Bapatla Engineering College

(*Autonomous*)

BAPATLA

ACADEMIC RULES & REGULATIONS and SYLLABUS (2020-2021)

Electronics and Communications Engineering

B.Tech.

Bapatla Engineering College:: Bapatla

(Autonomous under Acharya Nagarjuna University) ***(Sponsored by Bapatla Education Society)*** **BAPATLA-522102, Guntur District, A.P.**

www.becbapatla.ac.in

BAPATLA ENGINEERING COLLEGE :: BAPATLA
(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics and Communications Engineering
Effective from the Academic Year 2020-2021 (R20 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	
20EC101 / MA01	BS	Linear Algebra and ODE	3	1	0	4	30	70	100	3
20EC102 / PH01	BS	Waves and Modern Physics	3	1	0	4	30	70	100	3
20EC103 / CY01	BS	Engineering Chemistry	3	1	0	4	30	70	100	3
20EC104 / CS01	ES	Problem Solving with Programming	3	1	0	4	30	70	100	3
20EC105/ MC01	MC	Environmental Studies	3	0	0	3	30	70	100	0
20ECL101 / CYL01	BS	Engineering Chemistry Lab	0	0	3	3	30	70	100	1.5
20ECL102	ES	Hardware Lab	0	0	3	3	30	70	100	1.5
20ECL103 / CSL01	ES	Problem Solving with Programming Lab	0	0	3	3	30	70	100	1.5
		TOTAL	15	4	9	28	240	560	800	16.5

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture, T: Tutorial, P: Practical
BS: Basic Science Courses ES: Engineering Science Courses
MC: Mandatory Course

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Electronics and Communications Engineering
Effective from the Academic Year 2020-2021 (R20 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	
20EC201 / MA02	BS	Numerical Methods and Advanced Calculus	3	1	0	4	30	70	100	3
20EC202	ES	Basic Instrumentation	3	1	0	4	30	70	100	3
20EC203 / HS01	BS	Communicative English	3	1	0	4	30	70	100	3
20EC204 / CS02	ES	Programming with C ++	3	1	0	4	30	70	100	3
20EC205	ES	Circuit Theory	3	1	0	4	30	70	100	3
20EC206	PC	Fundamentals of Digital Electronics	3	1	0	4	30	70	100	3
20ECL201 / PHL01	BS	Physics lab	0	0	3	3	30	70	100	1.5
20ECL202 / HSL01	BS	English Communication and Skills Lab	0	0	3	3	30	70	100	1.5
20ECL203 / CSL02	ES	Programming with C ++ Lab	0	0	3	3	30	70	100	1.5
		TOTAL	18	6	9	33	270	630	900	22.5

CIE: Continuous Internal Evaluation SEE: Semester End Examination
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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
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Effective from the Academic Year 2020-2021 (R20 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	
20EC301/ MA03	BS	Probability and Statistics	3	0	0	3	30	70	100	3
20EC302	PC	Signals & Systems	3	0	0	3	30	70	100	3
20EC303	PC	Electronic Devices and Circuits	3	0	0	3	30	70	100	3
20EC304	PC	Electromagnetic Field Theory	3	0	0	3	30	70	100	3
20EC305	PC	Digital Logic Design	3	0	0	3	30	70	100	3
20EC306/SO01	SOC	Data structures Using Python	2	0	0	2	30	70	100	2
20ECL31	PC	Data Structures using Python Lab	0	0	3	3	30	70	100	1.5
20ECL32	PC	Electronic Devices Lab	0	0	3	3	30	70	100	1.5
20ECL33	PC	Signals & Systems Lab	0	0	3	3	30	70	100	1.5
20EC307/ MC02	MC	Constitution of India	2	0	0	2	30	0	30	0
		TOTAL	19	0	9	28	300	630	930	21.5

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
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Effective from the Academic Year 2020-2021 (R20 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	
20EC401/ MA04	BS	Complex Variables and Special Functions	3	0	0	3	30	70	100	3
20EC402	PC	Electronic Circuit Analysis	3	0	0	3	30	70	100	3
20EC403	PC	EM Waves and Transmission Lines	3	0	0	3	30	70	100	3
20EC404	ES	Analog Communication	3	0	0	3	30	70	100	3
20EC405/SO02	SOC	Microprocessor and Microcontroller	2	0	0	2	30	70	100	2
20EC406/HS01	HSS	Technical English	3	0	0	3	30	70	100	3
20ECL41	PC	Electronic Circuits Lab	0	0	3	3	30	70	100	1.5
20ECL42	PC	Digital Logic Design lab	0	0	3	3	30	70	100	1.5
20ECL43	PC	Microprocessor and Microcontroller lab	0	0	3	3	30	70	100	1.5
		TOTAL	17	0	9	26	270	630	900	21.5
Internship 2 Months (Mandatory) during summer vacation										
Honors/Minor courses (Maximum Two courses can be registered) (The hours distribution can be 3-0-2 or 3-1-0 also)--- Credits 4										

CIE: Continuous Internal Evaluation SEE: Semester End Examination
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For
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Effective from the Academic Year 2020-2021 (R20 Regulations)
Third Year B. Tech (SEMESTER – V)

		Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20EC501	PC	Linear Integrated Circuits	3	0	0	3	30	70	100	3
20EC502	PC	Antennas and wave propagation	3	0	0	3	30	70	100	3
20EC503	PC	Digital communication	3	0	0	3	30	70	100	3
20EC504	SAC	Machine Learning	1	0	2	3	30	70	100	2
20ECJ11,..14	JOE	Elective-1	2	0	2	4	30	70	100	3
20ECD11,..,14	PEC	Elective-1	3	0	0	3	30	70	100	3
20EC505/ MC03	MC	Essence of Indian Traditional Knowledge	2	0	0	2	30	0	30	0
20ECL51	PC	Analog & Digital Communications Lab	0	0	3	3	30	70	100	1.5
20ECL52	PC	Linear Integrated Circuits Lab	0	0	3	3	30	70	100	1.5
20ECL53 /INT01	INT	**Summer Internship 2 Months (Mandatory)**	0	0	0	0	0	0	0	1.5
		TOTAL	17	0	10	27	270	560	830	21.5
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)										4

CIE: Continuous Internal Evaluation SEE: Semester End Examination
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JOC Elective-I
20ECJ11: Embedded System & Design
20ECJ12: Data Communication & Computer Networks
20ECJ13: Programming with JAVA
20ECJ14:Computer organization and architecture
PEC Elective-I
20ECD11: Information Theory & Coding
20ECD12:Telecommunication Switching Systems and Networks
20ECD13: Pulse and Switching Circuits
20ECD14: Optical Communications

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Effective from the Academic Year 2020-2021 (R20 Regulations)
Third Year B. Tech (SEMESTER – VI)

		Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20EC601	PC	VLSI Design	3	0	0	3	30	70	100	3
20EC602	PC	Linear Control Systems	3	0	0	3	30	70	100	3
20EC603	PC	Digital signal Processing	3	0	0	3	30	70	100	3
20EC604	SAC	Internet of Things	2	0	0	2	30	70	100	2
20ECJ21,..24	JOE	Elective-2	2	0	2	4	30	70	100	3
20ECD21,..,14	PEC	Elective-2	3	0	0	3	30	70	100	3
20EC605/ MC04	MC	Professional Ethics and Human Values	2	0	0	0	30	0	30	0
20ECL61	PC	DSP lab	0	0	3	3	30	70	100	1.5
20ECL62	PC	IOT Lab	0	0	3	3	30	70	100	1.5
20ECL63	PC	VLSI Design Lab	0	0	3	3	30	70	100	1.5
		TOTAL	18	0	11	27	300	630	930	21.5
		Honors /Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)								4
Industrial/Research Internship (Mandatory) 2 Months during summer vacation										

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture, T: Tutorial, P: Practical
BS: Basic Science Courses ES: Engineering Science Courses
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JOCElective-2
- 20ECJ21: Digital Design Using Verilog HDL
- 20ECJ22: Artificfial intelligence
- 20ECJ23: Biomedical instrumentation
- 20ECJ24: Advanced Microcontrollers

PECElective-2
- 20ECDC21: Microwave Engineering
- 20ECDC22: Mobile & Cellular Communications
- 20ECDC23: Global Positioning Systems
- 20ECDC24: Pattern Recognition and Application

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
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Effective from the Academic Year 2020-2021 (R20 Regulations)
Fourth Year B. Tech (SEMESTER – VII)

		Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
20ECD31, …34	PC	Professional Elective-III	3	0	0	3	30	70	100	3
20ECD41, …44	PC	Professional Elective-IV	3	0	0	3	30	70	100	3
20EC703	PC	Professional Elective-V	3	0	0	3	30	70	100	3
20ECJ31, …34	JOE	Open/Job-Oriented Elective-III	3	0	0	3	30	70	100	3
20ECD21,.. ,14	JOE	Open/Job Oriented Elective-IV	3	0	0	3	30	70	100	3
20EC704/HS02	HSS	Industrial Management and Entrepreneurship Development	3	0	0	3	30	70	100	3
20EC705/SO03	SOC	Artificial neural networks	1	0	2	3	30	70	100	2
		Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VIII semester)								3
		TOTAL	19	0	2	21	210	420	630	23
	Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)									4

CIE: Continuous Internal Evaluation SEE: Semester End Examination
L: Lecture, T: Tutorial, P: Practical
BS: Basic Science Courses ES: Engineering Science Courses
PC: Professional Core

PEC Elective-III:
20ECD31:RADAR Engineering
20ECD32:Speech Processing
20ECD33:FPGA Design
20ECD34:MEMS
PEC Elective-IV:
20ECD41:Satellite Communication
20ECD42:Wireless Networks
20ECD43:Advanced DSP
20ECD44:Cloud Computing

Professional Elective: V
20ECD51:Low Power VLSI
20ECD52:Advanced Digital Communication
20ECD53:Real-Time Signal Processing
20ECD54:Wavelet Signal Processing
Open/JOC-Elective III
20ECI01Digital Image Processing
20ECI02 Embedded Systems
JOC Elective-IV
20ECJ41:Digital Image Processing
20ECJ42:Biomedical Signal Processing
20ECJ43:Robotics
20ECJ44:Deep Learning

Semester VIII (Fourth Year)

Code		Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
			L	T	P	Total	CIE	SEE	Total Marks	
EC461	PC	Project work, Seminar and internship in Industry	-	-	-	3	30	70	100	12

Linear Algebra and ODE
I B. Tech – I Semester (Sub. Code: 20EC101 / MA01)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

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 appropriate analytical 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 equations to 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. The piecewise continuous functions in terms of unit step functions and hence find its Laplace transforms. Solve linear differential equation with constant coefficients and unit step input functions using Laplace 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 of Radio-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 complementary function; 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‖, 44th edition, Khanna publishers, 2017.
2. Erwin Kreyszig, ―Advanced Engineering Mathematics, 9th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. N. P. Bali and M. Goyal, ―A Text book of Engineering Mathematics Laxmi Publications, 2010.

WAVES AND MODERN PHYSICS

(Common for ECE, EEE, EIE)

I B. Tech – I Semester (Sub. Code-20EC102 / PH01)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

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.

CO3: To make the students to understand the quantum theory and solving the various Physical problems using quantum mechanics.

CO4: 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. Read about properties and applications of ultrasonics in various fields. Know about radio isotopes and their applications.

SYLLABUS

UNIT – I

(ADVANCED OPTICS)

Lasers: Interaction of radiation with matter. Einstein co-efficient, Properties of laser, Population inversion, LASER principle, pumping schemes-Three level and four level laser, types 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 Pointing 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 BOOK:

1. Engineering physics M. V. Avadhanulu, P.G.KshirsagarS.Chand& Company Pvt. Ltd.
2. Engineering physics, PalaniSwamy,Scitech publication

REFERENCE BOOKS:

1. Basic engineering physics – Dr.P.srinivasaRao, Dr.K.Muralidhar, Himalaya Publication.
2. Applied physics – Dr. P. Srinivasa Rao, Dr. K. Muralidhar, Himalaya publication.

ENGINEERING CHEMISTRY

(Common to all branches)

I B. Tech – I Semester (Sub. Code: 20EC103 / CY01)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

COURSE OBJECTIVES: The student should be conversant:

CO1: With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.

CO2: To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.

CO3: With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking 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 at cheaper cost.

CLO-2: Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.

CLO-3: Have the capacity of applying energy sources efficiently and economically for various needs.

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 numerical 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 process

WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration. Disinfection methods: Chlorination, ozonization and UV treatment.

Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis. [15 Periods]

UNIT – II

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy 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. [15 Periods]

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. [15 Periods]

UNIT – IV

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution (SN^1, SN^2), addition (Markownikoff's and anti-Markownikoff's rules), elimination (E_1& E_2), 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. Biodegradable polymers: types, examples - Polyhydroxybuterate (PHB), Polyhydroxybuterate – co – β - hydroxyvalerate (PHBV), applications. [15 Periods]

TEXT BOOKS:

1. P. C. Jain and Monica Jain, ―Engineering Chemistry‖ DhanpatRai Pub, Co., New Delhi 17th edition (2017).
2. Seshi Chawla, Engineering Chemistry**,** DhanpatRai Pub, Co LTD, New Delhi 13th edition, 2013.

REFERENCE BOOKS:

1. Essential of Physical Chemistry by ArunBahl, B. S. Bahl, G. D. Tuli, by ArunBahl.
2. B. S. Bahl, G. D. Tuli, Published by S Chand Publishers, 12th Edition, 2012.
3. Text Book of Engineering Chemistry by C. P. Murthy, C. V. Agarwal, A. Naidu, B. S. Publications, Hyderabad (2006).
4. Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

PROBLEM SOLVING USING PROGRAMMING

(Common for all branches except Civil Engineering)

I B. Tech – I Semester (Sub. Code: 20EC104 / CS01)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: Basic Mathematics

COURSE OBJECTIVES: Students will be able to

CO1: Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetic rules.

CO2: Develop problem-solving skills to translate English described problems into programs written using C language.

