and improve computer security.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2	2	3	2	3					2	2	2
CO 2	2	3	2	2	2					2	2	2
CO 3	2	2	2	2	2		2	2		2		2
CO 4	2	2	2	2	2					2	2	2

Syllabus:

UNIT – I (16 Periods)

Int. to Computer Security: Definition of Computer Security, the OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms and A Model for Network Security.
Symmetric Ciphers: Classical Encryption Techniques, Block Ciphers and the DES, AES Techniques.

UNIT – II (14 Periods)

Public Key Cryptography: Principles of Public-Key Cryptosystems, The RSA algorithm and Diffie Hellman Key Exchange Algorithm.
Digital Signatures: Properties, Attacks and Forgeries, Digital Signature Requirements, Direct Digital Signature and Elgamal Digital Signature Scheme.

UNIT – III (14 Periods)

Hacking: Basic Terminology, Hacker's Motives and Objectives, Hacker Classes, Hacking Phases and Role of an Ethical Hacker.

Privacy in Cyberspace: Privacy Concepts, -Privacy Principles and Policies, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies.

UNIT – IV (16 Periods)

Information gathering tools: Recon-ng, Dmitry, Net discover and Nmap.
Network Scanning: Objectives of Network Scanning, TCP/IP protocol stack, Types of Network Scanning.
Security of Computer Systems: Malware attacks, Password attacks.

TEXT BOOK:

1. Cryptography and Network Security - Principles & Practice by William Stallings, 7th *edition*, Prentice Hall

REFERENCE BOOKS:

1. Cryptography and Network Security by Behrouz A. Forouzan and DebdeepMukhopadhyay 3rd*ed*, Mcgraw-Hill Education, 2016.
2. CISSP All-in-One Exam Guide, Seventh Edition 2016 by Shon Harris and Fernando Maymi McGraw-Hill Education.
3. Gray Hat Hacking: The Ethical Hackers Handbook 4th Edition by Allen Harper, Shon Harris McGraw-Hill Education.
4.Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing,5th Edition , Pearson Education , 2015.

MOBILE APPLICATION DEVELOPMENT
IV B.Tech – VIII Semester (18IT103)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites: Object Oriented Programming using Java

Course Objectives: Students will be able to:

COB 1: Understand basic concepts of Android platform.
COB 2: Learn Android UI palette.
COB 3: Familiarize with Building blocks of Android App.
COB 4: Understand working with Mobile hardware in Apps.
Course Outcomes: After the course the students are expected to be able to
CO 1: Apply Java programming concepts to Android App development.
CO 2: Develop User interfaces for Android Apps.
CO 3: Use the mobile sensors, google maps & multimedia in Apps.
CO 4: Develop a full featured Android Apps.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3		3		2		2	2	2	
CO 2	3				2		1		2	2		
CO 3	3		3		3		2				2	
CO 4	1								2	1	2	

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	1		
CO 2	1		
CO 3		1	2
CO 4		2	

Syllabus:

UNIT – I (14 Periods)

Introduction: Android background, Android SDK features, Android Software Stack, Android Development Tools, Types of Android applications, Hardware imposed design considerations, Practical application design considerations.
Creating Applications & Activities: Creating basic Android application using Android Studio, Exploring Android Studio IDE, Application Manifest file, Using the Manifest Editor, Using Resources.The Activity Life Cycle.
Building User Interfaces: Basic Views, Picker views, List views, View Groups, Android Layouts, Fragments - Fragment Life Cycle, working with Android fragments, using Adapters.

UNIT – II (14 Periods)

Advanced Views: Image View, Grid View, Image Switcher, Working with Menus, Web View, Working with Dialogs – Alert Dialog, Progress Dialog, Date Picker Dialog, Time Picker Dialog, Character Picker Dialog.
Intents and Broadcast Receivers: Using Intents to launch Activities, Returning results from Activities, Using intents to broadcast events; Pending Intents, Intent filters & Broadcast Receivers - using Intent Filters to service Implicit Intents, Listening for Native Broadcast Intents.
Files, Saving State & Preferences: Working with the File System, Saving & Restoring Activity Instance state using Life cycle Handlers, Saving & Retrieving Shared Preferences.
Using Internet Resources: Downloading files using Download Manager.

UNIT – III (14 Periods)

Databases: SQLite, Content Values & Cursors, Working with SQLite databases.
Content Providers: Creating Content Providers, Using Content Providers, Native Android Content Providers.
Messaging & Notifications: Sending SMS & MMS using Intents, sending SMS using SMS Manager, Receiving SMS Messages. Notifications - Creating Notifications, Using Standard Notification UI, Creating a Custom Notification UI, Triggering, Updating & Canceling Notifications.
Working in the Background: Creating and Controlling Services, Binding Services to Activities. Creating and Running Asynchronous Tasks, Manual Thread Creation.

UNIT – IV (14 Periods)

Hardware Sensors: Supported Android Sensors, Virtual Sensors, Monitoring Sensors, Interpreting Sensor values, using Accelerometer & Proximity sensors.
Maps & Location Based Services: Using the emulator with location based services, Finding and Tracking your location, using proximity alerts, using the Geocoder, map based activities.
Audio, Video and using the Camera: Playing Audio and Video, Recording Sound, Recording Video, using Camera.

