SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

Bachelor of Technology

Department of Electronics and Communication Engineering

INDUCTION PROGRAM (MANDATORY)	3 WEEKS DURATION
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./ Branch& Innovations

I B. Tech. – I Semester (ECE)

S.No.	Course Code	Subject	L	T	P/Drg	C
1.	20HS0830	Algebra and Calculus	3	-	-	3
2.	20HS0802	Applied Chemistry	3	-	-	3
3.	20HS0810	Communicative English	3	-	-	3
4.	20EE0253	Principles of Electrical Circuits	3	-	-	3
5.	20ME0301	Engineering Graphics	1	-	4	3
6.	20HS0803	Applied Chemistry Lab	-	-	3	1.5
7.	20HS0811	Communicative English Lab	-	-	3	1.5
8.	20ME0302	Workshop Practice Lab	-	-	3	1.5
Contact Periods / Week			13	-	13	19.5
			Total/Week 26			

I B. Tech. – II Semester (ECE)

S.No.	Course Code	Subject	L	T	P	C
1.	20HS0831	Differential Equations and Complex Analysis	3	-	-	3
2.	20HS0849	Applied Physics	3	-	-	3
3.	20CS0501	C Programming and Data Structures	3	-	-	3
4.	20EC0401	Fundamentals of Digital Computing Systems	3	-	-	3
5.	20EE0254	Electrical Technology	3	-	-	3
6.	20HS0851	Applied Physics Lab	-	-	3	1.5
7.	20CS0502	C Programming and Data Structures Lab	-	-	3	1.5
8.	20EE0255	Electrical Technology Lab	-	-	3	1.5
Mandatory Course						
9.	20HS0816	Indian Constitution	2	-	-	-
Contact Periods / Week			17	-	9	19.5
			Total/Week 26			

II B. Tech. – I Semester (ECE)

S.No.	Course Code	Subject	L	T	P	C
1.	20HS0834	Numerical Methods and Transforms	3	-	-	3
2.	20EC0402	Electronic Devices and Circuits	3	-	-	3
3.	20EC0403	Switching Theory and Logic Design	3	-	-	3
4.	20EC0404	Signals, Systems and Random Processes	3	-	-	3
5.	20EC0405	Analog Communications	3	-	-	3
6.	20EC0406	Electronic Devices & Logic Design Lab	-	-	3	1.5
7.	20EC0407	Signals and Systems Simulation Lab	-	-	3	1.5
8.	20EC0408	Analog Communications Lab	-	-	3	1.5
Skill oriented course						
9.	20EC0455	PCB Designing	1	-	2	2
Mandatory Course						
10.	20HS0801	Environmental Science	2	-	-	-
Contact Periods / Week			18	-	11	21.5
			Total/Week 29			

II B. Tech. – II Semester (ECE)

S.No.	Course Code	Subject	L	T	P	C
1.	20EE0214	Control Systems	3	-	-	3
2.	20EC0409	Electronic Circuit Analysis	3	-	-	3
3.	20EC0410	Digital Communications	3	-	-	3
4.	20EC0411	Linear & Digital IC Applications	3	-	-	3
5.	20HS0815	Entrepreneurship Development	3	-	-	3
6.	20EC0412	Electronic Circuit Analysis Lab	-	-	3	1.5
7.	20EC0413	Digital Communications Lab	-	-	3	1.5
8.	20EC0414	Linear & Digital IC Applications Lab	-	-	3	1.5
Skill Oriented course						
9.	20EC0456	CCNA	1	-	2	2
Contact Periods / Week			16	-	11	21.5
			Total/Week 27			
Internship 2 Months (Mandatory) during summer vacation						

III B. Tech. – I Semester (ECE)

S.No.	Course Code	Subject	L	T	P	C
1.	20EC0415	Electromagnetic Theory and Transmission Lines	3	-	-	3
2.	20EC0416	Microprocessors and Microcontrollers	3	-	-	3
3.	20EC0417	Digital Signal Processing	3	-	-	3
Open Elective-I						
4.	20CE0170	Fundamentals of Civil Engineering	3	-	-	3
	20EE0227	Generation of Energy from Waste				
	20ME0322	Non-Conventional Energy Resources				
	20CS0550	Relational Database Management systems				
	20HS0813	Management Science				
Professional Elective Course (PEC) –I						
5.	20EC0430	Electronic Measurements and Instrumentation	3	-	-	3
	20EC0431	Information Theory and Coding				
	20EC0432	Bio-Medical Electronics				
6.	20EC0418	Microprocessors and Microcontrollers Lab	-	-	3	1.5
7.	20EC0419	Digital Signal Processing Lab	-	-	3	1.5
Skill advanced course/ soft skill course						
8.	20HS0859	English for Corporate Communication Skills	1	-	2	2
Mandatory Course						
9.	20HS0817	Essence of Indian Traditional Knowledge	2	-	-	-
10.	20EC0420	**Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)**	-	-	-	1.5
Contact Periods / Week			18	-	8	21.5
			Total/Week 26			

III B. Tech. – II Semester (ECE)

S.No.	Course Code	Subject	L	T	P	C
1.	20EC0421	Antennas and Wave Propagation	3	-	-	3
2.	20EC0422	Embedded systems and IoT	3	-	-	3
3.	20EC0423	Microwave Theory & Techniques	3	-	-	3
Professional Elective Course (PEC) – II						
4.	20EC0433	Fiber Optic Communications	3	-	-	3
	20EC0434	Wireless Sensor Networks				
	20EC0435	Mixed Signal Design				
Open Elective - II						
5.	20CE0147	Fundamentals of Urban Planning	3	-	-	3
	20EE0235	Industrial Instrumentation				
	20ME0354	General Mechanical Engineering				
	20CS0551	JAVA Programming				
	20HS0814	Intellectual Property Rights				
6.	20EC0424	Antennas and Wave Propagation Lab(Virtual Lab)	-	-	3	1.5
7.	20EC0425	Embedded systems and IoT Lab	-	-	3	1.5
8.	20EC0426	Microwave Measurements Lab	-	-	3	1.5
Skill advanced course/ soft skill course						
9.	20EC0457	Robotics	1	-	2	2
		Mandatory Course				
10.	20HS0864	Human Values & Professional Ethics	3	-	-	- / 3*
Internship 2 Months (Mandatory) during summer vacation						
Contact Periods / Week			19	-	11	21.5 / 24.5*
			Total/Week 30			

* Applicable from 2021-22 batches onwards.

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I B. Tech. – I Sem.

L	T	P	C
3	-	-	3

(20HS0830) ALGEBRA AND CALCULUS
(Common to All branches)

COURSE OBJECTIVES

The objectives of this course:

1. *To illuminate the students in the concepts of calculus and linear algebra.*
2. *To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.*
3. *To estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives and select optimal results.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Develop the use of matrix algebra techniques that is needed by engineers for practical applications.*
2. *Utilize mean value theorems to real life problems.*
3. *Familiarize with functions of several variables which is useful in optimization.*
4. *Learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.*

UNIT – I

Matrices: Rank of a matrix by echelon form, solutions of system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

UNIT – II

Mean value theorems: Rolle's theorem-Lagrange's Mean value theorem-Taylor's and Maclaurin's theorems (without proof);

Partial Differentiation: Chain rule, Total derivatives, Jacobians, functional dependence, Maxima and Minima of functions of two variables, method of Lagrange multipliers with three variables only.

UNIT – III

Integral Calculus: Evaluation of definite and improper integrals (single variable), Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Evaluation of Triple integrals (Cartesian).

UNIT – IV

Vector differentiation: Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT – V

Vector integration: Line integral-circulation-work done, surface and volume integrals.

Integral theorems: Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof) and applications of these theorems.

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, 44th Edition, Khanna Publishers,2017.
2. Ramana B V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.

REFERENCES

1. Rukmangad achari.E & Keshava Reddy E, *Engineering Mathematics,* Volume-I,II&III, PearsonPublishers, 2010.
2. Satyanarayana Bh, Pradeep Kumar T.V & Srinivasulu D, *Linear Algebra and Vector Calculus*,Studera Press, New Delhi, 2017, ISBN: 978-81-930333-8-8.
3. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics,* Volume-I,II&III, 12th Edition, S.Chand publication, 2014.

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20HS0802) APPLIED CHEMISTRY

COURSE OBJECTIVES
The objectives of this course:

1. *To familiarize engineering chemistry and its applications.*
2. *To train the concepts of molecular structures and bonding.*
3. *To understand the physical and mechanical properties of polymers helps in selecting suitable materials for different purpose.*
4. *Learn the principles of spectroscopies to analyse them.*
5. *Be exposed to the importance of nano and engineering materials used in their daily life and Industry.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Apply Nernst equation for calculating electrode and cell potentials*
2. *Illustrate the molecular orbital energy level diagram of different molecular species*
3. *Explain the different types of polymers and their synthesis.*
4. *Synthesis of plastics, elastomers, conducting polymers and their applications in our daily life*
5. *Comprehend the principles and applications of spectroscopies.*
6. *Acquire spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.*

UNIT-I
Electrochemistry and Applications: Introduction to electrochemistry, Electrochemical cell - Nernst equation, Cell potential calculations and Numerical problems - Potentiometric - Potentiometric Titrations (Redox Titrations), Conductometric Titrations (Acid-Base titrations), Photovoltaic cell working and its applications, Photo galvanic cells electrochemical sensors.
Primary cells - Zinc-air battery, Secondary cells - Lead acid, NICAD batteries, and Lithium ion cells (Rechargeable) - working of the batteries including cell reactions Fuel cells - Hydrogen - Oxygen, Methanol - Oxygen fuel cell - working of the cells and application.

UNIT - II
Structure and Bonding Models: Planck's Quantum Theory, Dual Nature of matter - Schrodinger Equation, Significance of Ψ and Ψ^2, Molecular Orbital Theory - Bonding in Homo and Hetero nuclear Diatomic molecules - Calculation of Bond Order. Energy level diagrams of O_2, F_2, N_2 and CO, etc. π - Molecular orbital's Energy Level Diagram of Butadiene and Benzene. Crystal Field Theory - Salient features - Splitting in Octahedral and Tetrahedral geometry, Magnetic properties and Color.

UNIT - III
Polymer Chemistry: Introduction to Polymers, Functionality of Monomers, Nomenclature of Polymers. Chain growth and Step growth Polymerization, Co-ordination Polymerization, Co - Polymerization with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosetting, Preparation, Properties and Applications of – Bakelite, Nylon-6, 6, Carbon fibers.

Elastomers: Preparation, Properties and applications of Buna-S, Buna-N. Preparation, Properties and applications of Conducting Polymers – Classification, Synthesis and applications of polyacetylene, polyaniline.

UNIT - IV

Instrumental Methods and Applications: Regions of Electromagnetic Spectrum, Absorption of radiation: Beer-Lambert's Law, UV-spectroscopy, Infra red Spectroscopy (IR) and Atomic absorption Spectroscopy (AAS).

Chromatography Techniques: Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC), thin layer chromatography (TLC), Separation of Gaseous mixtures and Liquid mixtures.

UNIT- V

Modern Engineering Materials:

Semiconducting and Super Conducting materials: basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators and applications of electrical Insulating materials.