CO3: Use Conditional Branching, Looping, and Functions.

CO4: Apply pointers for parameter passing, referencing and differencing and linking data structures. 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

CLO1: Choose the right data representation formats based on the requirements of the problem.

CLO2: Analyze a given problem and develop an algorithm to solve the problem.

CLO3: Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.

CLO4: Write the program on a computer, edit, compile, debug, correct, recompile and run it. 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

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. [17 Periods]

UNIT – II

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 to display 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. [17 Periods]

UNIT – III

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 array of pointers [18 Periods]

UNIT – IV

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. [18 Periods]

TEXT BOOK:

1. Programming in ANSI C by E. Balaguruswamy, Fifth Edition.
2. Kernighan BW and Dennis Ritchie M, ―C programming language‖, 2nded, Prentice Hall.

REFERENCE BOOKS:

1. Yashavant P. Kanetkar, ―Let us C‖, BPB Publications.
2. Herbert Schildt, C: The Complete Reference‖, 4th edition, Tata Mcgraw - Hill.
3. Ashok N. Kamthane, ―Programming in C‖, PEARSON 2nd Edition.

ENVIRONMENTAL STUDIES
I B. Tech – I Semester (Sub. Code: 20EC105 / CE01)

Lectures	3	Tutorial	0	Practical	0	Credits	0
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

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 and 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. In addition, 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). [6 periods]
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 [6 periods]

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; Rainwater harvesting and Watershed management. Fieldwork on Rainwater harvesting and Watershed management. [6 periods + 6 periods field work / 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 vermin composting.

[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]

Fieldwork: 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 periods]

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Environmental studies, R. Rajagopalan, Oxford University Press.
2. Introduction to Environmental Science, Anjaneyulu Y, B S Publications Environmental Science, 11th Edition – Thomson Series – By Jr. G. Tyler Miller.
3. Text Book of environmental Studies – Erach Bharucha

ENGINEERING CHEMISTRY LABORATORY

(Common to all branches)

I B. Tech – I Semester (Sub. Code: 20ECL101 / CYL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives:

CO1: With the principles of water characterization and treatment of water for industrial Purposes and methods of producing water for potable purposes.

CO2: To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.

CO3: With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge Of knocking and anti-knocking characteristics

CO4: With aim to gain good knowledge of organic reactions, plastics, conducting Polymers & biodegradable polymers.

Course Outcomes: Students will be able to:

CLO-1: Develop innovative methods to produce soft water for industrial use and able to Solve the industrial problems

CLO-2: the students will be familiar with applications of polymers in domestic and Engineering areas & the most recent surface characterization techniques

CLO-3: Have the capacity of classifying fuels, their calorific value determination and applying energy sources efficiently and economically for various needs.

CLO-4: Explain features, classification, applications of newer class materials like smart materials, refrocteries, abbrasives, lubriants and composite materials etc.

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:

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 Harrmendra Goel.
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 (Sub. Code: 20ECL102)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives:

CO1: To Learn How Identification And Testing Of Various Circuit Elements.
CO2: To Observe Characteristics Of Electronic Devices.
CO3: To Show How to Measure V, Frequency and Phase of Any Waveform Using CRO
CO4: To Show How to Generate Sine, Square and Triangular Waveforms With Required Frequency And Amplitude Using Function Generator.

Course Outcome: After studying this course, students will be able to:

CLO-1: Identify And Can Test Various Circuit Elements And Components.
CLO-2: Measure Voltage, Frequency and Phase of Any Waveform Using CRO.
CLO-3: Generate Sine, Square and Triangular Waveforms with Required Frequency And Amplitude Using Function Generator.
CLO-4: Identify Passive And Active Electronic Components Such As Resistors, Capacitors, Diodes, And Transistors Etc. Demonstrate Measuring And Testing Equipment Like Dc Power Supply, Multimeter, C.R.O, Signal Generators Etc.

LIST OF LAB EXPERIMENTS

1. Identification and testing of various circuit elements.
2. Study of CRO and Function Generator.
3. Study of RPS and 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 CRO.
11. Verification Of Nortons Theorem
12. How Frequency And Phase Measured Using Cro
13. Lissajious Figures In Cro
14. Simulation Software Introduction
15. Small Circuits Design Using Simulation Software

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

Problem Solving With Programming Lab
I B. Tech – I Semester (Sub. Code: 20ECL103 / CSL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30		Semester End Examination (3 Hours)		:	70

Pre-Requisite: Basic Mathematics

Course Objectives:

CO-1: Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output and arithmetics.

CO-2: Develop problem-solving skills to translate „English" described problems into Programs Written using C language.

CO-3: Use Conditional Branching, Looping, and Functions.

CO-4: Apply pointers for parameter passing, referencing and differencing and linking data structures. 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: Students will be able to:

CLO-1: Choose the right data representation formats based on the requirements of the problem.

CLO-2: Analyze a given problem and develop an algorithm to solve the problem.

CLO-3: Use the comparisons and limitations of the various programming constructs and Choose the right one for the task in hand.

CLO-4: Write the program on a computer, edit, compile, debug, correct, recompile and run it. 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.

LIST OF LAB EXPERIMENTS

1. A program for electricity bill taking different categories of users, different slabs in each 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 (using loops):
   a) $1 + x^2/2! + x^4 / 4!+ \ldots$upto ten terms
   b) $x + x^3/3! + x^5/5!+ \ldots$ upto ten terms

3. Write a C program to check whether the given number is
    a) Prime or not.
    b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
    a) Mean
    b) Mode
    c) Median
    d) Variance.
5. WriteaCprogramtoreadalistofnumbersandperformthefollowingoperations
    a) Print the list.
    b) Delete duplicates from the list.
    c) Reverse the list.
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 the List".Write a C program to read two matrices and compute their sum and product.

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

8. 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.

9. 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.

10. Write a C program to read a data file of students' records with fields(Reg.no, Name, M1, M2, M3, M4, M5) and write the successful students data (percentage > 40%) to a data file.

11. 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 (Sub. Code: 20EC201 / MA02)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30		Semester End Examination (3 Hours)		:	70

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.
CO4: To understand the Vector calculus and its Applications.

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 value problem using appropriate numerical method. Evaluate the double and triple integrals using change of variables. Transform line integrals to surface and surface to volume integrals and evaluate them.

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 to scalar 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); Gauss divergence 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‖, 44th edition, Khanna publishers, 2017.
2. Erwin Kreyszig, ―Advanced Engineering Mathematics‖, 9th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. N. P. Bali and M. Goyal, ―A Text book of Engineering Mathematics‖ Laxmi Publications, 2010.

BASIC INSTRUMENTATION
I B. Tech – II Semester (Sub. Code: 20EC202)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

COURSE OBJECTIVES: To learn
CO1: To learn Basic concepts of measurement and Instrumentation.
CO2: To study working of various bridges and their applications.
CO3: To study the uses of CRO in measurements.
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 used for different applications.
CLO-4: Identify the suitable Sensors and Transducers for different applications.

SYLLABUS

UNIT – I

Measurement and Error
Definitions: Measurement, Standard, Instrument, Calibration, Instrumentation Accuracy, Precision, Significant figures, Sensitivity, Resolution, Threshold, and Linearity. Types of errors. **Limiting Errors:** Definition, Combination of Limiting errors, Statistical analysis, Probability of errors.
Electromechanical Indicating Instruments
Permanent Magnet Moving Coil Mechanism, DC Ammeters, DC Voltmeters, Voltmeter Sensitivity, Series type Ohmmeter, Shunt type Ohmmeter.

UNIT – II

Bridge Measurements
Introduction, Wheatstone Bridge, Kelvin Bridge, Kelvin's Double Bridge, **AC Bridges:** Maxwell Bridge, Hay Bridge, Schering Bridge, Wein Bridge.
Electronic Instruments for measuring Basic Parameters
AC voltmeter using rectifiers, True RMS-Responding voltmeter, **Q Meter:** Basic Q-meter circuit, Measurement methods, Sources of error**.**

UNIT – III

Oscilloscopes
Introduction, Block diagram and working of CRO and Cathode Ray Tube (CRT), **Oscilloscope Techniques:** Frequency determination, Phase angle and Time delay measurement, **Special Oscilloscopes**: Working of Storage Oscilloscope, Sampling Oscilloscope, and Digital Storage Oscilloscope.

UNIT – IV

Transducers as Input Elements to Instrumentation Systems
Classification of Transducers, Selection criteria of Transducer, **Strain gauges:** Principle of Strain gauge, Derivation for gauge factor of a strain gauge, **Displacement Transducers:**

Resistive potentiometers, LVDT, Capacitive transducers (i) Variable gap type (ii) Variable area type (iii) Variable dielectric type. **Temperature Measurements:** Principle and operation of RTD, Thermistor, Thermocouples

Analog and Digital Data Acquisition Systems

Introduction to Instrumentation systems, Block diagram and working of Digital data acquisition system

TEXT BOOK:

1. Modern Electronic Instrumentation and Measurement Techniques by W. D Cooper & A. D Helfrick PHI, 2008.
2. A Course in Electrical and Electronics Measurements and Instrumentation by Sawhney. A.K**,** 18th Edition, DhanpatRai & Company Private Limited, 2007.

REFERENCE BOOKS:

1. Electronic Instrumentation by H S Kalsi, Tata McGraw-Hill Education, 1995.

COMMUNICATIVE ENGLISH

I B. Tech – II Semester (Sub. Code: 20EC203 / EL01)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

Course Objectives:

CO1 To comprehend the importance, barriers and strategies of listening skills in English.
CO2 To illustrate and impart practice Phonemic symbols, stress and intonation.
CO3 To practice oral skills and receive feedback on learners‟ performance.
CO4 To practice language in various contexts through pair work, role plays, group work and dialogue conversations

Course Outcomes: Students will be able to:

CLO-1 Understand basic grammatical units and their usage;
CLO-2 Learn to think, Write critically and coherently;
CLO-3 Recognize writings as a process rather than a product;
CLO-4 Upgrading comprehension skills of English Material of various types and Enhancing range of vocabulary to communicate in varied contexts.

SYLLABUS

UNIT – I

Vocabulary Development: Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes
Essential Grammar: Prepositions, Conjunctions, Articles
Basic Writing Skills: Punctuation in writing
Writing Practices: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT – II

Vocabulary Development: Synonyms and Antonyms
Essential Grammar: Concord, Modal Verbs, Common Errors
Basic Writing Skills: Using Phrases and clauses
Writing Practices: Hint Development, Essay Writing

UNIT – III

Vocabulary Development: One word Substitutes
Essential Grammar: Tenses, Voices
Basic Writing Skills: Sentence structures (Simple, Complex, Compound)
Writing Practices: Note Making

UNIT – IV

Vocabulary Development: Words often confused
Essential Grammar: Reported speech, Common Errors
Basic Writing Skills: Coherence in Writing: Jumbled Sentences
Writing Practices: Paraphrasing & Summarising

TEXT BOOK:

1. Communication Skills, Sanjay Kumar & PushpaLatha. Oxford University Press:2011.
2. Practical English Usage, Michael Swan. Oxford University Press:1995.

REFERENCE BOOKS:

1. Remedial English Grammar, F. T. Wood. Macmillan:2007.
2. Study Writing, Liz Hamplyons & Ben Heasley. Cambridge University Press:2006

PROGRAMMING WITH C++
I B. Tech – II Semester (Sub. Code: 20EC204 / CS02)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30		Semester End Examination (3 Hours)		:	70

Prerequisites: None

COURSE OBJECTIVES: To learn

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

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

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

CO4: Understand design/implementation issues involved with variable allocation and binding, 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 and operator 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.

2. Object oriented programming with ANSI and turbo C++, Ashok N. Kamthane, Pearson Education, 2005.

REFERENCE BOOKS

1. C++ programming language by Bjarne Stroustup, 3rd edition, Pearson education, 2009.

CIRCUIT THEORY

I B. Tech – II Semester (Sub. Code: 20EC205)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

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. **[CHAPTER-3]**

UNIT – II

Basic Nodal and Mesh Analysis: Nodal analysis, the super node, Mesh analysis, and The super mesh, Nodal vs. Mesh analysis: A comparison. **[CHAPTER-4]**

UNIT – III

Useful circuit analysis techniques: Linearity and superposition, source transformations, Thevenin and Norton equivalent circuits, maximum power transfer Theorem, Reciprocity Theorem, and delta-wye conversion. **[CHAPTER-5]**

UNIT – IV

Basic RL and RC Circuits: The source free RL circuit, properties of the exponential response, the source free RC circuit, driven RL circuits, natural and forced response, driven RC circuits. **[CHAPTER-8]**

TEXT BOOK:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 8th Edition, Tata McGraw Hill, 2016.
2. Circuits & Networks: Analysis and Synthesis, A.Sudhakar and ShyammohanS.Pilli, Tata McGraw Hill, 2007.

REFERENCE BOOKS:

1. Network Analysis, M. E. Vanvalkenburg, 3rd Edition, PHI, 2003.

Fundamentals of Digital Electronics
I B. Tech – II Semester (Sub. Code: 20EC206)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

COURSE OBJECTIVES:

CO1: To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronic circuits.
CO2: To impart how to design Digital Circuits.
CO3: To analyze the implementation of combinational logic circuits.
CO4: To explore the knowledge on MSI circuits

COURSE OUTCOMES: Students will be able to

CLO1: Perform binary arithmetic operations and Conversion of numbers from one base to another base.
CLO2: Simplify logical functions using K-map method and Tabulation method.
CLO3: Design various combinational logic circuits and realize using logic gates.
CLO4: Design combinational logic circuits using MSI circuits.

SYLLABUS

UNIT – I

Number Systems and Codes: Decimal, Binary, Octal and Hexadecimal number systems and their conversion. Number systems arithmetic; Complements: The r's Complement, The (r-1)'s Complement, Subtraction using method of complements. Sign-magnitude representation, 1's & 2's complement representations, Codes: Introduction, Classification of Binary codes; BCD code, Excess-3 code, Gray code, Error detection and Correction codes.