TEXT BOOK:

1. **"Professional Android 4 Application Development",** Reto Meier, John Wiley & Sons, Inc., 2012.
2**. "Beginning Android Programming with Android Studio",** J. F. DiMarzio, 4th edition, John Wiley & Sons, Inc., 2017.

REFERENCE BOOKS:

1. **Head First Android Development -** A Brain Friendly Guide, Dawn Griffiths & David Griffiths, O' Reilly.
2. **Introduction to Android Application Development - Developer's Library,** Joseph Annuzzi, Jr.Lauren Darcey& Shane Conder, 5th ed., Addison-Wesley.

WEB TECHNOLOGIES
IV B.Tech – VIII Semester (18IT104)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites: C Programming (18CS001)

Course Objectives: Students will be able to:

COB 1: Analyze a web page and identify HTML elements and their attributes.
COB 2: Build dynamic web pages using JavaScript (client side programming).
COB 3: Write a well formed / valid XML documents.
COB 4: Understand Web server and its working also working with Ajax for asynchronous communication.
Course Outcomes: After the course the students are expected to be able to:
CO 1: Design web pages with different elements and attributes.
CO 2: Build websites with dynamic functionality using java script.
CO 3: Identify the functionality of XML and create an XML document and display data from XML document.
CO 4: Recognize the use of web servers and know the functionality of web servers.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	0	2	2	1					1	2	3	2
CO 2			1							1		3
CO 3			1									
CO 4		2	3	2		1	2	1	2	2	3	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1		2	
CO 2			
CO 3		2	
CO 4			

Syllabus:

UNIT – I (14 Periods)

Introduction to HTML5 Part I, Introduction to HTML5 Part II, Cascading Style Sheets I, Cascading Style Sheets II, **JavaScript:** Introduction to Scripting, Control Statements I, Control Statements II, Functions, Arrays.

UNIT – II (14 Periods)

JavaScript: Objects, Dynamic HTML: Document Object Model and Collections, Event Model, HTML5 Introduction to Canvas

UNIT – III (14 Periods)

XML: Introduction, XML Basics, Structuring data, XML Namespaces, DTD, XSD, XSL Transformations.

UNIT – IV (14 Periods)

Building Ajax-Enabled Web Applications, Web Servers (IIS and Apache), Working with JQuery

Programming Exercises for Unit - IV:

TEXT BOOK:

1. Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 5/e, PHI.
2. Kogent Learning Solutions Inc.,HTML5 Black Book: "Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery".

REFERENCE BOOKS:

1. Jason Cranford Teague, “Visual Quick Start Guide CSS, DHTML & AJAX”, 4e, Pearson Education.
2. Tom NerinoDoli smith, “JavaScript & AJAX for the web”, Pearson Education 2007.
3. Joshua Elchorn, “Understanding AJAX”, Prentice Hall 2006.

Institutional Elective-I (in VII semester – position as 6th theory subject)

FLUID POWER& CONTROL SYSTEMS

18MEI 001

IVYearB.Tech.Seventh Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

1. To acquire knowledge in fluid power sources, power utilization and trouble shooting
2. To understand and develop hydraulic circuits for various applications
3. To understand and develop pneumatic circuits used in automation.
4. To understand the importance and uses of accumulator

Course Outcomes:

At the end of the course students will be able to

1. Categorize fluid power systems and understand the working of hydraulic power sources and actuators
2. Illustrate the construction and working of control elements in hydraulic and pneumatic circuits.
3. Select suitable pneumatic circuit for various industrial applications.
4. Understand the function of an accumulator and Identify faults in hydraulic systems and maintenance of hydraulic system

UNIT-I

Introduction: Fluid Power, Basic Law, Application of Fluid Power, Advantages of Fluid Power Systems, Types of Fluid Power Systems.

Hydraulic Systems: Pumps – Gear Pumps and Vane Pumps. Selection and Specification of Pumps. Hydraulic Actuators: Linear and Rotary Actuators.

UNIT-II

Control and Regulation Elements: Pressure, Flow and Direction Control Valves Hydraulic Circuits: Reciprocation, Quick Return, Sequencing, Synchronizing Circuits, Industrial Circuits - Punching Press Circuit, Milling Machine Circuits

UNIT-III

Introduction to Pneumatic Systems: Pneumatic fundamentals, Pneumatic Valves Pneumatic Circuits: Pneumatic circuits- Basic pneumatic circuit, Quick exhaust circuit, feed control circuit and Time delay circuit.

UNIT-IV

Hydraulic Circuits: Accumulators, Accumulator Circuits – Leakage Compensation, Auxiliary Power Source, Emergency Source of Power Maintenance of Hydraulic Systems: Maintenance of Hydraulic Systems, Trouble Shooting of Hydraulic System.