Concepts and terms of Supra molecular chemistry, Complementarity, Basic Lock and Key principle, examples of Supramolecules, Applications of Supra molecules (Sensors, Catalysts, Gas storage, Medical and Molecular switches).

Nano Chemistry: Introduction, Classification, Properties of Nanomaterials. Fullerenes, Carbon Nanotubes.

TEXT BOOKS

1. Jain and Jain, *Engineering Chemistry*, 16 Ed., Dhanpat Rai Publishers, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry*, 10 Ed.,Oxford University Press, 2010

REFERENCES

1. Engineering Chemistry by G V Subba Reddy, K N Jayaveera and C.Ramachandraiah, McGraw Hill Higher Education,, New Delhi 2019.
2. K Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, 1 Ed., PearsonIndia Education Services Pvt. Ltd, 2016.
3. Dr. S.S. Dara and Dr S.S Umare, A Text book of Engineering Chemistry, 1 Ed., Chand &Company Ltd., 2000
4. D. J. Shaw, Introduction to Colloids and Surface Chemistry, 4 Ed, Butterworth-Heineman, 2013.

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20HS0810) COMMUNICATIVE ENGLISH
(Common to EEE, MECH & ECE)

COURSE OBJECTIVES

The objectives of this course:

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

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand social or transactional dialogues spoken by native speakers of English andidentify the context, topic and pieces of specific information.*
2. *Ask and answer general questions on familiar topics and introduce oneself/others.*
3. *Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.*
4. *Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.*
5. *Form sentences using proper grammatical structures and correct word forms.*
6. *Use effective sentence structure for their professional activities.*

UNIT – I

Part 1

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing:** Beginnings and endings of paragraphs - introducing the topic; Letter writing. **Grammar and Vocabulary:** Parts of speech, Function words, Content words; Tenses**. Soft Skills:** Attitude is Everything; Positive attitude Positive thinking- thought provoking ideas – creative thinking.

Part 2

Half a Rupee Worth by R K Narayan from Engage with English.

UNIT – II

Part 1

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Mechanics of writing –punctuations. **Grammar and Vocabulary:** Voice; Cohesive devices; Articles. Types of sentences – Simple, Complex, and Compound.

Soft skills: The factors of human mindset; self-confidence- self-belief, self-learning – self motivation.

Part 2

The Thakur's Well by Prem Chand from Paths to Skills in English

UNIT – III

Part 1

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing Report Writing.

Grammar and Vocabulary: Subject-verb agreement; If- clauses; Direct and Indirect speech. wh-questions.

Soft skills: Emotional intelligence; Work efficiency- peace of mind- Broad nature in ideas- having patience in multiple ways.

Part 2

I am not that Woman by Kishwar Naheed.

UNIT – IV

Part 1

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** conversational English in academic contexts (formal and informal).**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of synonyms and antonyms.

Soft skills: Time management; the priority of the task – the task you take- Urgent and importance- not urgent, important- not important, urgent- Not important, not urgent.

Part 2

What is my name? By Sathyavathi from Paths to Skills in English.

UNIT – V

Part 1

Listening: Identifying key terms. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).

Soft skills: Goal setting; Immediate goal – Short goal- midterm goal – Life goal.

Part 2

The Power of Prayer by A P J Abdul Kalam from Paths to Skills in English.

TEXT BOOKS

1. Pushpa Relia .P & Sanjay Mihhra .K *English All Round: Communication Skills for Undergraduation Learners* Vol. I, Orient Black Swan Publishers, First Edition, 2019.
2. Prof. Sundaravalli. G et al. *Paths to Skills in English,* Orient Blackswan, Publishers, FirstEdition2015

REFERENCES

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* HeinleyELT;2nd Edition, 2018.
3. Hewings, Martin. *Cambridge Academic English (B2).*CUP, 2012.
4. Eric H. Glendinning et al *Study Reading: A Course in Reading Skills for Academic* Purposes, Cambridge University Press; 2 edition, 14 October 2004.
5. Pattabiram, B.V, *Soft Skills,* Sonmez Publication, 2011(2nd Edition).
6. Virendranath Yandamuri, *Soft Skills for Engineer*, Yaswin Publication, 2nd Edition, 2009.

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I B.Tech. – I Sem.

L	T	P	C
3	-	-	3

(20EE0253) PRINCIPLES OF ELCTRICAL CIRCUITS

COURSE OBJECTIVES
The objectives of this course:

1. *Formulate the mathematical model of the electric circuits using basic laws*
2. *Apply various network theorems to solve the electric circuits*
3. *Compute and analyse the steady state and transient responses of DC and AC circuits*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Formulate the equations of the electric circuits using basic laws*
2. *Determine the response of DC circuits using basic analysis methods*
3. *Compute the response of DC circuits using network theorems*
4. *Analyze the transient behavior of electric circuits with different types of source*
5. *Describe the elements of AC circuits and the phasor concept*
6. *Solve simple two port networks*

UNIT- I
Fundamentals of Electric Circuits: Introduction to Circuit Elements, Ohms Law and Kirchhoff's Laws. Voltage and Current Division, Star-Delta Transformation and Source Transformation. Nodal and Mesh Analysis of Linear Network.

UNIT- II
Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer theorem, Reciprocity theorem, Millman's theorem, Telligen's theorem and Compensation Theorem for DC excitation.

UNIT- III
DC Transient Analysis: Transient response of R-L, R-C, and R-L-C Series circuits for DC excitation, initial conditions, solution method using differential equations and Laplace transforms

UNIT- IV
Single phase AC circuits: R.M.S, Average values and form factor for different periodic waveforms, phase and phase difference of sinusoidal alternating quantities, study of A.C circuits of pure resistance, inductance, capacitance and series RL, RC and RLC corresponding voltage- current phasor diagrams, voltage – current waveforms.

UNIT- V
Two Port Networks: Introduction to Two port network, Impedance parameters, Admittance parameters, ABCD parameters and hybrid parameters.
Filters: Introduction to filters, Types of Filters, K-type low pass, high pass, band pass, band reject filters.

TEXT BOOKS

1. V. N. Mittal and Arvind Mittal, " *Basic Electrical Engineering*" McGraw Hill
2. Vincent DelToro, "*Electrical engineering Fundamentals*", PHI second edition 2011
3. Edward Hughes, "*Electrical Technology*", Pearson Education

REFERENCES

1. Bolestaad, :"*Electronics Devices and Circuits Theory*", Pearson Education India
2. D.P. Kothari and Nagrath " *Theory and Problems in electrical Engineering*", PHI

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I B.Tech - I Sem

L	T	P	C
1	-	4	3

(20ME0301) ENGINEERING GRAPHICS

(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. *Draw simple curves like ellipse, cycloid and Involutes.*
2. *Describe the Orthographic projections of points, lines and planes.*
3. *Construct the projection of solids like cylinders, cones, prisms and pyramids.*
4. *Sketch the development of the surfaces for practical cut sections of cylinders, cones, prisms and pyramids.*
5. *Depict the isometric and Orthographic Projections of simple objects.*

COURSE OUTCOMES(COs)

On successful completion of this course, the student will be able to

1. *Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.*
2. *Know the projection of points and implement the same in the construction of projection of lines and planes.*
3. *Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.*
4. *Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.*
5. *Understand the basic principles of isometric and Orthographic Projections.*
6. *Construct the isometric and orthographic projections of simple objects.*

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections – Eccentricity method, Rectangle Method, Parallelogram Method, Cycloids- Epi& Hypo-Cycloids and Involutes.

UNIT – II

Projections of Points: Principles of Orthographic Projections-Conventions - Projections of Points.
Projections of straight lines: Inclined to both the planes (Trapezoidal Method & Rotating line method) - simple problems only, Traces.

UNIT – III

Introduction to plane surfaces: Surface Inclined to one plane- Surface inclined to both reference planes
Projections of Solids: Introduction– Projections of right regular solids-Prisms, Pyramids in different positions (Inclined to one plane only).

UNIT – IV

Section of solids - Sectional Views of Right regular Solids - Prisms, Pyramids

Development of surfaces - Development of surfaces of Right Regular Solids - Prisms, Pyramids.

UNIT – V

Orthographic Projections - Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections - Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

TEXT BOOKS

1. K. L. Narayana, P. Kannaiah, *A text Book of Engineering Drawing*, Scitech Publishers, 23rd Reprint Edition, 2010.
2. N. D. Bhatt, *Engineering Drawing*, Charotar Publishers, 49th Edition, 2008.

REFERENCES

1. K. Venugopal, *A text Book of Engineering Drawing and Graphic*, New Age Publishing, 5th Edition, 2008.
2. Warren J. Luzadder& Jon M, *Fundamentals of Engineering Drawing*, Peach Pit Press, 11th Edition, 1992.
3. Dhananjay A Jolhe, *Engineering Drawing with An introduction to AutoCAD*, McGraw Hill Education; 1st Edition, 2017.

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I B.Tech – I Sem.

L	T	P	C
-	-	3	1.5

(20HS0803) APPLIED CHEMISTRY LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Learn to estimate the chemical impurities present in water such as hardness, alkalinity, chlorine,* etc.
2. *Understand and experience the formation of inorganic complex and analytical technique for trace metal determination*
3. *Be trained to use the instruments to practically understand the concepts of electrochemistry*
4. *Bridge theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in engineering*
5. *Learn and understand the practical implementation of fundamental concepts*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically*
2. *Prepare advanced polymer materials*
3. *Estimate the Iron in cement*
4. *Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively*
5. *Think innovatively and improve the creative skills that are essential for solving engineering problems*
6. *Learn the alkalinity, acidity and viscosity of the any solutions*

List of Experiments

1. Conductometric Titration of Strong acid vs Strong base
2. Conductometric Titration of Weak acid vs. Strong base
3. Determination of Hardness of a Groundwater sample
4. pH metric titration of Strong acid vs. Strong base
5. Potentiometry - Determination of Redox potentials and emfs
6. Determination of Strength of an Acid in Pb-Acid battery
7. Preparation of a Polymer-Bakelite
8. Determination of viscosity of an oil by Redwood viscometer-1
9. Determination of percentage of Iron in Cement sample by Colorimetry
10. Determination of acidity of water sample
11. Determination of Alkalinity of water sample
12. Determination of Percentage Moisture content in a Coal sample

TEXT BOOKS

1. J. Mendham et al, *Vogel's Text book of Quantitative Chemical Analysis,* Pearson Education, Sixth Edition, 2002.
2. G.V. Subba Reddy, Chandra Sekhar and Jayaveera, *Chemistry Practical – Lab Manual*, McGrawHill Higher Education, 2015.

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I B.Tech. – I Sem.

L	T	P	C
-	-	3	1.5

(20HS0811) COMMUNICATIVE ENGLISH LAB
(Common to EEE, MECH & ECE)

COURSE OBJECTIVES
The objectives of this course:

1. *Students will be exposed to a variety of self-instructional, learner friendly modes of language learning*
2. *Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.,*
3. *Students will learn better pronunciation through stress, intonation and rhythm*
4. *Students will be trained to use language effectively to face interviews, group discussions, and public speaking*
5. *Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills*
2. *Apply communication skills through various language learning activities*
3. *Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension*
4. *Evaluate and exhibit acceptable etiquette essential in social and professional Settings*
5. *Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English*
6. *Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences*

LIST OF EXPERIMENTS

1.1 PHONETICS
Definition - Articulation - Phonetic Chart - Pure Vowels and Diphthongs.

1.2 MINIMAL PAIRS
Definition - Minimal Pairs 1 -Minimal Pairs 2

2.1 CLUSTERS AND MARKERS
Consonant Clusters - Initial Consonant Cluster -Final Consonant Clusters -
Past Tense Markers - Plural Markers.