UNIT – II

Boolean Algebra and Logic gates: Boolean Postulates & theorems, Digital Logic gates, Simplification of Boolean expressions, Implementation of Boolean expressions using logic gates, Canonical and Standard forms.
Minimization of Switching Functions: Simplification of logical functions using Karnaugh map method (Up to five variables), Don't-Care conditions, Quine-McCluskey minimization technique.

UNIT – III

Combinational Logic Design: General design Procedure, Design of: Half-Adder, Full-Adder, Half - Subtractor, Full – Subtractor. Design of Code converters, Ex-OR and Ex-NOR circuits, NAND and NOR implementation of Boolean functions.

UNIT – IV

Combinational Logic Design Using MSI Circuits: Multiplexer, Combinational logic design using multiplexers, Demultiplexers / Decoders and their use in combinational logic design, Design of BCD to 7 segment decoder, Magnitude comparator, Encoders.

TEXT BOOK:

1. M.Morris Mano, "Digital Logic and Computer Design", PHI 2003.
2. A.Anand Kumar, "Fundamentals of Digital Circuits", PHI 2006.

REFERENCE BOOKS:

1. R P Jain "Modern Digital Electronics", IVth ed., TMH.

PHYSICS LABORATORY

(COMMON TO ALL BRANCHES)

I B. Tech – II Semester (Sub. Code: 20ECL201 / PHL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

Course Objectives:

CO1: This unit aim to build the foundation and inspires interest of freshmen into electrical and electronics and to focus on fundamental concepts and basic principles regarding **Electrical conduction.**

CO2: This unit provides various properties of semiconductor materials and their importance In various device fabrications.

CO3: This unit aim to educate the student on various opto-electronic devices and their Applications.

CO4: This unit provide information about the principles of processing, manufacturing and Characterization of nano materials, nano structures and their applications

Course Outcomes: Students will be able to:

CLO-1: Students demonstrate the ability to apply the knowledge of band theory of solids and concept of energy band gap and hole.

CLO-2: Classify the different types of magnetic and dielectric materials and their applications

CLO-3: Understand importance of Nano materials, properties and their applications.

CLO-4: To familiarize the phenomenon of superconductivity and opto-electronic devices. Students to understand the principle in the production and applications of ultrasonic Students are able to estimate the crystal structures by x-ray diffraction technique.

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 radius of curvature of a Plano convex lens by forming Newton’s rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
11. Draw the load characteristic curves of a solar cell.

12. Determination of Hall coefficient of a semiconductor.
13. Determination of voltage and frequency of an A.C. signal using C.R.O.
14. Determination of Forbidden energy gap of Si &Ge.
15. Determination of wavelength of laser source using Diode laser.

Any three experiments are virtual

ENGLISH COMMUNICATION SKILLS LABORATORY
I B. Tech – II Semester (Sub. Code: 20ECL202 / ELL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

Course Objectives:

CO1: To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.

CO2: To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.

CO3: To improve students' fluency in English and neutralize their mother tongue.

CO4: To make them use effective vocabulary both in formal and informal situations.

Course Outcomes: The student would be able to

CLO1: Better, understand the nuances of English language through audio- visual experience and group activities.

CLO2: Develop neutralization of accent for intelligibility.

CLO3: Build confidence to enhance their speaking skills.

CLO4: Use effective vocabulary both in formal and informal situations.

SYLLABUS

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. New Interchange (4rth Edition), Jack C Richards. Cambridge University Press: 2015.
2. 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.

PROGRAMMING WITH C++ LAB
I B. Tech – II Semester (Sub. Code: 20ECL203 / CSL02)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30		Semester End Examination (3 Hours)		:	70

Prerequisites: None

Course Objectives:

CO1: Understand advantages of C++ programming over procedural oriented programming, learn the basics of variables, operators, control statements, arrays, classes and objects.

CO2: Understand, write and implement the following concepts: Inheritance, Interfaces, Packages, Strings and Collections.

CO3: Understand and write programs on Exception Handling, I/O, and Multithreading.

CO4: Understand and implement applications using Applets, AWT, Swings and Events.

Course Outcomes: Students will be able to:

CLO-1: Understand basics of variables and operators such as variables, conditional and iterative execution methods etc.

CLO-2: Identify classes, objects, members of a class and relationships among them needed for a specific problem and Write C++ principles and proper program structuring.

CLO-3: Demonstrate the concepts of polymorphism, inheritance, packages and interfaces.

CLO-4: Write C++ to implement error-handling techniques using exception handling

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. *this*pointer
15. File I/O operations

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

PROBABILITY AND STATISTICS
Common to All Branches 20MA003
II B.Tech, III Semester

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Pre-Requisite: None.

Course Objectives:

CO1: The Aptitude to learn about the concept of random variables and their properties
CO2: Evaluation of various Sampling Distributions
CO3: Statistical analysis for making decisions and choosing actions.
CO4: The Capability to infer the meaningful conclusions to the given data using statistical methods like Point Estimation

Course Outcomes: Students will be able to:

CLO-1: Understand the concept of random variables and probability mass functions, densities
CLO-2: Understand the mean and variance of a random variable.
CLO-3: Know various well-known distributions and how they are used in practice.
CLO-4: Understand joint, marginal, and conditional distributions. Interpret a confidence interval for a population mean when the population standard deviation is known and unknown.

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.

(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.

(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).

(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.

(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.

SIGNALS & SYSTEMS

II B.Tech – III Semester (Code: 20EC302)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Linear Algebra and ODE

Course Objectives: To learn
CO1: Basic mathematical operations on basic signals and classification of systems
CO2: Fourier series representation for continuous time signals
CO3: Fourier transform computation for continuous time signals and systems
CO4: The concept of sampling theorem and correlation of signals
Course Outcomes: At the end of the course, students will be able to
CLO-1: Understand the mathematical operations on standard signals and classification of systems
CLO-2: Develop Fourier series for continuous time signals
CLO-3: Apply the Fourier transform to continuous time signals and systems
CLO-4: Convert the continuous time signals into their discrete version and to perform correlation of signals

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.
2. Signals and Systems, Simon Haykin, John Wiley, 2004.

REFERENCE BOOKS:

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

ELECTRONIC DEVICES AND CIRCUITS
II B.Tech – III Semester (Code: 20EC303)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Semiconductor physics, Wave and Modern Physics

Course Objectives: To learn

CO1: The characteristics of the p-n junction, the diode and some special function diodes.

CO2: To Obtain knowledge about the operation of different types of Rectifiers.

CO3: To Understand the operation and characteristics of B.J.T and the concepts of Transistor biasing and thermal stabilization.

CO4: To Understand the operation and characteristics of FET, MOSFET and the operation Characteristics of PNPN and other electronic devices.

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 – III Semester (Code: 20EC304)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisite: 20EC102 / PH01-Waves and Modern Physics,
20EC201 / MA02-Numerical Methods and Advanced Calculus.

Course Outcomes (COs):

CO1: Understand the basic concepts 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 magnetostatic 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.

Course Learning Outcomes (CLOs):

CLO1: Understand the sources static electric fields, different types of charge distribution. Also, understand the Gausses law and its applications.

CLO2: Understand the Maxwell's equation for electrostatics able to derive the equations for Potential and the energy stored in the field.

CLO3: Able to derive the boundary conditions at boundary between perfect dielectric Materials, conductors-free space. Understand the examples of the solution of Laplace's equation, and relation between current and current density.

CLO4: Understand the different laws governing steady magnetic fields. Also understand the Applications of Ampere's Circuital Law. Able to derive the force equation due to Magneto static fields and Magnetic boundary conditions. Able to understand the Inconsistency in Ampere's law and derive the Maxwell's equations for time varying Fields. Analyze how uniform plane waves propagates in different media and able Derive Poynting vector.

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.
2. EC Jordan and KG Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, Prentice Hall of India.

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.

DIGITAL LOGIC DESIGN
II B. Tech – I Semester (Sub. Code: 20EC305)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: Fundamentals of Digital Electronics

COURSE OBJECTIVES:

CO1: To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronic circuits.

CO2: To impart how to design Digital Circuits.

CO3: Simplify the Boolean functions using Tabulation method, Concepts of combinational logic circuits.

CO-4: Understand the concepts of Flip-Flops, Analysis of sequential circuit.

COURSE OUTCOMES: Students will be able to

CLO1: Design synchronous sequential circuits and understand use of flip-flops.

CLO2: Design asynchronous sequential circuits, counters and understand the importance of registers.

CLO3: Operation of various logic families and their comparison.

CLO4: Operation of various memory devices and implementation.

SYLLABUS
UNIT – I

SYNCHRONOUS SEQUENTIAL LOGIC: Architectural Distinctions between Combinational and Sequential circuits, Latches, Flip-Flops, RS- Latch Using NAND and NOR Gates, Truth Tables, Excitation Tables, characteristic Tables and equations of SR, JK, D, T and Master slave JK flip-flop, Conversion from one type of Flip-Flop to another.

UNIT – II

SYNCHRONOUS SEQUENTIAL CIRCUITS -Introduction, Analysis procedure, Circuits with latches, Design procedure.

REGISTERS AND COUNTERS: Registers, shift Registers, Left shift, Right shift, SISO, SIPO, PIPO, PISO, Bidirectional Shift Register, Universal Shift Register, Design of Asynchronous and Synchronous Counters, Modulus of the Counters, Ripple Counters, Ring Counter, Johnson Counter, up-down counter.

UNIT – III

Logic Families: Significance of families, Characteristic parameters, types of Logic families: RTL, DTL, I^2L, TTL, TTL NAND gate with totem pole output, TTL TRI STATE logic ECL, MOS, CMOS, NMOS and PMOS Comparison between various logic families.

UNIT – IV

Memory and Programmable Logic Devices: Classification of memories – ROM: ROM organization, PROM, EPROM, EEPROM, RAM: RAM organization, Write operation, Read operation, Static RAM, Programmable Logic Devices: Programmable Logic Array (PLA) Programmable Array Logic, Implementation of Combinational Logic circuits using ROM, PLA, PAL.

TEXT BOOK:

1. M.Morris Mano, "Digital Logic and Computer Design", PHI 2003.
2. R P Jain "Modern Digital Electronics", IVth ed., TMH.

REFERENCE BOOK:

1. A.Anand Kumar, "Fundamentals of Digital Circuits", PHI 2006.

DATA STRUCTURES USING 'PYTHON

II B.Tech – III Semester (Code: 20EC306)

Lectures	2	Tutorial	0	Practical	2	Credits	2
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

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.

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 BOOK

1. Michael T. GoodRich, Roberto Tamassia, Michael H. Goldwasser . "Data Structures & Algorithms", John Wiley & sons 2013.
2. Y.Daniel Liang, "Introduction to programming using python", Pearson, 2013.

REFERENCE BOOK:

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

CONSTITUTION OF INDIA

II B.Tech – III Semester (Code: 20ECM31)

Lectures	2	Tutorial	0	Practical	0	Credits	0
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives: To learn

CO1: The importance of fundamental rights as well as fundamental duties

CO2: The powers of Union government in Indian federal system.

CO3: The functioning of Indian Parliamentary System at State level

CO4: The administration of local government and activities of election commission of India.

Course Outcomes (COs): At the end of the course, students will be able to

CLO-1: Comprehend the Fundamental Rights and Fundamental Duties of the Indian Citizen to implant morality, social values, and their social responsibilities.

CLO-2: Analyze the distribution of powers between Center and State and differentiate the roles of President and Cabinet.

CLO-3: Differentiate the functioning of Indian Parliamentary System at State level.

CLO-4: Get acquainted with Local Administration and Election Commission.

SYLLABUS

UNIT – I

INTRODUCTION: 'Constitution' meaning of the term, Indian Constitution: Sources, Features, Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT – II

UNION GOVERNMENT AND ITS ADMINISTRATION: Structure of the Indian Union: Federal System, Centre- State relations, President: Role, power and position, PM and Central Council of ministers, Central Secretariat.

UNIT – III

STATE GOVERNMENT AND ITS ADMINISTRATION: Governor: Role and Position, CM and State Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT – IV

LOCAL ADMINISTRATION: District's Administration head: Role and Importance, Municipalities: 74thAmendment Act of 1992, Panchayati raj: 73rd Amendment Act of 1992, Role and functioning of ECI.

Text Books:

1. Laxmikanth 'Indian Polity' - 6th edition-Mcgraw-hillindia.
2. Dr. P.K. Agrawal, 'Constitution of India', Dr. K.N. Chaturvedi -Kindle Edition.

Reference Books:

1. D.D. Basu, 'Indian Constitution' -24th edition-lexis nexis publishers.

DATA STRUCTURES USING PYTHON LAB

II B.Tech Semester-III 20ECL31

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Data Structures

Course Objectives: The objective of this course is to

CO 1: To implement different searching and sorting techniques.

CO 2: To create different linear data structures like linked lists, stacks, and queues.

CO 3: To create non-linear data structures like trees and graphs.

CO 4: To understand the searching mechanism like depth first search and breadth first search.

Course Outcomes: After successful completion of the course, the students can be able to:

CLO1: Apply the fundamentals to implement the searching and sorting techniques.

CLO2: Implement linear data structures like linked list, stacks, and queues.

CLO3: Develop non-linear data structures like trees and graphs.

CLO4: Implement traversal techniques on non-linear data structures.

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.

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

ELECTRONIC DEVICES LAB
II B. Tech – III Semester (Sub. Code: 20ECL32)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

Course Objectives: The objective of this course is to

CO1: To study basic electronic components.

CO2: To observe characteristics of electronic devices.

CO3: To perform operations on various Diodes, BJT and FET based circuits using Software.

CO4: To perform operations on various Diodes, BJT and FET based circuits using Hardware.

Course Out comes: After successful completion of the course, the students can be able to:

CLO1: Plot the characteristics of electronic devices to understand their behavior.

CLO2: Design different biasing techniques using BJT.