TEXT BOOKS

1. Anthony Esposito ‘Fluid Power with applications” Pearson Education.
2. Andrew Parr “ Hydraulics and Pneumatics-A technicians and engineers guide” Jaico publishing co

REFERENCE BOOKS

1. W.Bolton,"Pneumatic and Hydraulic systems" Butterworth-Heinemann

Web page references

1. https://www.grc.nasa.gov/www/k-12/WindTunnel/Activities/Pascals_principle.html
2. http://www.vickers.sh.cn/pdfs/M-SRSR-MC001-E.pdf
3. http://file.seekpart.com/keywordpdf/2011/3/31/20113319837232.pdf
4. http://www.associatedgroups.com/EATON-CAT/pdfs/i3155s.pdf

CO-PO MAPPING

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1											1	2	
CO2		2		1											
CO3	2	2												3	
CO4	1	3	1										2		

INSTITUTIONAL ELECTIVE
PROJECT MANAGEMENT
18MEI 002
IV Year B.Tech. Seventh Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:
The course is aimed at project planning and control before implementing any project.
The objectives are,

1. To acquire the knowledge of planning a project.
2. To perform SWOT analysis of project
3. To use PERT and CPM techniques in implementing a project
4. To learn to manage a project
5. To control the project and evaluate it.

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

1. Discuss the project life cycle and its phases
2. Develop an example of Work Breakdown Structure
3. Express the project plan through a network
4. Identify different project selection methods.
5. Identify the critical path of a given project
6. Carryout risk analysis using PERT method
7. Schedule the resources for a given project and prepare the relevant costs
8. Develop an organization structure for a given project and identify the appropriate leadership style
9. Explain the ways of performance appraisal of project team

UNIT - I

Introduction to the course and to Project Management - Definitions, scope and contents, Relevance, Classification of Projects, Defining the Project, Project Life Cycle, WBS, Project Life cycle, Developing a project Plan, Network analysis, Exercises 14

UNIT - II

Critical path method, Risk analysis, PERT; problems, Reducing Project Duration 14

UNIT - III

Estimating project Times and Costs, Scheduling Resources and Costs, problem solving, Progress and Performance Measurement 14

UNIT - IV

Organization – Structure and Culture, Designing a structure for a project, Leadership styles, Leading, Managing Project Teams. The Project Management Maturity Model (PMMM) 14

TEXT BOOKS

1. Harold Kerzner, "*Project Management*", 8th Edition, Wiley, New York, 2003. (pdf available)
2. Project Management: The Managerial Process, Erik W. Larson, and Clifford F. Gray. McGraw-Hill Higher Education

REFERENCE BOOKS

3. A Guide to the Project Management Body of Knowledge (PMBOK guide), PMI, 2017
4. Prasanna Chandra, "*Projects – Planning, analysis, selection, implementation and review*",Tata McGraw-Hill, New Delhi, 2010.

CO-PO MAPPING

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1		2		2			2	1					2	1
CO2			2				2								
CO3		1			1				1			1		1	1
CO4	3		2		2	2				2		2			2
CO5															

INSTITUTIONAL ELECTIVE
NON-CONVENTIONAL ENERGY SOURCES
18MEI 003
IVYearB.Tech. Seventh Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:
CO 1: To enable students to identify different sources of non conventional energy and innovative Technologies in harnessing energy from these sources.
CO 2: Understand the energy conversion from wind energy, geothermal energy, Biomass, biogas, fuel cells.
CO 3: Understand the advantages and limitations of different non conventional energy sources and identify a wide variety of applications for non conventional energy.

Course Outcomes: At the end of the course, the student will be able to
CO-1: Understand different methods of exploiting solar energy.
CO-2: Understand the principles and energy conversion from wind and geo thermal sources
CO-3: Gain knowledge in exploring the energy from ocean, tidal and bio-mass
CO-4: understand the techniques in power generation using Fuel cells, bio gas and MHD

UNIT-I

Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits
Solar Energy: Extra terrestrial solar radiation - terrestrial solar radiation –solar radiations on earth-measurement of solar radiations-solar constant-solar collectors-flat plate collectors-concentrating collectors-solar thermal conversion-solar thermal central receiver systems - photovoltaic energy conversion - solar cells- energy storage methods-applications of solar energy

UNIT-II

Wind energy: Availability of wind energy in India, site selection-Components of wind energy conversion systems-Classification of wind energy conversion systems-vertical axis and horizontal axis wind turbines-Performance characteristics-Betz criteria coefficient-applications of WECS-environmental aspects
Geo thermal Energy: Structure of earth's interior-geothermal sites-geothermal resources-Site selection for geothermal power plants-Principle of working-various types of geothermal power plants- applications

UNIT-III

Ocean thermal energy conversion (OTEC): Principle of ocean thermal energy conversion-Open cycle and closed cycle OTEC plants-Merits and demerits
Tidal Power: Tides and waves as sources of energy-fundamentals and use of tidal energy-limitations of tidal energy conversion system
Bio mass: Availability of biomass and its conversion techniques-bio mass gasification-bio mass resource development in India

UNIT-IV

Bio Gas: Bio gas production, aerobic and anaerobic bio conversion process-Properties of bio gas-classification of biogas plants-advantages and disadvantages-bio gas applications
Fuel Cells: Classification, Principle of working of various types of fuel cells, merits and demerits, future potential of fuel cells.
Magneto-Hydrodynamics (MHD): Principle of working of MHD Power plant, Classification, advantages and disadvantages.