2.2 ICE BREAKING ACTIVITY
Ice Breakers Overview - Ice Breakers Activity - Why Ice Breaker.

3.1 SYLLABLE
Syllable Overview -Syllable Types.

3.2. **STRESS**
Syllable Stress - Stress Pattern -Stress and Rhythm - Word Stress - Sentence Stress.

4. Accent & Intonation
Intonation overview- Intonation making lists – Intonation questions – Intonation – yes or no questions – notes.

5. JAM
Jam tips - Sample topics.

6. Listening skills
Listening skills - Effective listening - Listening importance - Barriers to listening.

7.1. ROLE PLAY 1
Greetings - Giving compliments - Making requests – Hobbies - Asking permission – Thanking.

7.2. ROLE PLAY 2
Comparing and contrasting - Agreeing and dis agreeing - Expressing opinions - Likes and dis likes - Formal and informal – Suggestions - Polite requests - Meeting people.

7.3. ROLE PLAY 3
Phone calls – Directions.

8. Description
Describing a person- Adjectives to describe – Giving direction – Asking giving direction – describing a product – Describing products – Personal narrative – narrative writing Notes.

9. Book review
Introduction – Book review over view- Book review tips – Book review notes.

10. Information Transfer
Information writings –Text to Diagram- Diagram to Text.

Minimum requirements for Communicative English Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. Communicative English Lab with movable chairs and audio visual aids with a P. A. system,Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component)

Computer network, LAN with minimum 60 multimedia systems with the following:

Specifications

i) a) Intel(R) core (TM) i3
   b) Speed 3.10 GHZ
   c) RAM – 4 GB
   d) Hard Disk – 320 GB

ii) Headphones with High quality

Software

Walden Info Tech Software

REFERENCES

1. *A Textbook of English Phonetics for Indian Students,* second edition T. Balasubramanian. (Mcmillian) 2012.
2. *A Course in Phonetics and spoken English*, Dhamija Sethi, Prentice-hall of India Pvt. Ltd, 2000.
3. *Speaking English Effectively,* second Edition Krishna Mohan & NP Singh 2011 (Mcmillian).
4. *A Hand Book of English Laboratories,* E. Sureshkumar ,P. Sreehari, Foundation books, 2011.
5. *Effective Technical Communication*, M Ashraf Rizvi, Director, Jaipuria Institute of Management, Lucknow. McGraw Hill Education; Second edition (27 July 2017).

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(20ME0302) WORKSHOP PRACTICE LAB

(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on Fitting and Electrical Wiring.*
4. *Learn about various peripherals of a computer.*
5. *Know about installation of MS Windows & Linux.*
6. *Gain knowledge on Productivity tools& Networking.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understand about Fitting and Electrical Wiring.*
4. *Identify various peripherals of a computer.*
5. *Explain the procedure to install MS Windows & Linux.*
6. *Understand about Productivity tools & Networking.*

PART A

LIST OF EXPERIMENTS

CARPENTRY: Familiarity with different types of woods and tools used in wood working and make following joints

1. T-Bridle joint
2. Corner Dovetail joint

SHEET METAL WORKING: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal jobs using GI sheets.

1. Tapered tray
2. Conical funnel

FITTING: Familiarity with different types of tools used in fitting and do the following fitting exercises

1. Step Fitting
2. V-Fit

ELECTRICAL WIRING: Familiarity with different types of basic electrical circuits and makes the following connections

1. Parallel and series
2. Two way switch
3. Go down lighting
4. Tube light
5. Three phase motor
6. Soldering of wires

PART B

Task 1:
Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:
A practice on disassembling the components of a PC and assembling them.

Task 3:
1. Basic DOS commands, Installation of MS windows.
2. Basic Linux Commands, Installation of Linux.

Task 4:
Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Productivity tools
Task 5:
1. **MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving
2. **Presentations:** Creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.
3. **Spread sheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6:
Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

TEXT BOOKS
1. V Ramesh Babu, *Engineering Workshop practice for JNTU*, VRB Publishers Pvt. Ltd.,2009.
2. Peter Norton, *"Introduction to Computers*", McGraw Hill, 7th Edition, 2017.
3. Joan Lambert, Joyce Cox, *MOS study guide for word, Excel, Power point & amp; Outlook Exams*, PHI. 1st Edition, 2011.

REFERENCES
1. P. Kannaiah & K.L. Narayana, *Workshop Manual*, SciTechPublishers,2010.
2. *Introduction to Information Technology,* ITL Education Solutions limited, Pearson Education. 2009.
3. Rusen, *Networking your computers and devices*, PHI, 2009.
4. Bigelows, *Trouble shooting, Maintaining & amp; Repairing PCs*, TMH, 2010.

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(20HS0831) DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS
(Common to: CIVIL, EEE, ME & ECE)

COURSE OBJECTIVES
The objectives of this course:

1. *To enlighten the learners in the concept of differential equations and multivariable calculus*
2. *To furnish the learners with basic concepts and techniques at plus two level to lead them intoadvanced level by handling various real world applications*
3. *Provide a setting that prepares students to read and learn mathematics on their own*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Classify the differential equations with respect to their order and linearity*
2. *Solve the differential equations related to various engineering fields*
3. *Identify solution methods for partial differential equations that model physical processes*
4. *Students will become familiar with 3- dimensional coordinate systems and also learn theutilization of special functions*
5. *Understand the significance of differentiability for complex functions and be familiar with theCauchy-Riemann equations*
6. *Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integralformula (relationship between the derivative and the contour integral of a function)*

UNIT-I
First and Higher Order Ordinary Differential Equations: Exact, linear and Bernoulli's equations - Second and higher order linear differential equations with constant coefficients with R.H.S term of the types e^{ax}, *sinax, cosax,* polynomials in*x*, e^{ax} *V(x).*

UNIT-II
Equations Reducible to Linear Differential Equations: Method of variation of parameters - Cauchy's and Legendre's linear equations- simultaneous linear equations with constant coefficients - Applicationsto L-C-R Circuit problems.

UNIT-III
Partial Differential Equations: Formation of P.D.E by elimination of arbitrary constants and arbitrary functions-Method of Separation of variables-Solutions of one dimensional Wave equation, Heat equation and two dimensional Laplace's equation under initial and boundary conditions.

UNIT-IV
Complex Variable – Differentiation: Differentiation, analytic functions, Cauchy-Riemann equations in Cartesian and polar co-ordinates (without proof), harmonic functions, conjugate harmonic functions,
Milne Thompson's method-Conformal mappings, Transformation by e^z, ln z, z^2, sin z and cos z-Mobius transformations and their properties.

UNIT-V

Complex Variable – Integration : Line integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof)- Taylor's series, zeros of analytic functions, singularities, Laurent's series- Residues, Cauchy Residue theorem (without proofs), Evaluation of definite integral involving sine and cosine.

TEXT BOOKS

1. Grewal B. S, *Higher Engineering Mathematics*, 44th edition, Khanna Publishers,2017.
2. Ramana B. V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.

REFERENCES

1. Rukmangadachari. E & Keshava Reddy E, *Engineering Mathematics*, Volume-I,II&III, PearsonPublishers, 2010.
2. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *EngineeringMathematics*,Volume-I, II & III, 12th Edition, S. Chand publication, 2014.
3. Garg Nishu Gupta R.L, *Engineering Mathematics*, Volumes-I &II, Pearson Education, 2014.

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(20HS0849) APPLIED PHYSICS

COURSE OBJECTIVES
The objectives of this course:

1. *To identify the importance of optical phenomenon i.e. interference and diffraction related to its engineering applications.*
2. *To impart knowledge in basic concepts of free electron theory, energy bands in solids and propagation of Electromagnetic waves.*
3. *To recognize the basic concepts related to the properties of Lasers and Optical Fibers.*
4. *To understand key points, formation and importance of semiconductors in the functioning of electronic devices.*
5. *To understand the fundamental concepts of Superconductivity and Nano Science & Technology.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Analyze the differences between interference and diffraction with applications.*
2. *Explain concepts of free electron theory and energy bands in solids and asses the EM wave propagation in non-conducting medium by using Maxwell Equations.*
3. *Explain the basic principles and properties of Lasers and Optical Fibers.*
4. *Identify the applications of semiconductors in electronic devices.*
5. *Explain the basic properties and applications of superconductors in various fields.*
6. *Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications.*

UNIT – I
WAVE OPTICS
Interference - Principle of Superposition-Interference of light-Conditions for sustained Interference - Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength of light-Engineering Applications of interference.
Diffraction -Introduction -Fraunhofer Diffraction-Single Slit-Double Slit-Diffraction Grating-Grating Spectrum-Determination of Wavelength of Light-Engineering Applications of diffraction.

UNIT – II
ELECTRON THEORY OF METALS & ELECTROMAGNETIC THEORY
Electron Theory of Metals: Classical free electron theory: postulates -drawbacks- Quantum free electron theory-Fermi Dirac distribution-Effective mass of electron- sources of electrical resistance- Energy bands in solids -Types of electronic materials: metals, semiconductors and insulators.
Electromagnetic Theory: Divergence and Curl of Electric and Magnetic Fields-Gauss theorem for divergence and Stokes theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium).

UNIT – III

LASERS AND FIBER OPTICS

Lasers: Introduction - Characteristics of Laser - Spontaneous and Stimulated emission of radiation - Einstein's coefficients - Population inversion - Pumping Mechanisms - He-Ne laser, Nd-YAG laser - Applications of laser.

Fiber Optics: Introduction to Optical Fibers - Total Internal Reflection - Construction of optical fibers, Critical angle of propagation-Acceptance angle - Numerical Aperture-Classification of fibers based on Refractive index profile & modes - Propagation of electromagnetic wave through optical fiber- Block Diagram of Fiber optic Communication system - Applications.

UNIT – IV

SEMICONDUCTORS

Intrinsic semiconductors - Carrier concentration (qualitative) - Fermi level - Energy Band Structure - Electrical conductivity - Energy band gap - Extrinsic semiconductors- P-type & N-type - Carrier concentration (qualitative) - Fermi level - Energy Band Structure - Life time of charge carriers- Carrier generation and recombination - Drift and Diffusion processes - Einstein's Relation - Hall Effect and it's applications - Theory of P-N junction - Construction and working of LED and Photo Diode

UNIT – V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction - Meissner effect - Properties of superconductors Type I and Type II superconductors - ac and dc Josephson effects - BCS theory (qualitative) - Applications of superconductors.

Physics of Nanomaterials: Introduction, Nanoscience and Nanotechnology - Surface area to volume ratio and Quantum confinement - Classifications of Nanomaterials - Properties of nanomaterials: Mechanical, Magnetic, Optical - Synthesis of nanomaterials- Top Down Process- Ball Milling; Bottom Up Process: Sol-Gel method - Applications of nanomaterials.