CLO3:Design various circuits using BJT and FET

CLO4: Simulate various Diode, BJT and FET based circuits using Software

LIST OF LAB EXPERIMENTS (Simulation/Hardware)

1. Characteristics of Silicon and Germanium diodes (**Hardware**)
2. Characteristics of Zener diode and its regulation characteristics (**Hardware**)
3. Characteristics of BJT in Common Base configuration. (**Hardware**)
4. Characteristics of BJT in Common Emitter configuration. (**Simulation /Hardware**)
5. Characteristics of Emitter follower circuit. . (**Simulation /Hardware**)
6. Output and Transfer Characteristics of JFET.(**Hardware**)
7. Characteristics of UJT. (**Hardware**)
8. Design and verification of self-bias circuit for BJT. . (**Simulation /Hardware**)
9. Design and verification of collector to base bias circuit for BJT. . (**Simulation /Hardware**)
10. Design and verification of Fixed bias circuit for BJT. (**Hardware**)
11. Voltage Regulator using BJT. . (**Simulation /Hardware**)
12. Characteristics of SCR.
13. Study of CRO.
14. Characteristics of Triac.
15. Characteristics of Photo Transistor.

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

SIGNALS & SYSTEMS LAB

II B.Tech – III Semester (Code: 20ECL33)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

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 and understanding of the Nyquist sampling theorem and the process of converting continuous 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 PROGRAMS

1. Basic Operations on Matrices.
2. Program to show how to create a variety of 2-D plots in MATLAB.
3. Generation of basic continuous time signals namely unit impulse, step, ramp, exponential and Sinusoidal signals.
4. Generation of basic discrete time signals namely unit impulse, step, ramp, exponential and Sinusoidal signals.
5. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
6. Finding the Even and Odd Parts of Signal or Sequence and Real and Imaginary Parts of Signal.
7. Verification of linearity and time invariance properties of a given Continuous/discrete system.
8. Convolution between Signals and Sequences.
9. Autocorrelation and Cross-correlation between Signals and Sequences.
10. Sampling Theorem Verification.

COMPLEX VARIABLES AND SPECIAL FUNCTIONS

II B.Tech, IV Semester (Code: 20MA004)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisite – None

Course Objectives: To learn

CO1: To understand the fundaments of Complex Analysis like n roots of Complex number, Analytic Function, Continuity, Harmonic Conjugates and their important role of applicability in various concepts.

CO2: To derive the series expansions of given functions by Taylor series and Laurent Series, Evaluate certain complicated real integrals under Contour integration using residue calculus.

CO3: To use various properties of Fourier transforms and their inverses in handling scientific and technical applications.

CO4: To obtain the meaningful Series Solutions for Differential Equations and analyze the Properties of Special Functions.

Course Outcomes:

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

CLO1: Compute the roots of a complex number and examine the nature of the function.

CLO2: Calculate different contour integrals by Cauchy's integral formula.

CLO3: Express the function as a Fourier Integral and Construct the Fourier transform.

CLO4: Solve Differential equation for deriving series solution and Solve Bessel's equation in various cases

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", 44thedition, Khanna publishers, 2017.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics",Laxmi publications,2010.

REFERENCE BOOK:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.

ELECTRONIC CIRCUIT ANALYSIS
II B.Tech.–IV Semester (Code: 20EC402)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Electronic Devices and circuits

Course Objectives: The objective of this course is to
CO 1: Understand the behavior of the various amplifier circuits (single stage and multistage) at Low frequencies.
CO 2: Understand the concept of power amplifier and identify different power amplifiers.
CO 3: Interpret the concept of feedback and classify various types of feedback amplifiers.
CO 4: Understand the principle of oscillation and design different types of oscillators.
Course Outcomes: Students will be able to
CLO1: Analyze single stage & multistage stage amplifiers using BJT and FET.
CLO2: Analyze power amplifiers.
CLO3: Design and Analyze Feedback amplifiers
CLO4: Design and Analyze 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, CE Amplifier with an Emitter Resistance, High Input Resistance Transistor Circuits – Darlington pair, Boot strapped Darlington pair.

FET at low frequency: FET Small signal model, Common Source and Common Drain configurations at low frequencies.

UNIT-II

Multistage amplifiers: Classification of amplifiers, Distortion in amplifiers, Frequency response of an amplifier, Methods of Coupling (Direct, Transformer, RC Coupling), RC-coupled amplifier, 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, The feedback concept, Transfer gain with feedback, General Characteristics of Negative Feedback Amplifiers, Input & Output resistance, Method of analysis of a feedback amplifier, Voltage-series feedback, Voltage-series feedback pair, 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, Wien-bridge Oscillator. General form of LC oscillators, Hartley, Colpitts oscillators using BJT, Crystal oscillator, Frequency stability criterion for oscillators.

TEXT BOOKS:

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

2. S. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits by, 3rd Edition, Tata McGraw-Hill Education, 2012.

REFERENCE BOOK:

1. N. N. Bhargava, D. C. Kulshrestha and S.C. Gupta Basic Electronics and Linear Circuits by, TTTI Series, Tata McGraw-Hill Education, 2003.

EM WAVES AND TRANSMISSION LINES

II B.Tech – IV Semester (20EC403)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Electromagnetic field theory

Course Objectives: The objective of this course is to

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

CO2: To Explore the fundamentals of different types of transmission lines.

CO3: To get the knowledge about impedance matching techniques using smith chart and transients associated with different transmission lines.

CO4: To know the theory of waveguides and different modes of propagation of the wave.

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 losses associated with them

CLO-3: Understand impedance matching using smith chart and analyze the transients present in transmission lines

CLO-4: Derive wave equations for different modes of propagation in 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 BOOK:

1. Edward Jordan, Keith G. Balmain, Electromagnetic Waves and Radiating Systems, , 2nd edition, PHI India. (Unit I)

2. Samuel Y Liao,, Microwave Devices & Circuits, 3rd edition, PHI India (Unit II,III,IV).

REFERENCE BOOK:

1. R.K.Shevgaonkar Electromagnetic waves by, Tata McGraw Hill.

2. P A Rizzi, Micro Wave Engineering: Passive Circuits, PHI, 2002.

ANALOG COMMUNICATION

II B.Tech – IV Semester (20EC404)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Signals &. Systems

Course Objectives: To learn

CO1: Fundamental concept of the analog communication systems.

CO2: Bandwidth and power requirements for various analog modulation schemes.

CO3: Various analog modulation and demodulation techniques in analog communication systems.

CO4: The importance of noise considerations in communication systems.

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

CLO-1: Explain the basic concepts of the analog communication systems

CLO-2: Compute modulation index, bandwidth and power requirements for various analog modulation schemes

CLO-3: Differentiate various modulation and demodulation techniques in analog communication systems

CLO-4: Determine the influence of noise on the performance of analog communication systems.

SYLLABUS

UNIT – I

AMPLITUDE MODULATION: Time domain description, Frequency domain description, Single tone modulation, Generation of AM wave, Square law modulator, Switching Modulator, Detection of AM waves, Square law detector, Envelope detector, DSB-SC Modulation, Timedomain and frequency domain descriptions of DSB-SC, Generation of DSB-SC: Balanced modulator, Coherent detection of DSBSC modulated waves, Costas loop, Quadrature-Carrier multiplexing.

UNIT – II

SSB AND VSB MODULATIONS: Band-pass transmission, Complex low-pass representation of Narrow-band signals, Concepts of pre-envelope, Complex envelope and Natural envelope, Equivalent low-pass transmission model, Single side band modulation: Frequency domain description, Generation of SSB-SC wave, Frequency-discrimination method, Phase discrimination method, Demodulation of SSB-SC waves, Vestigial side-band modulation, Frequency domain description, Generation of VSB modulated wave, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Frequency Division Multiplexing (FDM).

UNIT – III

ANGLE MODULATION: Introduction to Angle modulation, Relation between frequency Modulation and phase modulation, Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow Band FM and Wide Band FM, Transmission bandwidth of FM waves, Carson's Rule, Generation of FM waves, Indirect FM (Armstrong Method), Direct FM, Demodulation of FM waves, Balanced frequency discriminator – Zero-crossing detector, Linearized model of PLL, FM demodulation employing first order PLL, Practical Considerations, FM limiters, Applications.

UNIT – IV

DISCRETE MODULATION: Generation and Demodulation of PAM, PWM and PPM;TDM, Comparison of Discrete Modulation Techniques. NOISE IN ANALOG MODULATION: AM Receiver model, Signal to noise ratios for coherent reception. DSB-SC receiver, SSC-SC receiver, Noise in AM receivers using envelope detection. AM threshold effect, FM receiver model, Noise in FM reception, Capture effect in FM, Threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

TEXT BOOKS:

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, JohnWiley and Sons, 3rd Edition, 2001
2. LeonW Couch II, Digital and Analog Communication Systems, PearsonEducation, 2004

REFERENCE BOOKS:

1. Taub and Schilling, Principles of Communication Systems, TMH, 2nd Edition, 1986
2. Sam Shanmugam, Analog and Digital Communication Systems, John Wiley,1992

MICRO PROCESSORS AND MICRO CONTROLLERS

Second Year -IV– Semester (Code: 20EC405)

Lectures	2	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

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, 80386, 80486 and introduction to ARM processor.

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 2 nd Edition, TMH, 2006.
2. Mohammed Ari Mazidi and JanciGillispie, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi.

REFERENCE BOOKS:

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

TECHNICAL ENGLISH

II B.Tech – IV Semester (Code: 20EC406)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives:

CO1: At enhancing the vocabulary competency of the students

CO2: To enhance the understanding of the elements of grammar

CO3: To enable the students to use proper spelling, grammar in constructing the sentences

CO4: To enhance the learner‟s ability to communicate accurately

Course Outcomes: Students will be able to:

CLO-1: To comprehend the importance, barriers and strategies of listening skills in English.

CLO-2: To illustrate and impart practice Phonemic symbols, stress and intonation.

CLO-3: To practice oral skills and receive feedback on learners‟ performance.

CLO-4: To practice language in various contexts through pair work, role plays, group work and dialogue conversations

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

TEXT BOOKS:

1. Sanjay Kumar & Pushpa Latha, Communication Skills,. Oxford University Press: 2011.

2. Technical Communication Principles and Practice. Oxford University Press: 2014.

REFERENCE BOOKS

1. Advanced Language Practice, Michael Vince. MacMilan Publishers: 2003.

2. Objective English (Third Edition), Edgar Thorpe & Showick. Pearson Education: 2009.

ELECTRONIC CIRCUITS LAB

II B.Tech – IV Semester (Code: 20ECL41)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Electronic devices and circuits lab

Course Objectives: To learn

CO1: Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators..

CO2: Design and test MOSFET amplifiers.

CO3: Design and test multistage amplifiers using MOSFET.

CO4: Design and test various power amplifiers and know the essence of negative feedback using op-amp.

Course Outcomes: Students will be able to

CLO-1: Acquire a basic knowledge in solid state electronics including diodes, MOSFET and Opamp.

CLO-2: Develop the ability to analyze and design analog electronic circuits using discrete Components.

CLO-3: Observe the amplitude and frequency responses of amplification circuits using MOSFET.

CLO- 4: Know about the multistage amplifier using MOSFET determine frequency response In addition, concept of voltage gain. Design, construct, and take measurement of various analog circuits to compare Experimental results in the laboratory with theoretical analysis.

List of Experiments: (Simulation /Hardware)

1. Rectifiers (**Simulation/Hardware)** and Voltage Regulators. (**Hardware**),
2. Clippers and Clampers (**Simulation**/**Hardware**)
3. Drain and Transfer Characteristics of MOSFET **(Hardware)**
4. NMOS Inverter Circuit and A Two-Input NMOS NOR Logic Gate (**Hardware**)
5. Common-Source Amplifier Using MOSFET (**Simulation**/**Hardware**)
6. The Common-Drain (Source-Follower) Amplifier Using MOSFET (**Simulation**/**Hardware**)
7. Frequency response of CE amplifier (**Simulation/Hardware**)
8. Common-Source Amplifier in Cascade with Source Follower. (**Simulation/Hardware**)
9. Class A Power Amplifier (**Simulation**/**Hardware**)
10. Complementary Symmetry Push pull Power Amplifier **(Hardware)**
11. Op-Amp Series–Shunt Feedback Circuit

TEXT BOOK:

1. Electronic devices and circuit theory", Robert L. Boylestad and Louis Nashelsky.
2. Microelectronics: Circuit Analysis and Desigm, DONALD A. NEAMEN, 4th Edition, McGraw-Hill, 2010.

REFERENCE BOOKS:

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

DIGITAL LOGIC DESIGN LAB
II B. Tech – IV Semester (Sub. Code: 20ECL42)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)			:	70

Prerequisites: None

Course Objectives: The objective of this course is to

CO1: An ability to apply knowledge of Boolean algebra fundamentals to digital systems.

CO2: An ability to design and conduct experiments related to various combinational logic circuits.

CO3: An ability to design and conduct experiments related to various sequential logic circuits.

CO4: An ability to design and conduct experiments related to counters and registers.

Course Learning Outcomes:

Upon the Successful completion of course the student will be able to

CLO1: Realize the basic gates using discrete components and universal gates experimentally

CLO2: Design and test various combinational logic circuits experimentally

CLO3: Study the operation of various Digital ICs experimentally

CLO4: Design and test various sequential logic circuits experimentally

LIST OF LAB EXPERIMENTS

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half – adder, Full – adder, Half– subtractor and Full-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Encoders like 4:2 and 8:3 encoder.
6. Design of Decoders like BCD to Decimal decoder.
7. Design of Code Converters (Binary to Gray).
8. Design of Multiplexers/De Multiplexers.
9. Verification of Truth Table of Flip-Flops using Gates.
10. Design of Shift register (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.
11. Design of Ring & Johnson Counters using Flip-Flops.
12. Conversion of Flip-Flops (JK-T, JK – D).
13. Design of Binary/Decade Counter.
14. Design of Asynchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.
15. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

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

MICRO PROCESSORS AND MICRO CONTROLLERS PROGRAMMING LAB
Second Year IV – Semester (Code: 20ECL43)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives: The course should enable the students to:

CO1: Understand the basic programming of 8086 Microprocessor

CO2: Interface the 8086 microprocessor with various peripherals for various applications

CO3: Understand the basic programming of 8051 microcontroller.