TEXT BOOK:

1. H.P. Garg& Jai Prakash, Solar Energy: Fundamentals and Applications, Tata McGraw Hill, New Delhi
2. Non-Conventional Energy Sources by G.D.Rai, Khanna Publisher
3. B H Khan, "Non-Conventional Energy Resources", 2nd Edition, Tata McGraw Hill Education Pvt Ltd, 2011

REFERENCE BOOKS:

1. Power plant technology by EL-Wakil, McGraw-Hill.
2. Renewable Energy Sources by John Twidell& Toney Weir: E&F.N. Spon

CO-PO MAPPING

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1		2		2			2	1					2	1
CO2			2				2								
CO3		1			1				1			1		1	1
CO4	3		2		2	2				2		2			2

INSTITUTIONAL ELECTIVE
AUTOMOBILE ENGINEERING
18MEI 004
IVYear B.Tech. Eight Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:
To make the students to

1. Familiarize the fundamentals of Engine Components, Chassis and suspension system, braking and transmission system, and cooling and lubrication system.
2. Develop a strong base for understanding future developments like hybrid and electric vehicles in the automobile industry.

Course Outcomes: After successful completion of this course, student will be able to:

1. List different types of Vehicles and their applications
2. Define working of Automobile Engine cooling and lubrication system.
3. Describe functioning of Ignition system and its accessories.
4. Describe functioning of Transmission, Steering, Braking and Suspension system.
5. Understand the working and layout of Hybrid and electric vehicles and their components

UNIT-I

INTRODUCTION: Classification of vehicles – applications, valves, valve arrangements and operating Mechanisms, Piston - design basis, types, piston rings, firing order; Crankshafts, Flywheel, Air and Fuel Filters, Mufflers. (8)
FUEL SUPPLY SYSTEMS: Fuel supply pumps, Mechanical and Electrical type Diaphragm pumps. (3)
COOLING SYSTEMS: Need for cooling system, Air and water cooling, Thermal syphon cooling systems (4)

UNIT-II

LUBRICATING SYSTEMS: Various lubricating systems for I.C. Engines. (3)
ELECTRICAL SYSTEM: Ignition system, Spark plugs, Distributor, Electronic Ignition, Alternator, cut out, Current and voltage regulators, charging circuit, starting motors, lighting, instruments and accessories. (9)
CHASSIS: Introduction, Construction, Requirements of Chassis. (3)

UNIT-III

TRANSMISSION: Gear Box - Theory, Four speed and Five Speed Sliding Mesh, Constant mesh & synchromesh type, selector mechanism, automatic transmission, overdrive, propeller shaft, differential - principle of working. (8)
SUSPENSION SYSTEMS: Need for suspension systems, springs, shock absorbers, axles – front and rear, different methods of floating rear axle, front axle and wheel alignment. (7)

UNIT-IV

VEHICLE CONTROL: Steering mechanisms and power steering, types of brakes and brake actuation mechanisms (air and hydraulic). (6)
ELECTRIC, HYBRID AND FUEL CELL VEHICLES: Layout of electric and hybrid vehicles – Advantages and drawbacks, System Components, Electronic control system, Different configurations of electric and hybrid vehicles hybrid vehicles, Power split device, High energy and power density batteries – Basics of fuel cell vehicles. (9)

TEXT BOOKS

1. Automobile Engineering - G.B.S.Narang.
2. Automobile Engineering -R.B.Gupta
3. Automobile Engineering - Vol I & II - Kirpal Singh

REFERENCE BOOKS

1. Automotive Mechanics - Joseph Heitner
2. Automobile Engineering -S.Srinivasan

CO-PO MAPPING

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	1	1		2		1			1	2	1	1	1
CO2	1	2	2	1	1	2	2	1		1	1	2	1	1	1
CO3	2	1	2	1		1		1		1	2	2	1		1
CO4	1	2	2		2	2				2	1	3	1		1
CO5	2	2	2	2		2		2			2	2	2	2	2

GRAPH THEORY
(OPEN ELECTIVE)
18 MA006 (3Th, 3 credits)
IV B.Tech, VII Semester

Lectures	:	3 Hours/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Course Objectives

In this course, students will learn the following :

1. Understand the basic concepts of Graph Theory.
2. Check whether two graphs are isomorphic.
3. Determine whether the given graph is Eulerian and Hamiltonian Also explain Travelling salesman problem using Graphs.
4. Define the terms Tree, rooted tree, binary tree, and Spanning tree.
5. Apply Kruskal's algorithm and Prim's algorithm to find minimum spanning tree in a weighted connected graph.
6.Discuss the planarity of a graph, Euler's formula , dual of a graph, Kuratowski's theorem on planarity
7. Find the chromatic number of a graph and Explain Four-color-problem.
8. Study the properties of graphs through their matrix representation like incidence matrix , adjacency matrix and other related sub matrices