TEXT BOOKS

1. B.E.A. Saleh and M.C. Tech, "*Fundamentals of Photonics*", John Wiley & Sons, 2nd ed.2012.
2. K. Thyagarajan, "*Engineering Physics*" , Mc Graw Hill Education Private Ltd, New Delhi.2nd ed, 2019.

REFERENCES

1. M.N.Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy "*A Text book of Engineering Physics*", S.Chand Publications, 11th Edition,2019.
2. J. Singh, "*Semiconductor optoelectronics* : *Physics and Technology*", Mc Graw-Hill Inc.2nd 1995.
3. S.M. Sze, "*Semiconductor Devices: Physics and Technology*", Wiley, 2rd ed. 2015.
4. P. Bhattacharya, "*Semiconductor Optoelectronic devices*", Prentice Hall of India, 2nd ed.1997.
5. R. Fitzpdricle , "*Maxwell's equations and the principles of Electromagnetism*", Infinity Science Press, 1st ed.2010.
6. John David Jackson, "*Classical Electrodynamics*" Wiley, 3rd ed. 2007.

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(20CS0501) C PROGRAMMING AND DATA STRUCTURES
(Common to EEE, MECH and ECE)

COURSE OBJECTIVES
The objectives of this course:

1. *Teach the syntax and semantics of a C Programming language.*
2. *Demonstrate the use of Control structures of C Programming language.*
3. *Illustrate the methodology for solving Computational problems.*
4. *Explain the approach to algorithm analysis.*
5. *Introduce different data structures for solving the problems.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Recognize the programming elements of C language.*
2. *Select the control structure for solving the problem.*
3. *Apply modular approach for solving the problem.*
4. *Solve mathematical problems using C Programming language.*
5. *Develop the applications using stacks and queues.*
6. *Construct the linked lists for various applications and perform sorting techniques.*

UNIT- I
Introduction to C Language - C Language Elements, Variable Declarations and Data Types, General Form of a C Program, Input and Output Statements, Operators, Expressions, Precedence and Associativity, Type Conversions.
Statements: Decision Statements, Loop Control Statements, break, continue, goto statement.

UNIT- II
Arrays - Declaring and Referencing Arrays, Array Subscripts, Multidimensional Arrays.
Functions - Library Functions, Communications among Functions, Using Array Elements as Function Arguments, Scope, Storage Classes, Type Qualifiers, Recursion, Preprocessor Commands.
Strings - String Basics, String Library Functions.

UNIT- III
Pointers - Pointer Declaration, Pointers and Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Pointer to Functions, Pointers and Strings.
Structure and Union - Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

UNIT- IV
Data Structures - Overview of Data Structure, Types of data structures, Stacks: Introduction - Definition - Representation of Stack - Operations on Stacks - Applications of Stacks. Queues: Introduction, Definition - Representations of Queues - Various Queue Structures - Applications of Queues.

Linked List - Single linked list, Circular linked list, Double linked list, Circular Double linked list, Applications of linked lists.

UNIT- V

Searching & Sorting: Linear Search, Binary Search, Exchange Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort.

TEXT BOOKS

1. J. R. Hanly, Ashok N. Kamthane and A. Ananda Rao, "*Programming in C and Data Structures"*, Pearson Education.
2. B. A. Forouzan and R.F. Gilberg, "*C Programming & Data Structures"*, Third Edition, Cengage Learning.

REFERENCES

1. Stephen G. Kochan, *Programming in C* , III Edition, Pearson Education.
2. J.A. Jones & K. Harrow , *C Programming with problem solving*, Dream tech Press.
3. Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand, *C and Data Structures*, a snapshot oriented treatise with live engineering examples.
4. E. Balaguruswamy, *C and Data Structures*, Tata McGraw Hill.
5. A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein ,*Data Structures using C* , Pearson Education / PHI, Eighth Edition.

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(20EC0401) FUNDAMENTALS OF DIGITAL COMPUTING SYSTEMS

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the basic architecture of computer, evolution and its applications.*
2. *To understand the data formats and their representation.*
3. *To understand binary, hexadecimal and octal number systems and their arithmetic.*
4. *To learn the geometrical representation of binary numbers.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Understand the evolution of computers and its applications.*
2. *Understand the need of different computer architectures and role of system architect for it.*
3. *Analyze various system architectures used in the real-world applications.*
4. *Familiarize with various number systems, their representation and conversion techniques.*
5. *Understand various data formats that can be given to the computer for processing.*
6. *Solve the Arithmetic examples based on Binary arithmetic.*

UNIT – I
Computers and Systems: Introduction – The Starting Point – Components of the Computer System – The Hardware Components, The Software Components, The Communication Components and The Computer System – The Concept of Virtualization – Protocols and Standards – A Brief Architectural History of the Computer - Early Work, Computer Hardware, Operating Systems, Communication, Networks, and the Internet.

UNIT – II
An Introduction to System Concepts and Systems Architecture: Introduction - The General Concept of Systems – IT System Architectures –Distributed Processing Systems, The Role of the System Architect, Google: A System Architecture Example and Another Example: Facebook's Application Architecture.

UNIT – III
Number Systems: Introduction – Numbers as a Physical Representation – Counting in Different Bases – Performing Arithmetic in Different Number Bases – Numeric Conversion Between Number Bases – An Alternative Conversion Method – Hexadecimal Numbers and Arithmetic – A Special Conversion Case: Number Bases that are Related – Fractions –Fractional Conversion Methods – Mixed Number Conversions.

UNIT – IV
Data Formats: Introduction – General Considerations – Alphanumeric Character Data – Visual Data – Bitmap Images, Object Images, Representing Characters as Images and Video Images – Audio Data – Data Compression – Page Description Languages – Internal Computer Data Format – Numerical Character to Integer Conversion.

UNIT – V

Representing Numerical Data: Introduction – Unsigned Binary and Binary-Coded Decimal Representations – Representations for Signed Integers –Sign and Magnitude Representation, Nine's, ,Decimal and 1's Binary Complementary Representations, Ten's Complement and 2's Complement, Overflow and Carry Conditions, Other Bases and Summary of Rules for Complementary Numbers – Real Numbers –A Review of Exponential Notation, Floating Point Format, Normalization and Formatting of Floating Point Numbers, A Programming Example, Floating Point Calculations, Floating Point in the Computer, Conversion between Base 10 and Base 2 – Programming Considerations.

TEXT BOOKS

1. Irv Englander, *The Architecture of Computer Hardware, Systems Software, & Networking,* Wiley Publications, 5th Edition, 2014.
2. Morris Mano, *Digital Design*, PHI, 3rd Edition, 2006.

REFERENCES

1. M Morris Mano, *Computer System Architecture*, Pearson Publications, 3rd Edition, 2007.
2. Mostafa Abd-El-Barr, Hesham El-Rewini, *Fundamentals of Computer Organization and Architecture*, Wiley Publications. 1st Edition, 2005.
3. A. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008.

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(20EE0254) ELECTRICAL TECHNOLOGY

COURSE OBJECTIVES

The objectives of this course:

1. *To know the basic principle of DC generators and motors*
2. *To know the basic principle of single phase transformers*
3. *To understand the basic principle of three-phase induction motor and alternators*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able

1. *To analyze the performance of DC generators and motors*
2. *To analyze the speed control of DC motors*
3. *To analyze the characteristics of DC machines*
4. *To analyze the performance of transformers*
5. *To analyze the performance of three phase induction motors*
6. *To analyze the performance of three phase alternators*
7. *To Conduct O.C, S.C tests and predetermine the regulation and efficiency of transformer*

UNIT- I

DC GENERATORS: Principle of Operation – Constructional Features – E.M.F Equation– Numerical Problems – Types of DC Generators – Build-Up of E.M.F – Magnetization and Load Characteristics of Shunt, Series and Compound Generators- Applications.

UNIT- II

DC MOTORS: Principle of Operation – Back E.M.F. –Torque Equation – Characteristics and Applications of Shunt, Series and Compound Motors-Speed Control of DC Motors: Armature Voltage and Field Flux Control Methods. Losses – Constant & Variable Losses – Calculation of Efficiency – Swinburne's Test.

UNIT- III

SINGLE PHASE TRANSFORMERS: Principle of operation, Constructional Details- EMF Equation - Operation on No Load and On Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation-OC and SC Tests - Predetermination of Efficiency and Regulation.

UNIT- IV

3- PHASE INDUCTION MOTORS: Construction Details of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics.

UNIT – V

SYNCHRONOUS MACHINES: Principle and Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

TEXT BOOKS

1. I.J.Nagrath ,D.P.Kothari, *"Electric Machines"*, New Age International Ltd.
2. B L Theraja- *"Electrical Technology"* (Vol 1 and 2). S. Chand Publications

REFERENCES

1. P.S. Bimbhra, "*Electrical Machines",* Khanna Publishers, 2011.
2. B.R.Gupta, Vandana Singhal, *"Fundamentals of Electrical Machines"*, New Age International Ltd.

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(20HS0851) APPLIED PHYSICS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To explore the application of Interference and Diffraction by doing concerned experiments.*
2. *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.*
3. *To understand the concept of Rigidity modulus, energy gap and B-H curve.*
4. *Develop an ability to apply the knowledge of physics experiments in the later studies.*
5. *Recognize the significance of Laser by studying its characteristics and its application in finding the particle size.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Operate various optical instruments.*
2. *Estimate wavelength of laser and particles size using laser.*
3. *Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.*
4. *Evaluate the acceptance angle of an optical fiber and numerical aperture.*
5. *Determine energy loss by B-H curve.*
6. *Evaluate rigidity modulus of a given wire.*

Suggested list of experiments from the following: (Perform any TEN experiments from the following)

1. Determination of wavelengths of various colors of Mercury vapor lamp using Diffraction Grating Normal Incidence method.
2. Determination of Dispersive power of prism.
3. Rigidity Modulus - Torsional Pendulum.
4. Determination of thickness of thin object by wedge method.
5. Determination of radius of curvature of Plano convex lens - Newton’s Rings.
6. Determination of wavelength of a given laser source by using diffraction grating.
7. Determination of particle size (Lycopodium particles deposited on glass plates) using Laser source.
8. Determination of energy gap of a semiconductor using P - N junction diode.
9. B-H curve.
10. Magnetic field along the axis of current carrying coil - Stewart & Gee’s Method.
11. Determination of frequency of tuning fork - Melde’s Apparatus.
12. Determination of spring constant - Coupled Oscillator.
13. Determination of dielectric constant of dielectric material using charging and discharging of capacitor.
14. Determination of Numerical Aperture of an Optical fiber.
15. Measurement of resistance with varying temperature - Thermistor.