CO4: Interface the 8051 microcontroller with various peripherals for various applications

Course Outcomes: Students will be able to

CLO1: Develop 8086 programming skills in assembly language.

CLO2: Develop and execute ALP for Arithmetic and logical operations using 8086 microprocessor

CLO3: Develop 8051 programming skills in assembly language.

CLO4: Develop and execute ALP for Arithmetic and logical operations using 8051 microcontroller

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.
8. Programs on 80386, 80486
9. ARM processor

Experiments Based on Interfacing & Microcontroller (8051)

10. DAC Interface-Waveform generations.
11. Stepper Motor Control.
12. Keyboard Interface / LCD Interface.
13. Data Transfer between two PCs using RS.232 C Serial Port
14. Programs on Data Transfer Instructions using 8051 Microcontroller.
15. Programs on Arithmetic and Logical Instructions using 8051 Microcontroller.
16. 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

III B.Tech – V Semester (Code: 20EC501)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Digital Electronics & Electronic Circuits.

Course Objectives: To learn

CO1: Understand the basic fundamentals of operational amplifier and its linear and non linear applications.

CO2: Design and working principles of oscillators, waveform generators and comparators.

CO3: Analyze Nonlinear Wave shaping circuits and different data convertors.

CO4: Examine the functioning of 555 timer, IC 723, PLL, VCO and design of active filters

Course Outcomes: Students will be able to

CLO1: Learn the basic concepts and applications of op-amp.

CLO2: Understand the working and design of oscillators, waveform generators and comparators.

CLO3: Know the concepts of nonlinear wave shaping circuits and data converters.

CLO4: Explain the functioning of special IC's and able to design active filters.

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 Astable Multivibrator 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.

ANTENNAS AND WAVE PROPAGATION

III B.Tech – V Semester (Code: 20EC502)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: EMFT and EMTL

Course Objectives: The objective of this course is

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

Course Outcomes: Students will be able to

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 and 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.

DIGITAL COMMUNICATIONS

III B.Tech – V Semester (Code: 20EC503)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course objectives:

CO1: To understand the fundamental concepts of Pulse Modulation.

CO2: To analyze the basics of baseband and passband modulation.

CO3: To evaluate the performance of various pass band techniques with respect to probability of error.

CO4: To describe and analyze the digital communication system with spread spectrum modulation and error control coding techniques.

Course Outcomes:

CLO1: Understand the fundamental concepts of Pulse Modulation.

CLO2: Analyze the basics of baseband modulation and passband modulation.

CLO3: Evaluate the performance of various pass band techniques with respect to probability of error.

CLO4: Describe and analyze digital communication system with spread spectrum modulation and error control coding techniques.

SYLLABUS

UNIT-I

PULSE MODULATION: Introduction,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-II

BASE BAND PULSE TRANSMISSION: Matched filter, Properties, Intersymbol interference, Correlative level coding: Duo binary & Modified Duo binary signalling.

DIGITAL PASS BAND TRANSMISSION: Introduction, Pass band transmission model, Gram Schmidt Orthogonalization procedure.

UNIT-III

PROBABILITY OF ERROR: Coherent 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).

UNIT-IV

SPREAD SPECTRUM TECHNIQUES: PN Sequences, Notion of Spread Spectrum, DSSS: DSSS with CBPSK, Processing gain, Probability of error.

FHSS: Slow frequency hopping, fast frequency hopping.

INFORMATION THEORY: Uncertainty, Information, Entropy, Properties of Entropy, Source Coding Theorem, Huffman Coding, shannon-fano coding.

TEXT BOOKS:

1. Simon Haykin, Communication Systems, 3rd Edition, John Wiley & Sons.
2. Taub and Schilling, Principles of Communication Systems, 2nd Edition, TMH, 1986.

REFERENCE BOOK:

1. Bernard Sklar, Digital Communication, 2nd Edition, Pearson Education, 2001.

SAC 20EC5F04 **MACHINE LEARNING**
III B.Tech – V Semester (Code: 20EC504)

Lectures	1	Tutorial	0	Practical	2	Credits	2
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None
Course Objectives: In this course, students will learn the following topics
CO1 a: Certain fundamental concepts and applications of machine learning.
CO1 b: To understand the basic theory underlying machine learning
CO2 a: Statistical Machine Learning theory concepts
CO2 b: To understand a range of machine learning algorithms along with their strengths and weaknesses
CO3 a: Concepts of Support Vector Machine for regression, binary and multiclass problems.
CO3 b: To be able to apply machine learning algorithms to solve problems of moderate complexity.
CO4 a: Various data transformations and clustering techniques.
CO4 b: To apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Outcomes: Students will be able to
CLO1 a: Understanding the basics of machine learning and applications of machine learning and how they work and the difference between supervised and un supervised learning.
CLO1 b: Understand the mathematical and statistical prospectives of machine learning algorithms through python programming
CLO2 a: Know the role of statistical principles in machine learning theory and the difference between classification and regression.
CLO2 b: Evaluate the machine learning models pre-processed through various feature engineering algorithms by python programming.
CLO3 a: Understanding the importance of Support Vector Machine in classification and regression.
CLO3 b: Design and develop the code for recommender system using Natural Language processing.
CLO4 a: Learn various techniques of data clustering.
CLO4 b: Develop an appreciation for what is involved in learning from data.

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, Machine Learning and Data Mining.

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning. 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

Artificial Neural Networks – Neural network representation, Appropriate problems for neural network learning, Perceptrons- Gradient descent and the Delta rule, Multilayer networks and

the back propagation algorithm.

UNIT IV

Bayesian learning – Bayes theorem, Learning with Support Vector Machines (SVM), Variants of Basic SVM Techniques.

Practical Exercises

Exp1: Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

Exp 2: For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

Exp 3: Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Exp 4: Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

Exp 5: Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Exp 6: Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

Exp 7: Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

Exp 8: Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.

Exp 9: Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

Exp 10: Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

TEXT BOOK:

1. Applied Machine Learning , M.Gopal, McGraw Hill Education, 1 Edition , 2018, ISBN-13:978-93-5316-025-8.
2. Machine Learning by Tom Mitchell, Mc Graw Hill 1997, 1st edition

REFERENCE BOOKS:

1. Pattern Recognition and Machine Learning by Bishop, 2006 1st edition , ISBN: 978-0-387-31073-2

JOE-1 20ECJ11: **EMBEDDED SYSTEM & DESIGN**
III B.Tech – V Semester (Code: 20ECJ511)

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Problem-Solving with Programming, Microprocessors, and Microcontrollers.
Course Objectives (COs):
The main objectives of this course are:
CO1 a: To impart basic design and architectural concepts of embedded systems.
CO1 b: Explain Keil µVision 4 IDE and RTX51concepts.
CO2 a: To impart the concepts of Real-Time Operating Systems and provide the scheduling Algorithms.
CO2 b: Explain RTOS task scheduling, task synchronization, and task communication mechanisms.
CO3 a: To provide fundamentals of prevalent IP-Core: ARM Cortex M3/M4 & Design of an embedded system using ARM Cortex Processor.
CO3 b: Explain the concepts of ARM Cortex M3/M4 Processor.
CO4 a: To explain instruction set of ARM Cortex M3/M4 processor and explain the ALP's using ARM processor.
CO4 b: Explain the basic programming concepts ARM Processor.

Course Outcomes (CLOs): On successful completion of this course students will be able to:
CLO1 a: Have a basic understanding of different methodologies and approaches in the design of embedded systems.
CLO1 b: Basic understanding and exploring the features of Keil and RTX51 OS.
CLO2 a: Understand the requirements, and concepts of Real-Time Operating systems for real-time task processing.
CLO2 b: Understand the concepts of RTOS algorithms for real-time task processing.
CLO3 a: Analyze the basic concepts, architecture, memory management unit, and features of Embedded Processors.
CLO3 b: Basic understanding and exploring the features of ARM Cortex M3/M4 Processor
CLO4 a: Understand the basic concepts of ARM instruction set and design the embedded applications.
CLO4 b: Understand and explore the simple assembly language programs using ARM Cortex M3/M4 processor.

SYLLABUS

UNIT - I

Embedded Systems Design: Introduction to Embedded System, categories of embedded system, specialties, and recent trends in Embedded System.
Architecture of an Embedded System: Hardware Architecture, Software Architecture, application Software, Communication Software, Development/Testing Tools.

UNIT - II

Overview of RTOS: Architecture of the Kernel, Tasks, Task scheduler, real-time tasks, Task scheduling, Interrupt Service Routine, Memory Management, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes.
Classification of scheduling algorithms: Clock driven Scheduling, Event-driven Scheduling, Resource sharing, Priority inversion problem, Deadlock.

UNIT - III

Embedded Processors: Introduction to ARM family, ARM Architecture - Pipeline, Registers, Operation modes, Big Endian and Little Endian. Cache Mechanism, Memory Management Unit.

UNIT – IV

ARM Instructions: ARM and Thumb Instruction Sets, Data Processing Instructions, Data Transfer Instructions, Control Flow Instructions, Basic Assembly Language Programs.
Case Study: Smart Phone, Digital Camera, and Automatic Washing Machine.

Practical Exercises

1. Exploring the features of Keil and RTX51(CO1)
2. Task Creation and Deletion using RTX51 in Keil(CO2)
3. Task scheduling using RTX51 in Keil (CO2)
4. Processing Critical Section using RTX51 in Keil (CO2)
5. Task Synchronization using RTX51 semaphores in Keil (CO2)
6. Task Communication using shared memory in Keil (CO2)
7. Task Communication using RTX51 mailbox in Keil (CO2)
8. Introduction to ARM Cortex M3 Processor (CO3)
9. ALP to multiply two 16-bit binary numbers (CO4)
10. ALP to find the sum of the first 10 integers. (CO4)
11. ALP to find the number of 0's and 1's in 32-bit data. (CO4)
12. ALP to determine whether the given 16-bit number is ODD or EVEN.(CO4)
13. ALP to write data in RAM(CO4)
14. Display Hello World message using Internal UART. (CO4)
15. Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.(CO4)

***Any Ten programs Compulsory.**

TEXT BOOK:

1. KVKK Prasad, "Embedded/Real Time Systems" Dream tech Press, 2005.
2. Andrew N. Sloss/ Dominic Symes/ Chris Wright, "ARM System Developer's Guide Designing and Optimizing" Elsevier, 2004.

REFERENCE BOOKS:

1. Frank Vahid / Tony Givargis, "Embedded System Design A unified Hardware / Software Introduction" John Wiley & Sons, Inc.
2. Jonathan W Valvano, "Embedded Systems: Real-Time Operating Systems for ARM Corte-M Microcontrollers" Create Space, Volume 3, 5th Edition, 2019.

ONLINE SOURCES:

1. http://users.ece.utexas.edu/~valvano/
2. http://www.nptelvideos.in/2012/11/embedded-systems.html
3. https://developer.arm.com/ip-products/processors/cortex-m/cortex-m3

JOE-2 20ECJ12: **DATA COMMUNICATION & COMPUTER NETWORKS**

III B.Tech – V Semester (Code: 20ECJ512)

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Basics of Computer hardware and software

Course Objectives:

CO1 (a): To learn various protocols, Network hardware, and Network software.
CO1 (b): To understand the working principle of various communication protocols.
CO2 (a): To gain knowledge about functionality of each layer in OSI, TCP/IP protocols.
CO2 (b): To understand the working principle of data link layer
CO3 (a): Understand basics and challenges of network communication.
CO3 (b): to learn about the different types of LANS
CO4 (a): Interpret the operation of the protocols that are used inside the Internet.
CO4 (b): to understand the concepts of transport layer protocols

Course Outcomes: Students will be able to

CLO1 (a): Independently understand basic computer network technology.
CLO1 (b): Understand fundamental underlying principles of computer networking
CLO2 (a): Understand and explain Data Communications System and its components.
CLO2 (b): Understand details and functionality of layered network architecture.
CLO3 (a): Identify the different types of network topologies and protocols.
CLO3 (b): Compare routing algorithms
CLO4 (a): Understand and building the skills of sub netting and routing mechanisms.
CLO4 (b): Analyze performance of various communication internet protocols.

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, 4th Edition,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.

LIST OF EXPERIMENTS

S.NO	NAME OF THE EXPERIMENT	
1	Design and Build a Small Network	CO1
2	Test Network Latency with Ping and Traceroute	CO1
3	Secure Network Devices	CO1
4	Configure IPv4 Addresses on Network Devices	CO2
5	Troubleshoot IPv4 Static and Default Routes	CO2
6	Troubleshoot Inter-VLAN Routing	CO3
7	Configure VLANs and Trunking	CO3
8	Basic Switch Configuration	CO3
9	Switch Security Configuration	CO3
10	Implement DHCPv4	CO3
11	Configure Router-on-a-Stick Inter-VLAN Routing	CO3
12	Subnet an IPv4 Network	CO4
13	Implement Port Security	CO4
14	OSPF Multiarea Exploration	CO4
15	Configure and Verify Extended IPv4 ACLs	CO4

Note: Any Ten experiments Compulsory.

JOE-3 20ECJ13 **PROGRAMMING WITH JAVA**
III B.Tech – V Semester (Code: 20ECJ513)

Lectures	2	Tutorial	0		Practical	2	Credits	3	
Continuous Internal Assessment		:	30		Semester End Examination (3 Hours)		:	70	

Prerequisites: Programming with C++

Course Objectives (COs):
The main objectives of this course are:
CO1 a: Understand the different java programming concepts
CO1 b: Understand the basics of java to write simple java programs
CO2 a: impart the concepts of Classes and Objects
CO2 b: illustrate various constructors and keywords in java
CO3 a: Understand the concepts of inheritance, packages and interfaces.
CO3 b: Define the problem solving skills to write a java program using inheritance, interfaces and Packages.
CO4 a: Implement the concept of Exception handling mechanisms and multithreading.
CO4 b: Explain the error handling mechanisms and Multithreading concepts in java.