S.No	Outcome	Knowledge Level
CO-1	Discuss the baisc concepts of graph theory and able to determine whether a graph is Eulerian and Hamiltonian	K2
CO-2	Apply Kruskal's and Prim"s algorithms in order to determine the minimum spanning tree in a connected weighted graph.	K3
CO-3	Determine the planarity of a graph usningKuratowski's algorithm and find the chromatic number of a given graph.	K3
CO-4	Analyze the properties of graphs through matrix representation and utilize these ideas in the application of switching network	K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
C01	2	2		1										
C02	2	2		2										
C03	2	3		1										
C04	3	2		2										

UNIT - I

PATHS AND CIRCUITS:

Introduction: Graphs: Graph, Finite and infinite graphs, Incidence and degree, isolated vertex, pendent vertex and null graph; Isomorphism; Sub graphs; walks, paths and circuits; Connected graphs, Disconnected graphs and Components; Euler graphs(Konigsberg Bridge Problem); Hamiltonian Paths and circuits; Travelling salesman problem.

[Sections: 1.1; 1.3; 1.4; 1.5; 2.1; 2.2; 2.4; 2.5; 2.6; 2.9; 2.10] [12 Hours]

UNIT – II

TREES AND FUNDAMENTAL CIRCUITS: Trees; Some Properties of Trees; Distance and centers in a Tree; Rooted and Binary Trees; Spanning Trees; Fundamental circuits; Spanning Trees in a Weighted graphs(Kruskal's Algorithm and Prim's Algorithm).

[Sections:3.1; 3.2; 3.4; 3.5; 3.7; 3.8; 3.10] [12 Hours]

UNIT – III

PLANAR AND DUAL GRAPHS: Planar graphs; Kuratowski's two graphs; Different Representations of a Planar graph: Euler's formula, Theorem-5.6 and Corollary; Detection of planarity (Kuratowski's theorem); Geometric Dual; Coloring of a Graph, Chromatic number, the four Color problem.

[Sections: 5.2; 5.3; 5.4; 5.5; 5.6; 8.1, 8.6] [12 Hours]

UNIT – IV

MATRIX REPRESENTATION OF GRAPHS: Incidence Matrix; Sub matrices of A(G); Circuit Matrix; Fundamental Circuit Matrix and Rank of B; Application to a switching network; Cut-set Matrix; Relationship among A_f, B_f and C_f; Path Matrix; Adjacency Matrix.

[Sections:7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 7.7; 7.8; 7.9] [12 Hours]

TEXT BOOK:

1. NarsinghDeo, 'Graph Theory with Applications to Engineering and Computer Science' Prentice-Hall of India Private Limited, New Delhi.

REFERENCE BOOK:

1. Douglas B. West "Introduction to graph Theory" Pearson Education Private limited, Delhi, 2002.

18PHI01	Nano Materials and Technology	even sem	3-0-0	3credits

Course out comes: After completion of the course student will be able to:

CO 1	**Scale up synthesis of nanomaterials and understand quantum confinement**
CO2	**Understand properties of nanomaterials and nano tubes**
CO3	**Know the characterisation techniques of nano materials**
CO4	**Know the usage of nano particles in nano biology and nano medicine.**

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	2			2								
CO4	2				2							

UNIT-1

INTRODUCTION TO NANO TECHNOLOGY: history of Nano materials nano scale, conventional and Nano materials differences, quantum confinement, quantum wells, quantum wires, quantum dots, surface to volumeratio, nanoceramics, nanocomposites and nanoclusters .

SYNTHESIS OF NANOMATERIAL: Bottom up and top down approaches, cryo rolling, high energy ball milling, chemical vapour deposition, solgel method, laser ablation, rapid solidification processing, equal channel angular extrusion, molecular beam epitaxy, sputtering ,hydrothermal method, physical vapour deposition and electro deposition.

UNIT-2

PROPERTIESOFNANOMATERIALS: Electrical, magnetic, optical, physical, chemical, mechanical, thermal and electro-chemical properties.

CARBON NANOMATERIALS: Nanotubes, graphene, bucky balls, nano horns, properties of carbon nanotubes, synthesis of carbon nano materials, application of carbon nano tubes.

UNIT-3

CHARACTERIZATION OF NANO MATERIALS: X-ray diffraction, scanning electron microscopy, uv-visible spectroscopy, scanning tunnelling microscopy, differential thermal analysis and differential scanning calorimetry , FTIR.

UNIT-4

APPLICATION OF NANOMATERIALS: Electronics, computers, biomedical, mechanical, chemical, coatings, optoelectronic, environmental, sensors, aerospace, textiles, cosmetics and medical applications.

TEXT BOOKS:

1. Kulkarni SulabhaK, Nanotechnology: Principles and Practices, capital publishing company , 2007.
2. Stuart M.Lindsay, Introduction to nano science , Oxford University Press,2009.
3. Robert Kelsall, IamHamley, Mark Geoghegan, Nanoscale, Scince and Technology, John Wiley&Sons,2005.