REFERENCES

1. S. Balasubramanian, M.N. Srinivasan "*A Text book of Practical Physics*", S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

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(20CS0502) C PROGRAMMING AND DATA STRUCTURES LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Explain basic constructs of C language.*
2. *Explain problem solving techniques.*
3. *Develop applications in C using strings, pointers, functions, structures.*
4. *Explain the different operations that can be performed on data structures.*
5. *Introduce the different search and sorting algorithms.*

COURSE OUTCOMES (COs)

On Successful completion of this course, the student will be able to

1. *Read, understand and trace the execution of programs written in C language.*
2. *Develop C programs for simple applications making use of basic constructs, arrays and strings.*
3. *Develop C programs involving functions, recursion, pointers, and structures.*
4. *Select the data structure appropriate for solving the problem.*
5. *Illustrate the working of stack and queue.*
6. *Implement searching and sorting algorithms.*

LIST OF EXPERIMENTS:

1. Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +, - ,*, /,% and use Switch Statement)
2. a) Write a C program to find the sum of individual digits of a positive integer.
   b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. a) Write a C program to calculate the following Sum:
   Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
   b) Write a C program to find the roots of a quadratic equation.
4. a) Write a C program to determine if the given string is a palindrome or not.
   b) Write a C program to determine whether the given number is Armstrong number or not.
5. a) Write a C program to generate Pascal's triangle.
   b) Write a C program to construct a pyramid of numbers.
6. a) Write a C program to find both the largest and smallest number in a list of integers.
   b) Write a C program that uses functions to perform the following:
      i) Addition of Two Matrices
      ii) Multiplication of Two Matrices
7. Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To solve Towers of Hanoi problem.

8. Write a C program to swap(exchange) values of two integer variables using pointers.
9. Write a C program that uses functions to perform the following operations:
   a) To insert a sub-string in to given main string from a given position.
   b) To delete n Characters from a given position in a given string.
10. a) Write a C program to check whether the entered string is palindrome or not.
    b) Write a C program to read student roll no, name and marks in six subjects for n number of students and give class of each student.
11. Write a C programs that implement stack (its operations) using Arrays.
12. Write a C programs that implement queue (its operations) using Arrays.
13. Write a C program that uses functions to perform the following operations on singly linked list.
    i) Creation ii) Insertion iii) Deletion iv) Traversal
14. Write a C program that uses functions to perform the following operations on doubly linked list.
    i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
15. a) Write a C program to perform Linear Search on the elements of a given array.
    b) Write a C program to perform Binary Search on the elements of a given array.
16. a) Write a C program to sort the elements using Bubble sort.
    b) Write a C program to sort the elements using Insertion sort.

TEXT BOOKS

1. J.R. Hanly, Ashok N. Kamthane and A. Ananda Rao, "*Programming in C and Data Structures"*, Pearson Education.
2. B.A.Forouzan and R.F. Gilberg,"*C Programming & Data Structures"* ,Third Edition, Cengage Learning.

REFERENCS

1. P. Padmanabham , "*C programming and Data Structures"*, Third Edition, BS Publications.
2. E Balaguruswamy , "*C and Data Structures"*, TMH publications.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
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I B.Tech. – II Sem.

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(20EE0255) ELECTRICAL TECHNOLOGY LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To enhance the student with knowledge on electrical equipment's.*
2. *Students can gain practical knowledge about network theorems.*
3. *To enhance the student with practical knowledge about electrical machines.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Students will understand all the fundamental components about electrical engineering.*
2. Analyze complicated circuits using different network functions.
3. *Make the electrical connections by wires of appropriate ratings.*
4. *Understand the basic characteristics of transformers and electrical machines.*
5. *Understand the usage of common electrical measuring instruments.*
6. *Understand the OC and SC test on Single phase Transformer.*

PART-A

1. Verification of KVL and KCL.
2. Series and Parallel Resonance - Timing, Resonant Frequency, Bandwidth and Q-Factor Determination for RLC Network.
3. Time Response of First Order RC/RL Network for Periodic Non-Sinusoidal Inputs - Time Constant and Steady State Error Determination.
4. Two Port Network Parameters - Z-Y Parameters, Chain Matrix and Analytical Verification.
5. Two Port Network Parameters - ABCD and H-Parameters.
6. Verification of Superposition and Reciprocity Theorems.
7. Verification of Maximum Power Transfer Theorem. Verification on DC, Verification on AC with Resistive and Reactive Loads.
8. Experimental determination of Thevenin's and Norton's Equivalent Circuits and Verification by Direct Test.
9. Constant - K Low Pass Filter and High Pass Filter.

PART-B

1. Magnetization Characteristics of D.C. Shunt Generator. Determination of Critical Field Resistance.
2. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
3. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
4. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors and Determination of Equivalent Circuit).
5. Load Test on Single Phase Transformer.

Note: Any 12 of the above Experiments are to be conducted.

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I B.Tech. – II Sem.

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(20HS0816) INDIAN CONSTITUTION
(Common to All Branches)

COURSE OBJECTIVES
The objectives of this course:

1. *To know the premises informing the twin themes of liberty and freedom from a civil rights perspective.*
2. *To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional role.*
3. *To address entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*
4. *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.*
5. *To acquire knowledge for various competitive examinations.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Explain the key concepts of political economy.*
2. *Analyse the significant developments in the political ideologies.*
3. *Describe the salient features of the constitution of India interpret, integrate and critically.*
4. *Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.*
5. *Apply their knowledge and skills acquired to write various competitive examinations.*
6. *Analyse the constitutional rights in relating to Practical life.*

UNIT-I
Constitution: Definition, Introduction, Meaning of the term,- Indian Constitution: Sources and Features.

UNIT-II
Historical Perspective of Indian Constitution; The Government Act of 1919 and 1935 - A Dual Form of Government – The Constitutional Reforms of Simon commission –Formation of Drafting Committee – The Role of Constitution Assembly. Salient features and characteristics of the Constitution of India: Structure of the Indian Union: Federalism, Centre- State relationship.

UNIT-III
Scheme of the Fundamental Rights: Concept of Fundamental Rights in India, Justifiability of Fundamental Rights - Reach of Fundamental Rights -The scheme of the Fundamental Duties and its Legal Status: Fundamental Duties in India – Article 51A - Introduction to Fundamental Duties in India – Importance of Fundamental Duties. The Directive Principles of State Policy - Its importance And implementation - The Potential of Directive Principles of State Policy for the Judicial Enforcement of Socio-Economic Rights.

UNIT-IV

Parliamentary Form of Government in India: Origin, growth and development of the parliamentary system in India – Chief Characteristics of Indian Parliament – Constitutional Powers and Functions of Indian Parliamentary system. The President of India: Qualifications of President - Election of President, Tuner of President - Status, Powers and Functions of President. The Historical Perspectives of the Constitutional Amendments in India: Types of Amendments & Constitutional Amendment Process in India - Indian Polity - Judiciary System Introduction to Indian Judiciary System - Independent Indian Judiciary - Indian Judiciary Structure - Powers and Functions of Indian Judiciary.

UNIT-V

Local Self Government – Constitutional Scheme in India - District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayatiraj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zilla Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Election Commission: Role and Functions of Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS

1. Government of India Ministry of Law and Justice (Legislative Department), "*The Constitution ofIndia", 1950 (Bare Act)* Government Publication, 2015.
2. Dr.Busi S.N, "*Dr.B.R.Ambedkar framing of Indian Constitution"*, 1st Edition, Government Publication 2015.

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II-B.Tech. – I Sem.

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(20HS0834) NUMERICAL METHODS AND TRANSFORMS
(ECE)

COURSE OBJECTIVES

The objectives of this course:

1. *To introduce the tools of differentiation and integration of functions of numerical methods that is used in various techniques dealing engineering problems.*
2. *To acquaint the student with mathematical tools needed in evaluating Transform techniques.*
3. *To acquaint the student with mathematical tools needed in evaluating Fourier series.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Develop the mathematical skills of the students in the areas of numerical methods.*
2. *Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.*
3. *Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.*
4. *Calculate the Laplace transform of standard functions both from the definition and by using tables.*
5. *Comprehend basic systems properties and signals.*
6. *Apply Fourier analysis to periodic and aperiodic signals*

UNIT I

Numerical solution of Algebraic and Transcendental equations: The Bisection method, Newton-Raphson method and Regula-Falsi method.

Interpolation: Finite differences-Newton's forward and backward difference formulae.

UNIT II

Numerical solution of Ordinary differential equations:

Taylor's series (first and second order), Euler's method, modified Euler's method and Runge-Kutta method of fourth order for solving first order differential equations.

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8rules.

UNIT III

Laplace Transforms: Laplace transforms of standard functions-Properties of Laplace Transform-Inverse transforms-First shifting theorem, Unit step function, Second shifting theorem, Change of scale property, Transforms of derivatives and integrals-Evaluation of integrals by Laplace transforms. Use of partial fractions to find Inverse Laplace transforms - Convolution theorem.

UNIT IV

Application of Laplace transforms: Application of Laplace transforms to ordinary differential equations of first and second order.

Fourier Series: Determination of Fourier coefficients- Fourier series- Even and odd functions, Fourier series in an arbitrary interval, Periodic function, Half range sine and cosine series.

UNIT-V

Fourier transforms:
Fourier Integral theorem (without proof), Finite and Infinite Fourier transforms and Inverse transforms- Properties of Fourier transforms, Fourier sine and cosine transforms.

TEXT BOOKS

1. Grewal B.S, *Higher Engineering Mathematics*, 44th edition, Khanna Publishers,2017.
2. Ramana B. V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.

REFERENCES

1. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics*,Volume-I,II&III, 12th Edition, S.Chand publication, 2014.
2. Rukmangadachari.E & Keshava Reddy E, *Engineering Mathematics*, Volume-I,II&III, Pearson Publishers, 2010.
3. GargNishu Gupta R.L, *Engineering Mathematics*,Volumes-I &II, Pearson Education, 2014.
4. Bali N, Goyal M & Watkins C, *Advanced Engineering Mathematics*, Infinity Science Press, 2007.

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II B. Tech. – I Sem.

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(20EC0402) ELECTRONIC DEVICES AND CIRCUITS

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the characteristics and applications of P-N junction diode, special purpose devices in electronic circuits.*
2. *To familiarize working principle of BJT, JFET and MOSFET and to design single stage amplifier circuits using low frequency model.*
3. *To analyze and design various electronic devices and circuits using PN Junction diode, BJT, JFET and MOSFET.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe the construction of various electronic devices.*
2. *Analyze electronic devices with the help of equivalent circuits and electrical models.*
3. *Plot the characteristics and analyzing the behavior of electronic devices for different bias conditions.*
4. *Develop applications using electronic devices.*
5. *Analyze rectifiers, filters, regulators and amplifiers for finding different parameters.*
6. *Design rectifiers, filters, regulators and amplifiers to meet required specifications.*

UNIT – I

P-N Junction Diode: Open circuited PN Junction, Forward and Reverse Bias of PN Junction, Current Components in a PN diode, Volt - Ampere Characteristic, Temperature dependence of the V-I characteristic, Diode Resistances, Diode Capacitances, Effect of Temperature on V-I Characteristics, Breakdown Mechanisms, Zener Diode - Zener Diode as Voltage Regulator, Diode Clippers and Clampers.

UNIT – II

Rectifiers: Definition and Types, Half wave Rectifier, Full wave Rectifier and Bridge Rectifier, Comparison of Rectifiers, Filter - Definition and Types, Inductor Filter, Capacitor Filter, L-section Filter, CLC or π - section Filter, Comparison of various types of filters.

Special Purpose Devices: Varactor Diode, Tunnel Diode, Uni Junction Transistor, Solar Cell, LCD, LED.