Course Outcomes (CLOs): On successful completion of this course students will be able to:
CLO1 a: Understand the concepts of object oriented programming to implement java programs
CLO1 b: Apply Object oriented concepts to implement java programs
CLO2 a: Develop the java applications using the concepts of Classes and Objects
CLO2 b: Demonstrate the java programs using Method overloading, various keywords and Constructors.
CLO3 a: Apply the concepts of inheritance, packages and interfaces to implement java programs.
CLO3 b: Develop java programs using reusability, Packages, interfaces and Abstract classes.
CLO4 a: Analyze and Implement the role of exception handling and multithreading in program design using JAVA
CLO4 b: Develop the java programs using the concept of user defined, Built-in exceptions and Multithreading.

SYLLABUS

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.

Practical Exercises

1. Java Basic Programs (CO1)
2. Java Array Programs(CO1)
3. Implement the concept of Scope and lifetime of a variable. (CO1)
4. Implement the concept of polymorphism (CO1)
5. Implement the concept of objects and classes (CO2)
6. Illustrate the different types of Constructors. (CO2)
7. Write a Java program using static, this and final keyword (CO2)
8. Implement the concept of Method overloading (CO2)
9. Implement reusability concept using inheritance (CO3)
10. Develop Java programs using Abstract Class(CO3)
11. Demonstrate multiple inheritance-using interface (CO3)
12. Write a Java program to demonstrate packages (CO3)
13. Implement User defined Exceptions in java (CO4)
14. Implement Built-in Exceptions in java (CO4)
15. Develop Java programs using Multithreading (CO4)

Note: *Any Ten programs Compulsory.

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.

ONLINE SOURCES:

1. https://www.javatpoint.com/java-programs.
2. https://www.geeksforgeeks.org/java-programming-examples.

JOE-4 20ECJ14 **COMPUTER ORGANIZATION AND ARCHITECTURE**
III B.Tech – V Semester (Code: 20ECJ514)

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Digital Logic Design

Course Objectives (COs):

The main objectives of this course are:

CO1a: Basic structure and instructions of a computers & MIPS, VHDL, LabVIEW.

CO1b: Apply the basic structure and instructions of a computers & MIPS using simulators – VHDL or LabVIEW/MIPS

CO2a: Understand & design different subsystems of computer.

CO2b: Design and apply different subsystems of computer.

CO3a: To know the concept of arithmetic units, pipelining system of a digital computer.

CO3b: Apply the concept of arithmetic units, pipelining system of a digital computer.

CO4a: To study the memory systems & different ways of communicating with I/O devices.

CO4b: Apply the memory systems & different ways of communicating with I/O devices.

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

CLO1a: Understand basic units and operations of digital computer.

CLO1b: Implement basic units and operations of digital computer.

CLO2a: Understand the implementation of processing unit and sub systems.

CLO2b: Implement the processing unit and sub systems.

CLO3a: Understand the concept of and fast execution using pipelining & different arithmetic units.

CLO3b: Implement the concepts of and fast execution using pipelining & different arithmetic units.

CLO4a: Understand various memory system and paths of communicating with I/O devices through different standard interfaces.

CLO4b: Implement various memory system and paths of communicating with I/O devices through different standard interfaces.

SYLLABUS

UNIT –1

Basic Structure of Computer: Computer types, Functional Unit, Basic operational concepts, Bus structures, Performance, multiprocessors and multicomputers.

Instructions: Language of the Computer – Introduction, Operations of Computer Hardware, Operands of Computer Hardware, MIPS Instructions – Arithmetic, Logical, Stored program concept, Branch, JAL, RA, Stack/frame pointers. Introduction to LabVIEW & VHDL.

UNIT - II

Design of computers: Register Transfer & Micro operations – Register Transfer, Bus &

Memory Transfers, Arithmetic Logic Shift Unit.
Basic Computer Organization & Design – Computer Registers, Timing and Control (Hard wired control), Instruction Cycle, Design of basic computer (flow chart for computer operation),
Micro programmed Control – control memory, address sequencing, micro program example (computer hardware configuration)
Central Processing Unit – General Register Organization, Reduced Instruction Set

UNIT - III

Arithmetic and Pipelining:
Arithmetic: Addition and subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication, Integer division.
PIPELINING: Basic concepts, Data hazards, Instruction hazards, Influence of instruction sets, Data path and control considerations, Superscalar operation, speculative execution, Parallel Processing

UNIT – IV

Memory System & I/O Interfaces:
THE MEMORY SYSTEM: Some basic concepts, Semiconductor RAM memories-Internal Organization of memory chips, Read only memories, Speed, size and cost, Cache memories - mapping techniques & replacement algorithms, Performance considerations, Virtual memories, address translations.
Standard I/O interfaces: PCI, SCSI, and USB; SMT – Hyper threading, Trends in Computer Architecture

Practical Exercises

1. Introduction to MIPS Simulator (CO1)
2. Introduction to VHDL & Simulator (CO1)
3. Introduction to LabVIEW (CO1)
4. Arithmetic/Numerical Operations (CO1)
5. Logical/Boolean Operations (CO1)
6. Branch – Conditional statements, Stack/frame pointers (CO1)
7. Register Transfer /Sub VI or Modular Design (CO2)
8. Bus or Memory transfer (CO2)
9. Arithmetic Unit Implementation (CO2)
10. Logical/Shift Unit Implementation (CO2)
11. Microprogrammed control (CO2)
12. Implementation of Adders/Fast Adders (CO3)
13. Implementation of Subtractor (CO3)
14. Implementation of Multiplicators (CO3)
15. Implementation of Data Path & Control (CO3)
16. Pipeline Implementation (CO3)
17. Demonstration of Parallel processing(CO3)
18. ROM/RAM Memory Implementation (CO4)

19. Mapping algorithms Implementation(CO4)
20. I/O Interfaces (CO4)

Note: *Any Ten programs Compulsory.

TEXT BOOK:

1. Computer Organization Carl Hamacher, ZvonkoVranesic, 6th Edition, MGH, 2012.
2. Computer Systems Architecture M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization and Design, The Hardware/Software Interface, 5th Edition, D.A. Patterson and J.L. Hennessy (P and H), Morgan Kaufmann Publishing Co., 2013.
2. Computer Architecture, A Quantitative Approach, Sixth Ed, J.L Hennessy and D.A. Patterson (H and P), Morgan Kaufmann Publishing Co., 2019.

PEC-1 20ECD11: **INFORMATION THEORY & CODING**
III B.Tech – V Semester (Code: 20ECD11)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Digital Communication

Course Objectives (COs): The main objectives of this course are:
CO1: To define and apply the basic concepts of Source coding techniques.
CO2: To analyze and apply the basic concepts of Channel coding techniques.
CO3: To define and apply the basic concepts of Cyclic coding techniques.
CO4: To define and apply the basic concepts of Convolution coding techniques.

Course Outcomes: Students will be able to
CLO1: calculate entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system.
CLO2: Differentiate between lossy and lossless compression techniques.
CLO3: Decide an efficient data compression scheme for a given information source.
CLO4: Explain the impact of feedback and/or many senders or receivers on the communication systems.

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 BCH Codes: Description of the Codes, Minimum Distance and BCH Bounds, Decoding Procedure for BCH 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. Simon Haykin – Communication Systems, 4th edition.

REFERENCE BOOKS:

1. Digital Communications – Fundamentals and Applications by Bernard Sklar, Pearson Education Asis, 2003.
2. Digital Communications – John G. Proakis, Mc. Graw Hill Publications.

PEC-2 20ECD12: **TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS**

III B.Tech – V Semester (Code: 20ECD12)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Analog and Digital Communication

Course Objectives: To learn

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

CLO-1: Describe the fundamentals of telecommunication systems.

CLO-2: Explain the working principle of various switching systems in Telecommunication.

CLO-3: Discuss data networks.

CLO-4: 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.

Telephone Networks: 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.
2. Roger L. Freeman , "Telecommunication System Engineering"–, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 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.

PEC-3 20ECD13: **PULSE AND SWITCHING CIRCUITS**

III B.Tech – V Semester (Code: 20ECD13)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

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 Bi-stable, Mono-stable and Astable Multi vibrators 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 Multi-vibrator for various applications.

CLO4: Understand 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.
2. J Millman and H Taub, Mothiki S. Prakash Rao, Pulse Digital & Switching Waveforms, 2nd Edition, TMH.

REFERENCE BOOKS:

1. David A Bell, Solid State Pulse Circuits, 4th Edition, PHI 2003.

PEC-4 20ECD14: **OPTICAL COMMUNICATIONS**

III B.Tech – V Semester (Code: 20ECD14)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

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 of 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.
2. Henry Zanger and Cynthia Zanger, Fiber Optics: Communication and other Applications, Maxwell Macmillan Edition.

REFERENCE BOOKS:

1. JC Palais, Fiber Optic Communications, 2nd Edition, PHI, 2001.
2. W.Tomasi, Advanced Electronic Communication Systems, Pearson Education, 2002.

MC 20ECM51 **ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**

III B.Tech – V Semester (Code: 20ECM51)

Lectures	3	Tutorial	0	Practical	0	Credits	0
Continuous Internal Assessment	:	30	No SEE				

Prerequisites: None

Course Objective:

The prime objective of this course is to facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of roots of knowledge system and apply it to their day-to-day life.

CO1: Know the concept of Indian Traditional Knowledge in Medicine.

CO2: Know the concept of Indian Traditional Knowledge in Engineering.

CO3: Know the contribution of India in Mathematics, Astronomy.

CO4: Know the importance of Yoga in holistic living.

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

CLO1: Generalize the effect of pre-colonial and colonial period on Indian Traditional Knowledge System, traditional Medicine.

CLO2: Discover the knowledge of ITK in Production, Construction, Physics, Chemistry, Architecture and Vastu.

CLO3: Discriminate the contribution of India in Mathematics, Astronomy.

CLO4: Propose the importance of Yoga in holistic living.

SYLLABUS

UNIT - I

Traditional Knowledge: Introduction, Indian Traditional Knowledge System; **Traditional Medicine:** Ayurveda, Simple Definition, Origin, Texts, The Great Three Classics of Ayurveda, The Lesser Three Classics of Ayurveda, The Branches of Ayurveda, Basic Concepts of Ayurveda, Purusha/Prakruti, Manifestation of Creation, Space, Air, Fire, Water, Earth, Mental Constitution, Satvic Mental Constitutions, Rajasic Mental Constitutions, Tamasic Mental Constitutions, Vata, Pitta and Kapha: The Three Doshas; Qualities of Vata, Pitta and Kapha.

UNIT - II

Traditional Production and Construction Technology: Social Conditions and Technological Progress, the Impetus for Metallurgy, Social Needs and Technological Applications, Scientific Rationalism and Technological Efficacy, Limitations of Pre-Industrial Manufacturing, India and the Industrial Revolution. **History of Physics and Chemistry:** Particle Physics, Experimentation versus Intuition, the Five Basic Physical Elements, Indian Ideas about Atomic Physics. **Traditional Art and Architecture and Vastu Shashtra:** Vastu, the Principles of Vastu are Simple.

UNIT - III

Origin of Mathematics; Astronomy and Astrology; TKS and the Indian Union: Protection and the Legislative Frameworks in India, Trade Secrets and Know-how, Geographical Indications Bill, Protection of Plan varieties and Farmers Rights Bill, Rights of Communities, Monitoring Information on Patent Applications World-wide, Frameworks for Supporting R&D Activities in the Area of TKS.

UNIT – IV

Common Yoga Protocol: Introduction, What is Yoga? Brief History and Development of Yoga, The fundamentals of Yoga, Traditional Schools of Yoga, Yogic practices for health and wellness

General Guidelines for Yoga Practice: Before the practice, During the Practice, After the Practice, Food for Thought, How Yoga can help. Invocation; Sadilaja/CalanaKriyas /Loosening Practices; **Yogasanas**: *Standing Postures: Tadasana* (Palm Tree Posture), *Vrksasana* (The Tree Posture), *Pada-Hastasana* (The Hands to Feet Posture), *ArdhaCakrasana* (The Half Wheel Posture) and *Trikonasana* (The Triangle Posture)**;** *Sitting Postures: Bhadrasana* (The Firm/Auspicious Posture), *Vajrasana* (Thunderbolt Posture), *Uṣṭrasana* (Camel Posture), *Śasakasana (*The Hare Posture), *Vakrasana* (The Spinal Twist Posture); *Prone Postures: Makarasana* (The Crocodile Posture), *Bhujangasana* (The Cobra Posture), *Salabhasana* (The Locust Posture); *Supine Postures: Setubandhasana* (The Bridge Posture), *UttanaPadasana* (Raised feet posture), P*avanaMuktasana* (The Wind Releasing Posture), *Savasana* (The Corpse/ Dead Body Posture); Kapalabhati; *Pranayama:* nadisodhana or anulomaviloma pranayama (Alternate Nostril Breathing), SitaliPraṇayama, BhramariPraṇayama (BhrāmarīRecaka); . Dhyana; Sankalpa; Santihpatha.

TEXT BOOKS:

1. Traditional Knowledge System in India, Amit Jha, 2009.
2. Common YOGA Protocol, Ministry of Ayush.

REFERENCE BOOKS:

1. Traditional Knowledge System & Technology in India, Basanta Kumar Mohanta, Vipin Kumar Singh, 2012.

20ECL51 **ANALOG & DIGITAL COMMUNICATIONS LAB**

III B.Tech – V Semester

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Signals & Systems

Course Objectives: The objective of this course is to:
CO1: Test amplitude modulation and demodulation techniques.
CO2: Test the basic principles of angle modulation and demodulation techniques.
CO3: Explore the various pulse 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 the candidate to attain eligibility for Semester End Examination.

TEXT BOOK:

1. Simon Haykin and Michael Moher, "An Introduction to Analog & Digital Communications",2nd Ed., Wiley, (2007).
2. H Taub& D. Schilling, GautamSahe, "Principles of Communication Systems", TMH, 3rd Edition, (2007).