18PHI02	FIBER OPTICS COMMUNICATIONS	even sem	3-0-0	3credits

Course out comes: After completion of the course student will be able to:

CO1	**identify signal degradation and losses in optical fibers.**
CO2	**understand power launching and coupling in optical fibers .**
CO3	**compute optical fiber link design parameters .**
CO4	**measure optical parameters and optical signal losses.**

CO-PO-Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	3	1										
CO3	2		2									
CO4	2			1	1							

UNIT-1

Fiber optical wave guides : Introduction ,total internal reflection ,types of fibers, planar dielectric wave guide, optical fiber wave guides-inter-modal dispersion ,single mode fibers, low dispersion fibers.
Signal degradation in optical fibers: Attenuation, Absorption, Scattering losses, Radioactive losses signal distortion in optical wave guides, information capacity determination, intra model dispersion (material dispersion, wave guide dispersion**)**

UNIT-2

Power launching and coupling: Source to fiber power launching, source output pattern power-coupling calculation, power launched verss wave length, equilibrium numerical. Aperture lensing schemes for coupling improvement nanimaging micro sphere. Laser diode-to-fiber-coupling, fiber-to-fiber joints, mechanical misalignment, fiber-related losses, fiber end face preparation, fiber splicing optical fiber connectors**.**

UNIT-3

Transmission link analysis :point –to-point links, system consideration, link power budget, rise time budget ,transmission distance for single model links ,wave length division multiplexing (WDM) passive components ,the 2x2 fiber coupler ,the 2x2 wave guide coupler ,star coupler ,local area network .

UNIT-4

Measurement attenuation Measurement ,the cut back technique,insertion loss method optical time domain reflectometer.dipersion measurement – inter modal diaspersion,time domainter modal diaspersion measurement ,Frequency domain inter modal diaspersion measurement,OTDR fiber application ,OTDR Trace ,attenuation measurments fiberfault location.

TEXT BOOKS:

1. WillamJ & Hawkes F.B opto electronics: An introduction.(PHI)
2.Gerd Keiser optical fiber communication (3 rd edition McGraw Hill)

Reference Books:

1. A .Selvarajan , S .Kar,and T.SRINIVAS , fiber optic communications ,Tata Mc GrawHill,2002.
2. D.C Agarwal "fiber optics in communications "Wheeler publishing,1993.

18PHI03	ADVANCED MATERIALS	odd sem	3-0-0	3credits

Course Objectives:

CO1	**To acquire knowledge on synthesis and properties of nano and bio materials**
CO2	**To educate the student on characteristics and usage of composite and optical materials.**
CO3	**To possess the knowledge on properties and applications of superconducting materials.**
CO4	**To know the functionality of smart materials and their adoption in real time applications**

Course Outcomes: **After the completion of course the student is able to**

CLO1	**Understand the importance of nano-materials, their characteristics and applications.**
CLO2	**Identify, describe and evaluate the properties of fibre reinforcements, polymer materials and optical materials.**
CLO3	**Advance their knowledge in phenomenon of superconductivity and applications.**
CLO4	**Explain the strengths and weaknesses of a smart material and surface acoustic wave materials into the design of a product in various applications.**

CO-PO-Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	2	2										
CO3	2			2								
CO4	2	2										

UNIT-I

Nano Materials: Origin of nano technology, Classification of nano materials, Physical, chemical, electrical, mechanical properties of nano materials. Preparation of nano materials by plasma arcing, physical vapour deposition, chemical vapour deposition (CVD), Sol-Gel, electro deposition, ball milling, carbon nano tubes(CNT).Synthesis, preparation of nanotubes, nano sensors, Quantum dots, nanowires,nano biology, nanomedidcines.

Biomaterials: Overview of biomaterials. Biomaterials, bioceramics, biopolymers, tissue grafts, soft tissue applications, cardiovascular implants, biomaterials in ophthalmology, orthopeadiac implants, dental materials.

UNIT-II

Composites: General characteristics of composites , composites classes, PMCs, MMCs, CMCs, CCCs, IMCs, hybrid composites, fibers and matrices, different types of fibers, whiskers, different matrices materials, polymers, metal, ceramic matrices, toughening mechanism, interfaces, blending and adhesion, composite modeling, finite element analysis and design.

Optical materials: Mechanisms of optical absorption in metals, semiconductors and insulators. Non-linear optical materials, optical modulators and optical fibers. Display devices and materials photo-emissive, photovoltaic cells, charge coupled devices (CCD), laser materials.

UNIT-III

Super conducting materials: Types of super conductors, an account of mechanism of superconductors, effects of magnetic field currents, thermal energy, energy gap, acoustic attenuation, penetration depth, BCS theory, DC and AC Josephson effects, high Tc superconductors, potential applications of superconductivity, electrical switching element, superconductor power transmission and transformers, magnetic mirror, bearings, superconductor motors, generators, SQUIDS etc.

UNIT-IV

Smart materials: An introduction, principles of smart materials, input – output decision ability, devices based on conductivity changes, devices based on changes in optical response, biological systems smart materials. Devices based on magnetization, artificial structures, surfaces, hetero structures, polycrystalline, amorphous, liquid crystalline materials.

Surface Acoustic Wave (SAW) Materials and Electrets: Delay lines, frequency filters, resonators, Pressure and temperature sensors, Sonar transducers. Comparison of electrets with permanent magnets, Preparation of electrets, Application of electrets.