UNIT – III

Transistor Characteristics: BJT: BJT - Construction, Operation, Transistor Current Components, Transistor as an Amplifier, Transistor Characteristics - CB, CE and CC.

FET: Types, JFET - Construction, Working, Characteristics, MOSFET - types, Construction, Working, Characteristics, Comparison between JFET and MOSFET.

UNIT – IV

Transistor Biasing and Thermal Stabilization: Need for Transistor biasing, Operating point, Load line analysis, Biasing methods - Fixed bias, Collector to Base bias, Self-bias, stability factors, Bias compensation, Thermal Runaway, Thermal stability.

UNIT – V

Small Signal Low Frequency Transistor Amplifier: Frequency Response of Amplifier, Transistor hybrid model, generalized analysis of Transistor amplifier using h-parameter model, Simplified Hybrid Model - Analysis of CE, CB and CC amplifiers using Approximate Model, Analysis of CE amplifier with emitter resistance using simplified hybrid model.

FET Amplifier: Small Signal Model, Analysis of CS and CD Amplifiers at Low frequencies.

TEXT BOOKS

1. J.Millman, C.Halkias, *Electronic Devices and Circuits,* Tata Mc-Graw Hill, 4th Edition, 2010.
2. S.Salivahanan, N.Suresh Kumar, *Electronic Devices and Circuits,* McGraw Hill Education (India) Private Limited, 3rd Edition, 2012.

REFERENCES

1. Jacob Millman, C.Halkies, C.D.Parikh, Integrated Electronics, Tata Mc-Graw Hill, 2nd Edition, 2009.
2. Sedra and Smith, Micro Electronic Circuits, Oxford University Press, 4th Edition, 2002.
3. Robert Boylested and Louis Nashelsky, Electron Devices and Circuit Theory, Pearson Prentice Hall, 10th Edition, July 2008.

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II B.Tech. – I Sem.	**L**	**T**	**P**	**C**
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(20EC0403) SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVES

The Objectives of this Course:

1. *Familiarize the student with fundamental principles of Logic design.*
2. *Acquire the skills to manipulate and examine Boolean algebraic expressions, logical operations, Boolean functions and their simplifications.*
3. *Acquaint with classical hardware design for both combinational and sequential logic circuits.*

COURSE OUTCOMES (COs)

On Successful Completion of this Course the Student will be able to

1. *Demonstrate the fundamentals of digital logic design concepts.*
2. *Apply the minimization techniques for logical function reduction.*
3. *Describe the function of logical circuits.*
4. *Analyze the different types of logical circuits.*
5. *Implement the digital logic functions using logical circuits.*
6. *Develop the digital circuits to meet a set of requirements.*

UNIT – I

Boolean Algebra and Logic Gates: Basic Definitions– Axiomatic Definition of Boolean Algebra – Basic Properties of Boolean Algebra – Boolean Functions– Canonical and Standard Forms – Other Logic Operations – Digital Logic Gates.

UNIT – II

Gate – Level Minimization: The Map Method– Four Variable K-Map– Five Variable K-Map – Product of Sums Simplification – Don‘t–Care Conditions – NAND and NOR implementation, EX-OR Function – Tabular Minimization method.

UNIT – III

Combinational Logic: Combinational Circuits – Analysis Procedure – Design Procedure – Binary Adder–Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers – De-Multiplexers.

UNIT – IV

Synchronous Sequential Logic: Sequential Circuits – Latches– Flip Flops – Analysis of Clocked Sequential Circuits – Registers– Shift Registers– Ripple counters– Synchronous counter– Ring Counter and Johnson Counter.

UNIT – V

Finite State Machines and Programmable Memories: Introduction to FSM – Mealy and Moore models – State Reduction and State Assignment **–** Design procedure – Random access memory– Read–only Memory – Programmable Logic Array – Programmable Array Logic.

TEXT BOOKS

1. Morris Mano *"*Digital Design", PHI, 3rd Edition, 2006.
2. Zvi Kohavi "Switching *& Finite Automata theory"*, TMH, 2nd Edition.

REFERENCES

1. Fletcher *"An Engineering Approach to Digital Design"* –, PHI.
2. Charles H. Roth *"Fundamentals of Logic Design"*,5th Edition, 2004,Thomson Publications.
3. John M. Yarbrough *"Digital Logic Applications and Design"* ,2006, Thomson Publication.

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(20EC0404) SIGNALS, SYSTEMS AND RANDOM PROCESSES

COURSE OBJECTIVES
The Objective of this course:

1. *Study about signals and systems.*
2. *Do the analysis of signals & systems using time domain & frequency domain methods.*
3. *Understand the stability of systems through the concept of ROC.*
4. *Understand the concept of convolution.*
5. *Understand and analyze the concept of Laplace Transform and ROC.*

COURSE OUTCOMES (COs)
On Successful Completion of this Course the Student will be able to

1. *Express the continuous and discrete time signals and systems mathematically.*
2. *Analyze continuous and discrete time signals and systems by using suitable property.*
3. *Represent CT and DT systems in the Frequency domain using various transforms.*
4. *Identify the suitable transform based on the system requirements.*
5. *Determine the response of a system for the given input using the suitable transform.*
6. *Apply the basic concepts of probability, random variables & random signal for the spectral analysis.*

UNIT-I
Introduction to Signals and Systems: Signal, Elementary Signals, Classification of signals - Continuous and Discrete time signals-Energy and Power signals-Periodic and Aperiodic Signals-Deterministic and Random Signals, Operations on signals, System-Classification of Systems-Linear and Non-linear Systems, Time Variant and Time Invariant Systems, Static and Dynamic Systems, Causal and Non-causal Systems, Stable and Unstable Systems.

UNIT-II
Fourier Series: Representation of Fourier series, Properties of Fourier series, Dirichlet‘s conditions, Trigonometric Fourier Series and Exponential Fourier Series.
Fourier Transform: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Magnitude and Phase response, Properties of Fourier Transform, Fourier Transform of Periodic signals.

UNIT-III
Signal Transmission through Linear Systems: Linear system, Impulse response, Step response, Response of a linear system, Linear Time-Invariant (LTI) system, Linear Time Variant (LTV) system, LTI System properties, Transfer function of a LTI system, Filter characteristics of Linear systems.

Convolution and Correlation of Signals: Concept of Convolution in Time domain and Frequency domain, Graphical representation of Convolution. Cross correlation and Autocorrelation of functions, properties of Correlation functions.

UNIT-IV

Laplace Transforms: Laplace transform (LT)-Region of convergence, Constraints on ROC for various classes of signals, Laplace domain analysis, Properties of LT, relation between LT and FT of a signal.

Introduction to Probability: Probability Definitions, Sample Spaces, Events, Joint Probability, Conditional Probability, Definition of a Random Variable, Distribution and Density functions, Properties.

UNIT-V

Random Processes: The Random Process Concept, Classification of Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second-Order, (N-Order) Stationary, Time Averages, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties. The Power Spectrum: Properties, The Cross-Power Density Spectrum, Properties.

TEXT BOOKS

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, *Signals and Systems*, PHI, 2nd Edition.
2. Peyton Z. Peebles, *Probability Random Variables & Random Signal Principles*, TMH, 4th Edition.

REFERENCES

1. Anand Kumar, *Signals and Systems*, PHI.
2. B.P. Lathi, *Linear Systems and Signals*, Oxford University press, 2nd Edition, 2008.
3. Michel J. Robert, *Fundamentals of Signals and Systems*, MGH International Edition, 2008.
4. Y. Mallikarjuna Reddy, *Probability Theory & Stochastic Processes*, University Press, 4th edition,.
5. Athanasios Papoulis and Unni krishna Pillai, *Probability, Random Variables and Stochastic Processes*, PHI, 4th Edition, 2002.
6. R. P. Singh and S.D. Sapre, *Communication Systems Analog & Digital*, TMH, 1995.

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(20EC0405) ANALOG COMMUNICATIONS

COURSE OBJECTIVES
The Objective of this course:

1. *To study the fundamental concepts of the analog communication system.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *To know the working of various transmitters and receivers.*
4. *To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.*

COURSE OUTCOMES (COs)
On Successful Completion of this Course the Student will be able to

1. *Describe the fundamentals of Analog Communication Systems.*
2. *Express the concept of various Analog Modulation schemes and Multiplexing.*
3. *Compute various parameters of continuous and pulse wave modulation Techniques.*
4. *Analyze various continuous and pulse wave modulation and Demodulation Schemes.*
5. *Estimate the performance of Analog Communication System in the presence of noise.*
6. *Identify different Radio receivers and understand the concept of coding schemes in Information theory.*

UNIT – I
Amplitude Modulation - I: Introduction to Communication Systems – Modulation, Need forModulation –Introduction to Amplitude Modulation – Power and transmission efficiency, Single tone AM, Generation of AM wave – Square law Modulator & Switching modulator, Detection of AM Wave –Square law detector & Envelope detector, AM Transmitters, Illustrative Problems.

UNIT – II
Amplitude Modulation - II: Introduction to DSB-SC, Power calculations, Generation of DSB-SC, Balanced Modulators& Ring Modulator, Coherent detection of DSB-SC– Time domain description of SSB - Hilbert transform, Generation of SSB wave, Frequency discrimination & Phase discrimination method, Demodulation of SSB Wave– Introduction to Vestigial sideband (VSB) modulation and its Features– Comparison of AM Techniques– Illustrative Problems.

UNIT – III
Angle Modulation: Generalized concept of angle modulation –Frequency modulation, Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Generation of FM waves, Indirect method, Direct method, Demodulation of FM, Phase modulation – Pre – emphasis & De-emphasis filters - FM Transmitter - Illustrative Problems.

UNIT – IV

Radio Receiver: Introduction to radio receivers & its parameters - Super heterodyne AM & FM Receiver.
Noise: Review of noise and noise sources - noise figure - Performance analysis of AM, DSB-SC, SSB-SC in the presence of noise - Illustrative Problems.

UNIT – V

Analog Pulse Modulation Schemes: Pulse amplitude modulation (PAM) & demodulation, Transmission bandwidth – Pulse Time Modulation, Pulse Duration and Pulse Position modulations and demodulation schemes - Multiplexing Techniques, FDM, TDM.
Information Theory: Introduction to information theory, Entropy, Mutual information, Channel capacity theorem - Shannon-Fano encoding algorithm - Illustrative Problems.

TEXT BOOKS

1. Simon Haykin, *Communication Systems*, Wiley-India, 2nd Edition, 2010.
2. A. Bruce Carlson, & Paul B. Crilly, *Communication Systems – An Introduction to Signals& Noisein Electrical Communication*, McGraw-Hill, 5th Edition, 2010.

REFERENCES

1. Herbert Taub & Donald L.Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 3rdEdition, 2009.
2. R.E. Ziemer & W.H. Tranter, *Principles of Communication-Systems Modulation & Noise*, JaicoPublishing House, 2001.
3. George Kennedy and Bernard Davis, *Electronics & Communication System*, TMH, 2004.