REFERENCE BOOKS:

1. Sam Shanmugam, "Analog and Digital Communication Systems", John Wiley and Sons, 1992.

PC 20ECM52 **LINEAR INTEGRATED CIRCUITS LAB**

III B.Tech – V Semester (Code: 20ECM52)

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Digital Electronics and Electronic Circuits

Course Objectives: To learn

CO1: Understand the basic op-amp circuits adder, subtractor, integrator, differentiator and able to measure its parameters.
CO2: Design of various Oscillators and Active Filters.
CO3: Examine the functioning of different ICs like Timer (555) , Voltage regulators (723) , PLL(556) and their applications
CO4: Design R-2R digital to analog convertor circuit

Course Outcomes: Students will be able to

CLO1: Understand the parameters and various applications of op-amp µA 741
CLO2: Design Oscillators & Active filters for various frequencies
CLO3: Know the operation and applications of 555 Timers, Voltage Regulators and PLL
CLO4: Know the principle and operation of DAC using R-2R Ladder Network.

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.

PC-1 20EC601: **VLSI DESIGN**
III B.Tech – VI Semester (Code: 20ECD14)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Electronic Devices and Circuits, Digital Logic Design, Linear IC Applications.

Course Objectives:

CO1: To understand various techniques of MOS fabrication process and basic electrical properties of MOS and BiCMOS circuits.
CO2: To design and analyse basic MOS circuits by using stick diagram and MOS layout 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 ofMOS 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.

REFERENCE BOOK:

1. Mead, C.A and Conway, L.A., Introduction to VLSI Systems, Wesley – Wesley.

PC-2 20EC602: **LINEAR CONTROL SYSTEMS**

III B.Tech – VI Semester (Code: 20EC602)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

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 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 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 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 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, bandwidth – 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.

PC-3 20EC603: **DIGITAL SIGNAL PROCESSING**

III B.Tech – VI Semester (Code: 20EC603)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives: To learn

CO1: Various types of Digital signals and systems and their frequency domain representation

CO2: The concept of DFT and FFT and their importance in signal processing applications.

CO3: The design of IIR Digital Filters through Approximation Procedures and their realization

CO4: The design of FIR Digital Filters through Different Techniques and their realizations; and Decimation & Interpolation operations.

Course Outcomes: Students will be able to

CLO-1: Analyze various types of Digital signals and systems.

CLO-2: Understand and determine the DFT of a given signal.

CLO-3: Construct an IIR Digital Filter for given specifications.

CLO-4: Construct a FIR Digital Filter for given specifications and Realization of digital filters

SYLLABUS

UNIT – I

DISCRETE-TIME SIGNALS AND SYSTEMS: Introduction to Digital Signal Processing, Advantages and Applications, Discrete time signals, LTI system: Stability and Causality. Frequency domain representation of discrete time signals and systems.

Z-TRANSFORMS: The Z Transform, Region of Convergence, Z-Transform theorems and Properties, Persaval's relation, Relation between Z-Transform and Fourier Transform, Inverse Z-transform using: (i) Cauchy's Integration theorem (ii) Partial fraction method (iii) Long division method. One sided Z-Transform, Solution of Difference equations using one sided Z-Transform.

UNIT – II

THE DFT AND FFT: Discrete Fourier Series (DFS), Properties of DFS, Discrete Fourier Transform (DFT), Properties of DFT, Computations for evaluating DFT, Decimation in time FFT algorithms (DITFFT), Decimation in Frequency FFT algorithms (DIFFFT), Computation of Inverse DFT.

UNIT-III

DESIGN OF IIR FILTERS: Introduction, Properties of IIR filter, Design of Digital Butterworth and Chebyshev filters using: (i) Bilinear transformation method (ii) Impulse invariance method. Design of Digital filters using frequency transform method.

UNIT – IV

DESIGN OF FIR FILTERS: Introduction, Characteristics of Linear Phase FIR filters, Frequency response of FIR linear phase filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method.

REALIZATION OF DIGITAL FILTERS: Direct, Canonical, Cascade and Parallel realizations of Digital filters, Realization of Linear phase FIR filters

FUNDAMENTALS OF MULTIRATE SYSTEMS: Introduction, Decimation, Interpolation.

TEXT BOOKS:

1. Lonnie C Ludeman, "Fundamentals of Digital Signal Processing," John Wiley & Sons, 2009.
2. Sanjit K Mitra, "Digital Signal Processing: A Computer Based Approach," 3rdEdition, TMH, SIE, 2008.

REFERENCE BOOKS:

1. John G. Proakis, Dimitris G Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications," 4th Edition, Pearson Education, 2007.
2. 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.
4. Johnny R.Johnson-Introduction to Digital Signal Processing, Prentice Hall, 1989

INTERNET OF THINGS (IoT)

III B.Tech – VI Semester (Code: 20EC604)

Lectures	2	Tutorial	0	Practical	2	Credits	2
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

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 and different cloud servers.

CO3: Summarize distinct IoT communication protocols.

CO4: Recognize several real-time applications 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.
6. N. Mathivanan, PC-Based Instrumentation – Concepts & Practice, PHI, 2007.

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/

JOE-31 20ECJ21: **DIGITAL DESIGN USING VERILOG HDL**

III B.Tech – VI Semester (Code: 20ECJ21)

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: A course on Digital Logic Design.

Course Objectives:

CO1: Understand the basics of Hardware Description Languages, Program structure and basic language elements of Verilog.
CO2: To enable the student to gain experience by designing, modeling, implementing, and verifying several digital circuits using Verilog HDL.
CO3: To know the gate-level modeling and dataflow modeling of combinational and simple sequential circuits.
CO4: To know the behavioral modeling of combinational and sequential circuits , tasks and functions.

Course Outcomes: Students will be able to

CLO-1: Understand the language constructs and programming fundamentals of Verilog HDL
CLO-2: Design and verify the functionality of digital circuit/system using test benches.
CLO-3: Write gate-level and data flow models of digital circuits.
CLO-4: Write behavioral models of digital circuits.

UNIT – I

Overview of Digital Design with Verilog HDL: Evolution of CAD, emergence of HDLs, typical HDL-based design flow, importance of HDL.
Hierarchical Modeling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, components of a simulation, design block, stimulus block.

UNIT – II

Basic Concepts: Lexical conventions, data types, system tasks, compiler directives
Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing.

UNIT III

Gate-Level Modeling: Modeling 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 Modeling: Continuous assignments, delay specification, expressions, operators, operands, operator types, Examples.

UNIT IV

Behavioral 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

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

Practical Exercises

1. Introduction to Verilog Simulator, Adders – Structural CO1
2. Adders - Data Flow & Subtractors – Behavioral CO1
3. Full adder using Half Adder various types CO1
4. Full adder testing using Test Bench CO1
5. Priority Encoder 74x148 or 8x3 encoder using 4x2 encoder CO2
6. Decoder 74x138 or 3x8 decoder using 2x4 decoder CO2
7. Multiplexer 74x151, 8:1 mux using 4:1 using 2:1 mux CO2
8. Multiplier CO2
9. Arithmetic Unit Implementation 74x181 CO2
10. Logical Unit Implementation CO2
11. Fast Adders, 74x283 CO2
12. 4-Bit Parity Generator, Comparator 74x85 CO2
13. Flip flops, Level, Edge triggered CO3
14. 4-Bit Universal shift register 74x194 CO3
15. 3-bit Linear Feedback Shift Register CO3
16. Counters 74x163, 74x169 CO3
17. 74x194, Mod-8 Counter, Ring counter CO3
18. Bus Transceiver, 74x245, Bus/Register Transfer CO3
19. Simulation/Study of Static/Dynamic electrical behavior CO4
20. Simulation/Study of CMOS logic families, Low voltage CMOS interfacing. CO4

Minimum of 10 experiments to be completed.

JOE-2 20ECJ22: **ARTIFICIAL INTELLIGENCE**

III B.Tech – VI Semester (Code: 20ECJ22)

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives: To learn

CO1 a: To Gain a historical perspective of AI and its foundations.

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

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

CO2 b: To understand basic principles of AI toward problem solving, inference, perception, knowledge and learning.

CO3 a: To learn different knowledge representation techniques

CO3 b: To explore the current scope, potential, limitations, and implications of intelligent systems.

CO4 a: To Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

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

Course Outcomes: Students will be able to

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

CLO1 b: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

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

CLO2 b: Use of python to understand the concept of AI.

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

CLO3 b: Understanding of Natural Language Tool Kit and implement Application of Natural Language Tool Kit

CLO4 a: Gain awareness of several advanced AI applications and topics such as intelligent agents, planning and scheduling, machine learning, etc.

CLO4 b: 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-World Problems. 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.

Practical Exercises

Exp 1: Write a python program to implement Breadth First Search Traversal?
Exp 2: Write a python program to implement Water Jug Problem?
Exp 3: Write a python program to remove punctuations from the given string?
Exp 4: Write a python program to sort the sentence in alphabetical order?
Exp 5: Write a program to implement Hangman game using python.
Exp 6: Write a program to implement Tic-Tac-Toe game using python.
Exp 7: Write a python program to remove stop words for a given passage from a text file using NLTK?
Exp 8: Write a python program to implement stemming for a given sentence using NLTK?
Exp 9: Write a python program to POS (Parts of Speech) tagging for the give sentence using NLTK?
Exp 10: Write a python program to implement Lemmatization using NLTK?
Exp 11: Write a python program to for Text Classification for the give sentence using NLTK?

TEXT BOOKS:

1. Artificial Intelligence: Building Intelligent Systems By Parag Kulkarni and Prachi Joshi, PHI Publications.
2. 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.
5. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011

JOE-3 20ECJ23 **BIOMEDICAL INSTRUMENTATION**

III B.Tech – VI Semester (Code: 20ECJ23)

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives (COs):

The main objectives of this course are:

CO1: To deal with various types of physiological systems of the human body, and Bio-potentials related to the human body.

CO2: To deal with devices used to pick up the bio-signals of the body such as ECG, EEG, and EMG.

CO3: To deal with the measurement techniques of cardiovascular parameters such as blood pressure, blood flow, cardiac output and heart sounds.

CO4: To deal with the types of medical instruments and modern technologies in medical field.

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

CLO1: Understand the physiological nature of biological systems and bio-electric potentials in medical field.

CLO2: Have a detailed understanding about the various bio-electric signals of the body.

CLO3: Gain the knowledge on the measurement of non-electrical parameters in the human body.

CLO4: 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. Phonocardiography: 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, hem dialysis. 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 P^H, $P^{O2}P^{CO2}$ 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.

Practical Exercises

1. ECG Recording (CO1,CO2)
2. EEG Recording (CO1,CO2)
3. EEG Recording (CO1,CO2)
4. Measurement of various blood pressure parameters(CO3)
5. Measurement of Blood flow monitoring (CO3)
6. Measurement of Blood P^H value (C03)
7. Measurement of Blood O2 (P^0_2)(CO3)
8. Measurement of Blood C02 (PC^o_2) (CO3)
9. Measurement of Respiration Parameters (CO3)
10. Study of operation of Defibrillator (CO4)

TEXT BOOKS:

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

JOE-4 20ECJ24 **ADVANCED MICROCONTROLLERS**
III B.Tech – VI Semester (Code: 20ECJ2)4

Lectures	2	Tutorial	0	Practical	2	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: A course on Microprocessors& Microcontrollers.

Course Objectives (COs):

The main objectives of this course are:

CO1a: Illustrate the architecture and programming of PIC18 Microcontrollers.

CO1b: Apply the architecture features and programming concepts of PIC18 Microcontrollers using MPLAB IDE.

CO2a: Understand different peripheral & interfacing of PIC18 Microcontroller.

CO2b: Apply the knowledge of different peripheral & interfacing of PIC18 Microcontroller.

CO3a: Illustrate the architecture and programming of MSP430 Microcontrollers.

CO3b: Apply the architecture features and programming of MSP430 Microcontrollers using CCS.

CO4a: Understand different peripheral & interfacing of MSP430 microcontroller.

CO4b: Apply the knowledge of different peripheral & interfacing of MSP430 microcontroller.

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

CLO1a: Describe the architecture and programming techniques of PIC18 & MSP430.

CLO1b: Implement the architecture and programming techniques of PIC18 & MSP430.

CLO2a: Develop PIC18 & MSP430 programming skills in C & Assembly language.

CLO2b: Implement PIC18 & MSP430 programming skills in C & Assembly language.

CLO3a: Explain the need for different peripherals devices & interfacing of PIC18 & MSP430.

CLO3b: Implement the need for different peripherals devices & interfacing of PIC18 & MSP430

CLO4a: Understand the latest microcontroller systems and interface, and have the ability to program PIC18 & MSP430 using appropriate simulation tools.

CLO4b: Implement the latest microcontroller systems and interface, and have the ability to program PIC18 & MSP430 using appropriate simulation tools.

SYLLABUS

UNIT - I

PIC18 Microcontroller: Overview of PIC18 family, Features of PIC18F458, PIC18C801, PIC18F8720 & PIC18LF57K42. Typical architecture of PIC18, Register & Memory Organization: ROM & RAM Space. Instruction set of PIC18, Assembler Directives, I/O Port structure of Port B, basic assembly programs.

UNIT - II

PIC18 Peripherals: Overview of Timers, structure of Timer0, Timer1 & Timer2 & Serial port, PIC18 interrupt structure, Capture, Compare and PWM using CCP module, parallel communication using PSP module, accessing flash and EEPROM and Interfacing external memory, basic interfacing programming using Assembly/C.

UNIT - III

MSP430 Microcontroller: Overview of MSP430 series, Features of MSP430G2553, MSP430F5529 & launch pad, Functional Block diagram, addressing modes, constant generator & emulated instructions, instruction set, typical port structure, basic programs, Clock system & generator, Low power modes, Exceptions – Interrupts & resets.