Textbooks & References:

1. B.S. Murthy et al., Textbook of Nano science and Nanotechnology, Universities press, Springer.
2. Krishan K Chawla, Composite Materials;Springer; 3rd ed. 2012.
3. A.C. Rose-Innes and E.H. Rhoderick, *Introduction to Superconductivity*.2nd Edition 1978
4. Brian Culshaw, Smart structures and materials, Artech House Publishers

18PHI04	OPTO ELECTRONIC DEVICES AND APPLICATIONS	Odd sem	3-0-0	3credits

Course objectives

CO1	Understand the concepts of different lasers and mode locking systems.
CO2	Gain the knowledge about light generating devices, solar cells and display devices.
CO3	To know the operating mechanism and applications of various light detecting devices.
CO4	To familiarize electro optic modulators relating to communication

Course Outcomes

CLO1	Develop the knowledge of laser operating principles and structures to produce giant optical pulses.
CLO2	To Acquire the detailed knowledge about functionality and applications of solar cells ,light generating and display devices
CLO3	To posses the skills of design ,develop and adoption of photo detectors in real time electronic applications.
CLO4	To have the knowledge on the usage of optical modulators in communication process.

Course Outcomes and POs mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	2											
CO3	2		2									
CO4	2			1	1							

UNIT-1

Optical process in semiconductors /optical media: Interaction of photons with matter , radiative non radiative processes , rates of absorption and emission –laser principle optical feedback-threshold condition-semiconductor laser –heterojunction lasers quantum well lasers, tunneling based lasers, mode locking: active mode locking and passive mode locking Q-switching

UNIT-2

Display devices: photo luminescence, cathode luminescence, electro luminescence, injection luminescence, LED principle of operation- LED structure –frequency response –defects and reliability, plasma display liquid crystal display, numerical display-photovoltaic effect- I-V characteristics and spectral response of solar cells –heterojunction and cascaded solar cells-Schottky barrier and thin film solar cells –design of solar cell.

UNIT-3

Detection devices: photo detection principle ,photo detector –thermal detector – photo conductor –noise in photo conductors –PIN photo diode –APD detector performance parameters –detectors for long wave length operation –wave length selective detection charge coupled device (CCD), application of infrared detector used for TV and remote controllers

UNIT-4

Communication –types of communication –examples –modulation-types of modulation –limitations of direct modulation – modulation by carrier injection in semiconductors – electro optic modulators – Kerr modulators Acousto- optic modulators (Bragg cell) , interferometric modulators semiconductor optical amplifiers .

Text Books:

1. Pallab Bhattacharya “Semiconductor opto electronic devices” , Prentice Hall of India Pvt. LTD, New Delhi 2009
2. Jasptit Singh, “Opto Electronics-An introduction to Materials and Devices” ,McGraw-Hill International Edition,2014.
3. S.C.Gupta,”Opto Electronic Devices and Systems”, Prentice Hall of India,2015
4. J.Wilson and J.F.B.Hawes,”Optoelectronics-An Introduction”, PearsonEducatiob, Taiwan Ltd,2010.

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BAPATLA ENGINEERING COLLEGE
(AUTONOMOUS)
Department of English
Institutional Elective-I
Professional Communication (18EL003)
IV B.Tech (Theory)

Lectures:3 Periods/Week | Continuous Assessment: 50M
Sem End Exam Duration: 3 hours | Sem End Exam : 50M

Course Schedule: IV B.Tech – VII Semester

Credits: 2

UNIT-I

L	P	T
10	0	0

Preparing project reports

Research methods- Abstract writing- background knowledge of the research topic-Literature review—Plagiarism- methodology- sampling- data collection and analysis- Integrate tables, figures, and other images into documents -presenting the findings- conclusion- preparing references- Appendices

UNIT-II

L	P	T
10	0	0

Oral presentation of the Projects (Viva voce)

Presentation and oral communication skills- presenting the findings of research- Maintaining audience orientation- body language- voice modulation- delivery of ideas

Unit III

L	P	T
10	0	0

Life skills for professionals

Understanding career management- Networking professionally- Mastering Cross Cultural Etiquette -Respecting social protocols- Developing a long termcareer plan- Making career choices

Unit IV

L	P	T
12	0	0

Corporate Etiquette

Power Dressing – Greeting – Introduction - Polishing Business Manners (Hand Shakes, Gifts, Humour, Office Behaviour) – The art of Small talk & Conversations - Dining Etiquette

Reference Books

- Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6 edition, 2015.
- The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.
- Butterfield Jeff, "Soft Skills for Everyone", Cengage Learning India Pvt Ltd; 1 edition, 2011.
- Markel, Mike, Technical Communication (9th Edition) Boston: Bedford/St. Martin's, 2009.

Course Description

This course is designed to help students develop writing skills that will enable them to produce clear and effective technical documents. Focus will be on basic principles of good technical writing like proposals and projects. While the emphasis will be on writing, oral communication of technical information will form an important component of the course. This course is also designed to enhance the employability and maximize the potential

of the students by introducing them to the principles of personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers.