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(20EC0406) ELECTRONIC DEVICES & LOGIC DESIGN LAB

COURSE OBJECTIVES

The Objectives of this Course:

1. *To understand the working of various Semiconductor devices and plot their characteristics.*
2. *To obtain the characteristics of BJT and FET.*
3. *To understand the Basics of logic Gates.*
4. *To know the concepts of Combinational circuits.*

COURSE OUTCOMES (COs)

On Successful Completion of this Course the Student will be able to

1. *Demonstrate knowledge in different electronic devices and analog circuits.*
2. *Analyze the characteristics of different electronic devices and circuits like Diodes-PN Junction Diode, Zener Diode and Transistors-BJT, FET.*
3. *Design and develop electronic Devices & Circuits like rectifiers, BJT and FET.*
4. *Learn the basics of gates.*
5. *Construct basic combinational circuits and verify their functionalities.*
6. *Apply the design procedures to design basic sequential circuits.*

LIST OF EXPERIMENTS:

(Minimum of 5 Experiments to be conducted from PART-A & PART-B)

PART-A

1. Forward and Reverse bias characteristics of P-N Junction diode.
2. Zener diode characteristics.
3. Half Wave Rectifier with and without filter.
4. Full Wave Rectifier with and without filter.
5. Input and Output characteristics of Transistor in CE Configuration.
6. Drain and Transfer Characteristics of N-channel JFET.

PART-B

1. Verify the truth tables of Basic Logic gates.
2. Design & Verify the truth tables of Half /Full Adder/Subtractor using logic gates.
3. Design & Verify the truth tables of Multiplexer and De-Multiplexer.
4. Design & Verify the truth tables of Encoder and Decoder using logic gates.
5. Verify the truth table of Magnitude comparator.
6. Verify the functionality of RS & JK FF using NAND gates.

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(20EC0407) SIGNALS AND SYSTEMS SIMULATION LAB

COURSE OBJECTIVES

The Objectives of this Course:

1. *To know the fundamental operation on matrices.*
2. *To address the generation and operation of CT and DT signals.*
3. *To acquire knowledge on LTI properties of DT and CT systems.*
4. *To address the role Laplace Transform and Fourier Transform.*
5. *To acquire knowledge for generation of noise and removal of noise.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Explain the key concepts of operation on matrices.*
2. *Analyse the significant operation of CT and DT signals.*
3. *Describe the salient features of the LTI properties of DT and CT systems.*
4. *Analyse the different waveform based on Laplace and Fourier transform.*
5. *Apply the knowledge and skills acquired to generate the different noises.*
6. *Analyse the sampling theorem under the different conditions (under sampling and over sampling).*

LIST OF EXPERIMENTS:

(Minimum of Ten experiments to be conducted)

1. Basic operations on matrices
2. Generation of various signals and sequences
3. Operations on Signals and Sequences
4. Finding the Even and Odd parts of signal and sequence and real and imaginary parts of signal
5. Convolution of Sequences
6. Autocorrelation and Cross correlation of signals
7. Verification of Linearity and Time Variant and Invariant properties of a given discrete system
8. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the given LTI System
9. Gibbs Phenomenon
10. Finding the Fourier Transform of a given signal
11. Waveform synthesis using Laplace Transform
12. Generation of Gaussian Noise
13. Sampling Theorem verification
14. Removal of Noise by Auto Correlation / Cross correlation in a given signal corrupted by noise

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(20EC0408) ANALOG COMMUNICATIONS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To experience real time behavior of different analog & digital modulation schemes.*
2. *To provide a real time experience for different analog modulation systems and demodulation schemes.*
3. *To provide exposure to the real time behavior of different elements available in analog communication system such as filters, amplifiers etc.*
4. *To perform radio receiver measurements.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Technically visualize spectra of different analog modulation schemes.*
2. *Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.*
3. *Measure characteristics of radio receiver measurements.*
4. *Experience real time behavior of different analog modulation schemes.*
5. *Acquired knowledge about pulse modulation systems.*

LIST OF EXPERIMENTS:

(All Experiments are to be conducted)

Cycle-I

1. Amplitude modulation and demodulation
2. Frequency modulation and demodulation
3. Phase modulation and demodulation
4. Characteristics of Mixer
5. Pre-emphasis & de-emphasis

Cycle-II

6. Pulse amplitude modulation & demodulation
7. Pulse width modulation & demodulation
8. Pulse position modulation & demodulation
9. Radio receiver measurements – sensitivity, selectivity and fidelity
10. Time division multiplexing

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(20EC0455) PCB DESIGNING

COURSE OBJECTIVES

The objectives of this course:

1. *Understand the need for PCB Design and steps involved in PCB Design and Fabrication process.*
2. *Familiarize Schematic and layout design flow using Electronic Design Automation (EDA) Tools.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.*
2. *Understand basic concepts of transmission line, crosstalk and thermal issues.*
3. *Create schematics from lue prints and perform simple simulations.*
4. *Design (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits.*
5. *Design (schematic and layout) and fabricate PCB for simple circuits.*
6. *Apply techniques, skills and modern engineering tools necessary for engineering practice.*

Tools and materials required for PCB fabrication:

1. Open-source EDA Tool Kit Cad
2. Single-sided copper clad sheet
3. Diluted Acidic solution for copper etching purpose with plastic tray
4. Tapes and pads for layout design of different dimensions
5. Hand drilling/Power drilling machine
6. Tool kit (tong, hand gloves etc.)

LIST OF CONTENTS

1. Introduction to PCB

- Definition and Need/Relevance of PCB
- Background and History of PCB
- Types of PCB
- Classes of PCB Design
- Terminology in PCB Design
- Different Electronic design automation (EDA) tools and comparison.

2. PCB Design Process

- PCB Design Flow, Placement and routing
- Steps involved in layout design
- Artwork generation Methods - manual and CAD
- General design factor for digital and analog circuits
- Layout and Artwork making for Single-side, double-side and Multilayer Boards
- Design for manufacturability
- Design-specification standard

3. Introduction to PCB Fabrication & Assembly

- Steps involved in fabrication of PCB
- PCB Fabrication techniques-single, double sided and multilayer
- Etching: chemical principles and mechanisms
- Post operations- stripping, black oxide coating and solder masking
- PCB component assembly processes

4. Transmission lines and crosstalk

- Transmission Line: Transmission lines and its effects, Significance of Transmission line in Board design, Types of Transmission lines.
- Crosstalk: The crosstalk in transmission lines, Crosstalk control in PCB design parts, planes, tracks, connectors, terminations Minimization of crosstalk.
- Thermal issues: Thermal mapping of design.

5. Design PCB (schematic and Layout) for following exercises.

Example Circuit: - Inverting Amplifier or Summing Amplifier using op-amp

- Using any Electronic design automation (EDA) software, Practice following PCB Design steps
- Open-source EDA Tool Ki Cad Preferable
- Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, Net list generation
- Layout Design: Familiarization of Footprint Editor, Mapping of components, Creation of PCB layout Schematic
- Create new schematic components
- Create new component footprints

6. Example circuit: **Full-wave Rectifier**

7. Example circuit: **Full-Adder using half-adders.**

8. Design a 8051 Development board

- Power section consisting of IC7805, capacitor, resistor, headers, LED

9. Serial communication

- Serial Communication section consisting of MAX 232, Capacitors, DB9 connector, Jumper, LEDs

10. Reset & Input/ output sections

- It consisting of 89C51 Microcontroller, Electrolytic Capacitor, Resistor, Jumper, Crystal Oscillator, Capacitors

Note: Fabricate single-sided PCB, mount the components and assemble in a cabinet for any one of the circuits mentioned

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(20HS0801) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES

The objectives of this course:

1. *Identify environmental problems arising due to engineering and technological activities and the science behind those problems.*
2. *To identify the importance of interlinking of food chains.*
3. *Learn about various attributes of pollution management and waste management practices.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Recognize the physical, chemical and biological components of the earth's systems and show how they function.*
2. *Characterize and analyze human impacts on the environment.*
3. *Integrate facts, concepts and methods from multiple disciplines and apply to environmental Problems.*
4. *Create informed opinions about how to interact with the environment on both a personal and a social level.*
5. *Perform independent research on human interactions with the environment.*
6. *Recognize the ecological basis for regional and global environmental issues.*

UNIT – I

Introduction: Definition, Scope and Importance of environmental science, Need for Public Awareness
Natural Resources: Forest resources: Use and over-exploitation, deforestation, Mining, dams and their effects on forests and tribal people.
Water Resources: Use and over utilization of surface and ground water. Floods, drought, conflicts over water, dams benefits and problems.
Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral
Energy Resources: Renewable and Non- Renewable sources of energy. Solar energy, Hydro electrical energy, Wind energy, Nuclear energy.

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem. Producers, Consumers and Decomposers. Biogeochemical cycles, Ecological succession, energy flow in an ecosystem, Food chains, food webs and ecological pyramids. Types of ecosystems (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem.

UNIT-III

Biodiversity And Its Conservation: Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega diversity Nation, Hot spots of biodiversity, Value of biodiversity, Threats to biodiversity, Endemic, Endangered and Extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

UNIT-IV

Environmental Pollution and Global Environmental Issues: Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake.

Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile, Nuclear pollution. Global warming, Acid rain, Ozone layer depletion and controlling measures.

Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment.

Solid Waste Management: causes, effects and control measures of Municipal solid wastes.

E-waste and management, Role of an individual in prevention of pollution.

UNIT-V

Environmental Legislations, Laws, Policies for Sustainable Development: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water Act. Wildlife protection Act, Forest conservation Act. Municipal Solid Waste management. International conventions/Protocols Earth summit, Kyoto protocol and Montreal Protocol. Unsustainable to sustainable development, Role of NGO's for Sustainable development. Role of IT in Environment, GIS methods for Sustainable development.

Field work- visit to a local area to document environmental assets, river, forest, grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture). Study simple ecosystems.

TEXT BOOKS

1. A. Kaushik and C. P. Kaushik, *Environmental Sciences, 5th edition*, New age internationalpublishers, 2015.
2. M. Anji Reddy, *Text Book of Environmental Science and Technology*, BS Publications, 2016.

REFERENCES

1. Anil Kumar and Arnab Kumar De, *Environmental Studies*, New Age International Publishers, New Delhi, 3rd Edition 2015.
2. R.K. Trivedi, *"Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards"*, Vol. I and II, Enviro Media, 2016.
3. Rajagopalan .R, *"Environmental Studies-From Crisis to Cure"*, Oxford University Press, 2005.

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(20EE0214) CONTROL SYSTEMS

COURSE OBJECTIVES
The objectives of this course:

1. *To make the students familiarize various representations of systems*
2. *To make the students analyze the stability of linear systems in time domain and frequency domain*
3. *To make the students analyze the stability of linear systems in frequency domain*
4. *To make the students design compensator based on the time and frequency domain\ specifications*
5. *To develop linear models mainly state variable model and Transfer function model*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Identify open and closed loop control system*
2. *Represent simple systems in transfer function and state variable forms*
3. *Analyse simple systems in time domain*
4. *Analyse simple systems in frequency domain*
5. *Infer the stability of systems in time and frequency domain*
6. *Interpret characteristics of the system and find out solution for simple control problems*

UNIT-I
Systems and Representation: Control systems: Open and closed loop systems, First principle modeling: Mechanical, Electrical and Electromechanical systems, Transfer function representations: Block diagram – Signal flow graph.