UNIT – IV

MSP430 Peripherals: Structure of internal Timers, Watchdog Timer, ADC, DAC, CCP & PWM, Comparator, USI & USCI (I2C or SPI) and basic interfacing programming using Assembly/C.

Practical Exercises

1. Arithmetic/Logical operations (CO1)
2. Program control, bit wise operations (CO1)
3. I/O Programming (CO1)
4. EEPROM or Flash programming (CO2)
5. Timers & Clock configurations (CO2)
6. Capture/Compare using CCP(CO2)
7. PWM – CCP or ECCP (CO2)
8. Interrupt programming (CO2)
9. Program control, bit wise operations (CO3)
10. I/O Programming (CO3)
11. Arithmetic/Logical operations (CO3)
12. ADC or DAC (CO3)
13. Low Power Modes (CO3)
14. Interrupt programming (CO3)
15. Timers & Clock configurations (CO4)
16. Watchdog Timer (CO4)
17. Capture/Compare using CCP (CO4
18. PWM (CO4)
19. Comparator (CO4)
20. USI/USCI – (I2C or SPI) (CO4)

Note: *Any Ten programs Compulsory

TEXT BOOK:

1. Muhammad Ali Mazidi, Danny causey, Rolin D. McKinlay, PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18, Pearson Education, 2021.
2. John H. Davies, MSP430 Microcontroller Basics, Newnes, Publications, 2008

REFERENCE BOOKS:

1. Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems (with the PIC18 Microcontroller Family), Penram International, First edition,2010.
2. Chris Nagy, Embedded Systems Design using the TI MSP30 Series, Newnes Publications, 2003.
3. Myke Predko, Programming and Customizing the PIC Microcontroller, 3rd Ed, McGraw Hill TAB, 2017.

PEC-1 20ECDC21 **MICROWAVE ENGINEERING**

III B.Tech – VI Semester (Code: 20ECD21)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: EM Waves and Transmission Lines

Course Objectives: In this course, students will

CO-1: Learn about microwave frequency band designations and analyse microwave passive devices using S-parameters**.**

CO-2: Understand the functioning, usage and applications of different microwave solid-state devices.

CO-3: Evaluate the parameters of microwave tubes**.**

CO-4: Discuss the measurement of parameters using microwave bench set up.

Course Outcomes: Students will be able to

CLO-1: To use S-parameter terminology to describe various microwave circuits**.**

CLO-2: Know the construction and operation of microwave solid-state devices.

CLO-3: Comprehend the design aspects of O type tubes and M-type tubes and their characteristics**.**

CLO-4: Understand the description of microwave bench set up and measures different microwave parameters using microwave bench setup.

UNIT I

Introduction: Microwave Frequencies, Advantages and Applications of Microwaves.

Microwave components: Microwave Cavities - Rectangular and Circular cavity Resonators, Microwave Hybrid Circuits - Waveguide Tees E-plane, H-plane, Magic Tees(Hybrid Tees), , Applications of magic Tee, Hybrid Rings, Significance of Scattering(S) parameters, Properties of a Scattering matrix, Scattering matrix calculations for E-plane Tee, H-plane Tee, Magic Tee Waveguide Corners, Bends and Twists, Directional couplers, Coupler parameters, S-matrix calculation for directional coupler, Applications of directional couplers, Circulators and Isolators.

UNIT – II

Microwave solid-state devices: Microwave Tunnel diode,

Transferred Electron Devices: GUNN-EFFECT Diodes, RWH Theory, Modes of operations,

Avalanche Transit Time Devices: IMPATT diode, TRAPATT diode, Pin diodes, Varactor diodes.

UNIT-III

Microwave linear beam tubes (o type): Limitations of Conventional tubes at Microwave frequencies, Klystrons: Velocity modulation process, bunching process, output power and beam loading, Reflex Klystron: Velocity modulation, Power output and efficiency. Helix Traveling Wave tube: Slow Wave structures, Amplification process **Microwave cross field tubes (m type):**Magnetron Oscillators: M-Type Tubes- Eight cavity Cylindrical Magnetron, Modes of Resonance and π Mode operation, Hull Cut-off Voltage Equation, Separation of π mode, Sustained Oscillations in Magnetrons.

UNIT-IV

Microwave measurements: Components of Microwave Bench, Detection of Microwaves, Microwave power measurement, Impedance measurements, VSWR measurement, Frequency measurement, scattering coefficient measurements.

TEXT BOOK:

1. Microwave and Radar Engineering by M. Kulkarni, Umesh Publications, New Delhi, 2009.
2. Microwave and Radar Engineering by Gottapu Sasi Bhushana Rao, Pearson Publications, 2014.

REFERENCE BOOKS:

1. Samuel Y Liao, Microwave Devices and Circuits, 3rd Edition, Pearson Education, 2003.

PEC-2 20ECDC22 **MOBILE & CELLULAR COMMUNICATIONS**

III B.Tech – VI Semester (Code: 20ECD22)

Lectures	3	Tutorial	0	Practical	0	Credits	3		
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70				

Prerequisites: Digital communications

Course objectives:

CO1: To understand the examples and fundamental concepts of wireless cellular communication systems.

CO2: To learn the basic signal propagation mechanisms and practical link budget design using path loss models.

CO3: To know the role of equalization in mobile communication and to study different types of equalizers and diversity techniques.

CO4: To study the different wireless communication systems and their standards (1G to 4G).

Course Outcomes:

CLO1: Understand the fundamental concepts of wireless cellular communication systems.

CLO2: Illustrate the basic signal propagation mechanisms and practical link budget design using path loss models.

CLO3: Understand the need of equalization and analyze the different diversity techniques.

CLO4: 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.
4. Wireless Communications" 1st Edition, Kindle Edition, Goldsmith.

PEC-3 20ECDC23 **GLOBAL POSITIONING SYSTEMS**

III B.Tech – VI Semester (Code: 20ECD23)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Signals and systems, satellite communication.

Course objectives:

CO1: To understand the basic concepts of GPS systems

CO2: to know the signals structure of GPS systems

CO3: To know the coordinate frames and time references used in various GPS systems

CO4: To understand GPS satellites working in free space.

Course Outcomes:

CLO-1: Student will be able to understand the basic concepts of GPS systems worldwide and their applications

CLO-2: student will know the signals structure of GPS systems, which will be essential for proper working

CLO-3: student will know the coordinate frames and time references of GPS satellites

CLO-4: student will understand how GPS satellites works in free space and the types of errors which are encountered

SYLLABUS

UNIT – I

Overview of GPS: Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture.

UNIT – II

GPS Signals, Signal structure, anti-spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

UNIT – III

GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

UNIT – IV

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination. GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

TEXTBOOKS:

1. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, ‘GPS – Theory and Practice’, Springer – Wien, New York (2001).

2. Bradford W. Parkinson, James J. Spilker, “The Global Positioning System Theory and Applications” American Institute of Aeronautics and Astronautics, Volume 1, 1996.

REFERENCE BOOKS:

1. James Ba – Yen Tsui, ‘Fundamentals of GPS receivers – A software approach’, John Wiley & Sons (2001).

PEC-4 20ECDC24 **PATTERN RECOGNITION AND APPLICATION**

III B.Tech – VI Semester (Code: 20ECD24)

Lectures	3	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives: The objective of this course is to

CO 1: Learn about importance pattern recognition and its broad applications.

CO 2: Study of various linear classification algorithms and Support vector machines.

CO 3: Understanding of different nonlinear classification algorithms and networks.

CO 4: Study of various feature selection and feature generation methods.

Course Learning Outcomes: Students will be able to

CLO1: Analyze probability density function between the patterns using bayes classifier for supervised learning.

CLO2: Estimate cost function and minimum mean square error between the pattern classes using linear classifier algorithms such as LMS, Support Vector Machines.

CLO3: Estimate cost choice function and minimum mean square error between the pattern classes using Non-Linear classifier algorithms such as back propagation algorithms, Multi-Layer perceptron Algorithms.

CLO4: Apply feature selection and generation techniques to identify features and separate objects in an image.

SYLLABUS

UNIT – I

Introduction to Pattern Recognition: Importance of pattern recognition, Features, Feature Vectors and Classifiers, Supervised, Unsupervised and Semi Supervised Learning.

Classifiers based on Baye's Decision Theory: Baye's decision theory, Discriminant Functions and decision surfaces, Bayesian classification for Normal Distributions, Estimation of Unknown probability density functions, The Nearest Neighbor Rule.

UNIT-II

Linear Classifiers: Linear Discriminant functions and Decision Hyperplanes, The perceptron Algorithm, Least Squares Method, Mean Square Error Estimation, LMS Algorithm.

Support Vector Machine: Separable classes, Nonseparable classes, Support Vector Machines-A geometric Viewpoint.

UNIT – III

Non Linear Classifiers: The XOR problem, The two layer perceptron, Three layer perceptrons, The Backpropagation Algorithm, The cost function choice, choice of the network size, A simulation example, Networks with weight sharing, generalized linear classifiers, polynomial classifiers, Radial basis Function Networks.

UNIT – IV

Feature Selection: Preprocessing, The peaking phenomenon, Feature selection based on statistical hypothesis testing, ROC curve, class separability measures, feature subset selection.
Feature Generation: Basis Vectors and Images, The KL Transform, The Singular Value Decomposition, Independent Component Analysis, Non-negative Matrix Factorization, Regional features, Features for shape and size characterization.

TEXT BOOKS:

1. Sergios Theodoridis, Konstantinos Koutroumbas, Pattern Recognition, Academic Press, Fourth Edition, 2009.
2. Pattern Classification (2 edition) – Richard Duda, Peter E Hart, David G Stork, John Wiley & Sons, 2001.

REFERENCE BOOKS:

1. Pattern Recognition and Machine Learning, Christopher M.Bishop, Springer Publications 2006.

MC 20ECMC61 **PROFESSIONAL ETHICS AND HUMAN VALUES**

III B.Tech – VI Semester (Code: 20EMC61)

Lectures	2	Tutorial	0	Practical	0	Credits	0
Continuous Internal Assessment	:	30	NO SEE				

Prerequisites: None

Course objectives:

CO1: Understand the importance of Values and Ethics in Personal lives and professional careers.

CO2: Learn about various social issues, code of ethics and uses of ethical theories.

CO3: Learn the concept of safety & risk assessment, responsibilities and engineering rights.

CO4: Understand different global issues and ethical principles of professional societies.

Course Outcomes:

CLO1: Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values. Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories.

CLO2: Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.

CLO3: Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.

CLO4: 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. MikeMartinandRolandSchinzinger,EthicsinEngineering,McGrawHill,NewYork1996.

REFERENCE BOOK:

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

20ECL61 **DIGITAL SIGNAL PROCESSING LAB**

III B.Tech – V Semester

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: None

Course Objectives: To learn

CO1: The Implementation of various modulation operations on signals.

CO2: The implementation of FFT algorithms

CO3: The implementation of Filters.

CO4: The development of algorithms using MATLAB / SCI-Lab.

Course Outcomes: Students will be able to:

CLO-1: Implement various modulation schemes on signals.

CLO-2: Implement FFT algorithms.

CLO-3: Implement different filters.

CLO-4: Write a program for an algorithm using MATLAB / SCI - Lab.

LIST OF EXPERIMENTS

1. Simulation of AM.
2. Simulation of FM.
3. Simulation of DFT and IDFT.
4. Simulation of LPF & HPF.
5. Generate the basic pulse shapes, NRZ, RZ.
6. Simulation of Digital Modulation and Demodulation Schemes (ASK, PSK, FSK).
7. Simulation of DPCM.
8. Evaluation of DFT and IDFT of 16 sample sequence using DIT Algorithm.
9. Evaluation of DFT and IDFT of 16 sample sequence using DIF Algorithm.
10. Design of IIR Butterworth Filter using Impulse Invariant Method.
11. Design of FIR Filter using Windowing Technique.
12. Convolution of Two signals.
13. Correlation of Two signals.
14. Direct form II realization of Given Second ordered Digital Filter using Simulink.
15. Serial / Parallel form realization of Given Second ordered Digital Filter using Simulink.

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

TEXT BOOK:

1. John G. Proakis, Dimitris G Manolakis, “Digital Signal Processing: Principles, Algorithms and Applications,” 4 th Edition, Pearson Education, 2007.
2. Simon Haykin and Michael Moher, “An Introduction to Analog & Digital Communications”, 2nd Ed., Wiley, 2007.

REFERENCE BOOKS:

1. Sanjit K Mitra, “Digital Signal Processing: A Computer Based Approach,” 3 rd Edition, TMH, SIE, 2008.
2. H Taub & D. Schilling, GautamSahe, “Principles of Communication Systems”, TMH, 3rd Edition, 2007.

20ECL62 **IOT Lab**
III B.Tech – VI Semester

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

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 using Arduino board and Node MCU
CO2: To implement skills in programming edge devices using Raspberry Pi
CO3: To Know Design and interface different sensors with Arduino, Raspberry Pi and Node MCU
CO4: To impart Design & Interfacing skills using Edge Devices, communication protocols, 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; Tinker CAD; 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 & UI 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 using Matlab

20ECL63 **VLSI DESIGN LAB**

III B.Tech – VI Semester

Lectures	0	Tutorial	0	Practical	3	Credits	1.5
Continuous Internal Assessment	:	30	Semester End Examination (3 Hours)	:	70		

Prerequisites: Digital Logic Design

Course Objectives (COs): The main objectives of this course are:

CO1: Knowledge on various I.C fabrication technologies like NMOS, PMOS, CMOS and Bi-CMOS and their Electrical properties.

CO2: Understand the physical design process of Digital Integrated Circuits.

CO3: Design various combinational gate level logics.

CO4: Draw the stick diagrams and layout diagrams of various logic circuits and analyze various design rules.

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

CLO1: To achieve the understanding of parallel, shared architectures and important organizational details of superscalar architecture.

CLO2: To understand the Designing of stick diagrams and layouts for MOS transistors

CLO3: Study and analyze the performance of CMOS Inverter circuits on the basis of their operation and working.

CLO4: Implement and design of building blocks of data path and array sub systems with suitable testing design approach.

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.