Objectives

The course will enable students to

- improve grammar, mechanics and writing style for clarity, concision, coherence and emphasis and increase knowledge of technical communication
- identify and understand the facets and functions of the primary genres of technical writing, reports, proposals and project reports
- define and identify different life skills required in professional life
- Explain the basic mechanics of effective communication and demonstrate these through presentations.

Outcomes

The students will be able to

- use and apply writing skills in writing Technical reports, Project Proposals and make oral presentations of their findings
- Develop strategies for addressing multiple audiences, expert and lay audiences.
- apply principles of cross cultural etiquette and build professional network
- demonstrate improved competency of Soft Skills required for the workplace

CO-PO Mapping

Sr No	Outcome	KL
I	utilize writing skills in writing Technical reports, Project Proposals and make oral presentation of their findings	K4
II	develop strategies for addressing multiple audiences, expert and lay audiences	K4
III	apply principles of cross cultural etiquette and build professional network	K3
IV	demonstrate improved competency of Soft Skills required for the workplace	K3

CO/PSO	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	PSOI	PSOII
I								2		3	3	2	2	1
II								2		3	3	2	2	1
III								3	2	3	2	2	2	1
IV								3	2	3	2	2	2	1

BAPATLA ENGINEERING COLLEGE
(AUTONOMOUS)
Department of English
Institutional Elective-II
English for Competitive Examinations (18EL004)
IV B.Tech (Theory)

Lectures:3 Periods/Week — Continuous Assessment: 50M
Sem End Exam Duration: 3 hours — Sem End Exam : 50M

Course Schedule: IV B.Tech-VIII Sem
Credits: 2

UNIT-I

L	P	T
10	0	0

Orientation on different formats of competitive exams - Vocabulary – Verbal ability – Verbal reasoning - Exploring the world of words – High Frequency Words – Meaning and their usage – Synonyms-antonyms –Word substitution –Double Unit Analogies – Idioms and phrases – Commonly confused words – Spellings –Word variables – New words in use.

UNIT-II

L	P	T
10	0	0

Grammar – Sentence improvement –Sentence completion – Rearranging phrases into sentences – Error identification –Tenses – Prepositions – Adjectives – Adverbs – Subjectverb agreement – Voice – Reported speech – Articles.

Unit III

L	P	T
10	0	0

Listening and Speaking

Contextual listening – Listening to instructions – Listening for specific information – Identifying detail, main ideas – Following signpost words – Connected Speech with Intonation Patterns - Speaking to respond and elicit ideas – Guided speaking (Visual Description) – Opening phrases (Formal & Informal) –Speaking on a topic – making an interactive presentation – Telling a story or a personal anecdote – Talking about oneself - Utterance – Speech acts- Brainstorming ideas – Group discussion.

Unit IV

L	P	T
12	0	0

Reading& Writing:

Reading: Specific information and detail – Identifying main and supporting ideas – Speed with accuracy – Improving global reading skills – Linking ideas – Summarising – Understanding argument – Identifying opinion/attitude and making inferences - Critical reading

Writing:Pre-writing techniques – Mind Mapping - Describing pictures and facts-Focus on cohesion – Using cohesive devices –organizing points – Rhetoric writing -Analytic writing-Statements of Purpose – Structure, Content and Style

Reference Books:

- Showick Thorpe, English for Competitive Examinations, Pearson Education, India:Fifth edition, 2015.
- Philip Sunil Solomon, English for Success in Competitive Exams, Oxford University Press
- Sharon Weiner Green, Barron's GRE, Galgotia Publications: Seventeenth Edition, 2008.

Course Description:

This course aims to prepare the Students for competitive examinations where the English language is a vital component. It is designed for students in the higher semesters, the course will help students to familiarise themselves with those aspects of English that are tested in these examinations.

Course Objectives:

The course aims

- To train the students in the language components essential to face competitive examinations both at national (UPSC, Banking, Railway, Defence) and international levels (GRE, TOEFL, IELTS).
- to enhance an awareness of the specific patterns in language testing and the respective skills
- Togear up with verbal reasoning and verbal ability tests.
- To inculcate effective practices in language-learning in order to improve accuracy in the usage of grammar and coherence in writing.

Course Outcomes:

Students will be able to

- develop and use vocabulary effectively and gain practical techniques
- utilize reading skills to comprehend a wide range of texts with the emphasis required
- apply principles of functional grammar to identify errors with precision and write with clarity and coherence
- develop improved competence in listening skills in order to follow and comprehend different accents and speak effectively

CO-PO Mapping

Sr No	Outcome	KL
I	develop and use vocabulary effectively and gain practical techniques	K4
II	utilize reading skills to comprehend a wide range of texts with the emphasis required	K4
III	apply principles of functional grammar to identify errors with precision and write with clarity and coherence	K3
IV	develop improved competence in listening skills in order to follow and comprehend different accents and speak effectively	K4

CO/PSO	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	PSOI	PSOII
I										3	1	2	2	1
II										3	1	2	2	1
III										3	1	2	2	1
IV										3	1	2	2	1

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