UNIT-II
Time Domain Analysis: Time Response Analysis - Standard test input signals – Time response - Time domain specifications, Transient and steady state response of first and second order systems- Error constants, Steady state error and generalized error constants–- Proportional, integral and derivative Controllers.

UNIT-III
Stability Analysis: Stability analysis: Concept of stability – Routh Hurwitz stability criterion – Root locus: Construction and Interpretation. Effect of adding poles and zeros.

UNIT-IV
Frequency Domain Analysis: Frequency Response Analysis: Frequency domain specifications, Frequency response plots - Bode Plots, Polar plots, Nyquist Plots, Gain margin and Phase margin – Stability Analysis. Lead, Lag and Lag-lead compensators.

UNIT-V
State Space Analysis: State, state variables and state model, diagonalization, solution of state equations- State transition matrix and its properties. Concept of controllability and observability.

TEXT BOOKS

1. Benjamin C. Kuo, *Automatic Control Systems*, 7th edition PHI Learning Private Ltd, 2010.
2. Nagarath. I.J. and Gopal. M, *Control Systems Engineering*, New Age International Publishers 2010.

REFERENCES

1. Richard C. Dorf and Bishop, R.H., *Modern Control Systems*, Education Pearson, 3Impression2009.
2. John J.D., Azzo Constantine, H. and Houpis Stuart, N Sheldon, *Linear Control System Analysis and Design with MATLAB*, CRC Taylor& Francis Reprint 2009.
3. Katsuhiko Ogata, *Modern Control Engineering*, PHI Learning Private Ltd, 5thEdition, 2010.
4. NPTEL Video Lecture Notes on *Control Engineering* by Prof. S. D. Agashe, IIT Bombay.

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(20EC0409) ELECTRONIC CIRCUIT ANALYSIS

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the characteristics of BJT amplifiers at high frequencies, multistage amplifiers, Feedback amplifiers, Oscillators, Power amplifiers, Tuned amplifiers and Multivibrators.*
2. *To analyze and design of small signal Amplifiers at High Frequencies, Multistage amplifiers with compound connections, Feedback amplifiers, Oscillators, Power amplifiers, Tuned amplifiers and Multivibrators.*
3. *To use the basic building blocks of analog electronic circuits for real time applications.*

COURSE OUTCOMES (COs)
On successful completion of the course, students will be able to

1. *Describe the basics of BJT High Frequency Model, amplifiers and oscillators.*
2. *Classify amplifiers and oscillators and find suitable operating conditions.*
3. *Describe the functioning of amplifiers and oscillators.*
4. *Derive the parameters of BJT at high frequencies, amplifiers and oscillators.*
5. *Analyze BJT at high frequencies, amplifiers and oscillators for different circuit conditions.*
6. *Design amplifiers and oscillators to meet required specifications.*

UNIT – I
BJT High Frequency Model Analysis: BJT Hybrid- π Common Emitter transistor model and its parameters, CE short circuit current gain, Current gain with resistive load.
Multistage Amplifiers: Need for cascading, Methods of coupling**,** Cascade transistor amplifier and its analysis, Cascode amplifier, Darlington pair and its analysis, Effect of cascading on Bandwidth.

UNIT – II
Feedback Amplifiers: Feedback concept, Classification of basic amplifiers - Voltage amplifier, Current Amplifier, Transresistance Amplifier and Transconductance Amplifier, Feedback amplifier topologies, Characteristics of negative feedback amplifiers, Analysis of feedback amplifiers, Performance comparison of feedback amplifiers.

UNIT – III
Oscillators: Principle of operation of oscillator, Barkhausen Criterion, Types of oscillators, Analysis of RC phase shift and Wien bridge oscillators using BJT, Generalized analysis of LC Oscillators, Hartley and Colpitts oscillators with BJT, Crystal oscillators, Frequency stability of Oscillators.

UNIT – IV
Power Amplifiers: Types of power amplifiers, Class A large signal Amplifiers - Series fed, Directly Coupled and Transformer Coupled class A power amplifier and their Efficiency, Class B Amplifiers - Push Pull and Complementary Symmetry class B power amplifier and their Efficiency, Crossover Distortion.
Tuned Amplifiers: Introduction, Single Tuned Amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers.

UNIT – V

Multivibrators: Multivibrator-Definition and Types, Astable Multivibrator, Monostable Multivibrator and Bistable Multivibrator, Triggering methods for bistable Multivibrator.

TEXT BOOKS

1. S.Salivahanan, N.Suresh Kumar, *Electronic Devices and Circuits,* McGraw Hill Education (India) Private Limited, 3rdEdition, 2012.
2. Sedra and Smith, *Micro Electronic Circuits,* Oxford University Press, 6th Edition, 2011.

REFERENCES

1. Jacob Millman, C.Halkies, C.D.Parikh, *Integrated Electronics,* Tata Mc-Graw Hill, 2nd Edition,2009.
2. Robert Boylested and Louis Nashelsky, *Electron Devices and Circuit theory,* Pearson PrenticeHall, 10th Edition, July 2008.
3. David A. Bell, *Electronic Devices and Circuits,* Oxford University Press, 5thEdition, 2008.

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(20EC0410) DIGITAL COMMUNICATIONS

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the building blocks of digital communication system.*
2. *To Understand and analyze the signal flow in a digital communication system.*
3. *To learn the basic principles of baseband pulse transmission and passband data transmission.*
4. *To Analyze error performance of a digital communication system in presence of noise and other interferences.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Describe the fundamental concepts of Digital Communication Systems.*
2. *Analyze the characteristics of base band transmission and pass band transmission of Digital Communications.*
3. *Interpret the design concepts of Different digital modulation and Coding Techniques.*
4. *Estimate the performance of various schemes for the reliable transmission of digital signals and information over the channel.*
5. *Apply the knowledge of signal & system and evaluate the effect of noise on Digital transmission and reception.*
6. *Identify the significance of Filters in Digital communication Systems.*

UNIT – I
Introduction & Source Coding Systems: Digital communication system model, analog vs digital communication, Fundamental limitations of communication systems, Sampling process – quantization – quantization noise, Pulse Code Modulation (PCM) – Noise considerations in PCM systems, Differential PCM (DPCM), Delta modulation (DM), Comparison of the above systems, Illustrative Problems.

UNIT – II
Baseband Pulse Transmission: Introduction, Matched filter – Properties of Matched filter – Matched filter for rectangular pulse, Inter symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, Correlative coding, Duo binary & Modified duo binary signaling schemes, Baseband M-array PAM transmission, Eye diagrams – Illustrative Problems.

UNIT – III
Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt Orthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Correlation receiver, Equivalence of correlation and Matched filter receivers, Signal constellation diagram - Illustrative Problems.

UNIT – IV

Passband Data Transmission: Passband transmission model, Coherent digital modulation schemes – ASK, binary phase shift keying (BPSK), Quadrature shift keying (QPSK) & Binary Frequency shift keying (BFSK), Error probabilities of BPSK, QPSK & BFSK, Generation and detection of Coherent ASK, BPSK, QPSK & BFSK, M-ary PSK, M-ary Quadrature amplitude modulation, non-coherent orthogonal modulation schemes -Differential PSK, Binary FSK, Generation and detection of non-coherent BFSK, DPSK, Illustrative Problems.

UNIT – V

Channel Coding: Introduction – Error Detection & Correction – Parity Check Codes – Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes(encoding) – Syndrome decoding, Convolutional Codes – Convolutional Encoding – Decoding Methods – Illustrative Problems.

TEXT BOOKS

1. Simon Hakin, *Communication Systems*, Wiley India Edition, 4th Edition, 2011.
2. Bruce Carlson A, & Paul B. Crilly, *Communication Systems – An Introduction to Signals & Noise in Electrical Communication*, McGraw-Hill International Edition, 5th Edition, 2010.

REFERENCES

1. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2005.
2. B.P. Lathi, & Zhi Ding, *Modern Digital & Analog Communication Systems*, Oxford University Press, International 4th edition, 2010.
3. Bernard Sklar, *Digital Communications*, Prentice-Hall PTR, 2nd edition, 2001.
4. Herbert Taub & Donald L Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 3rd Edition, 2009.
5. J. G. Proakis, M Salehi, Gerhard Bauch, *Modern Communication Systems Using MATLAB*, CENGAGE, 3rd Edition, 2013.

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(20EC0411) LINEAR & DIGITAL IC APPLICATIONS

COURSE OBJECTIVES
The objectives of this course:

1. *To Design of OPAMPS, Classification of OPAMPs.*
2. *To study and design various linear and non-linear applications of OPAMPs.*
3. *To Learn VHDL programming Language.*
4. *To design Complex Combinational and Sequential circuits using Standard Digital ICs.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Describe the basics of op-amps, timers and PLL.*
2. *Interpret the internal Structure of the op-amps, timers and PLL.*
3. *Analyse the behavior of op-amp 741, 555 timer and 565 ICs.*
4. *Design different circuits using op-amp circuits, timers and PLL.*
5. *Illustrate the fundamentals of HDL Programming.*
6. *Apply the Knowledge of HDL programming to design standard combinational and sequential circuits.*

UNIT – I
Op-Amp Characteristics: Basic information of Op- amp – ideal and practical Op-amp – Op- amp block diagram – Op-amp characteristics – DC and AC characteristics–741 Op-amp and its features – Modes of operation-Inverting, Non-inverting, Differential – Basic applications of Op-amp, Instrumentation amplifier, AC amplifier, V to I and I to V Converters-**S**ample & Hold circuits – Differentiator and Integrator – Comparators – Schmitt trigger.

UNIT – II
Active Filters: Introduction – 1st order LPF – HPF filters – Band pass – Band reject and all pass filters.
Oscillators: Oscillator types – Principle of operation, RC phase shift, Wien Bridge.
Timers: Introduction to 555 timer, Functional diagram, Monostable and Astable operations, Applications.

UNIT – III
Phase Locked Loops: Introduction, Block schematic, Principles and description of individual blocks of 565.

D-A and A-D Converters: Basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC– Different types of ADCs, Parallel comparator type ADC, Counter type ADC, Successive approximation ADC and dual slope ADC–DAC and ADC specifications.

CMOS Logic: Introduction to logic families – CMOS logic – Bipolar logic – Transistor logic – low voltage CMOS logic and interfacing – Emitter coupled logic.

UNIT – IV

Hardware Description Languages: HDL Based Digital Design, the VHDL Hardware Description Language – Program Structure – Types – Constants and Arrays – Functions and procedures – Libraries and Packages– Structural design elements – Dataflow design elements – Behavioral design elements – The Time Dimension.

UNIT – V

Combinational Logic Design Practices: Description of basic structures like Decoders – Encoders – Comparators – Multiplexers (74 – series MSI) – Adders & subtractors, VHDL models for the abovestandard building block ICs.

Sequential Logic Design Practices: Latches & flip flops – counters – shift register and their VHDL models for the above standard building block ICs.

TEXT BOOKS

1. D.Roy Chowdhury, *Linear Integrated Circuits,* New Age International (p) Ltd, 2nd Edition., 2003.
2. Ramakanth A. Gayakwad, *Op-amps & Linear IC,* PHI, 1987.

REFERENCES

1. R.F. Coughlin & Fredric F. Driscoll, *Operational Amplifiers & Linear Integrated Circuits,* PHI.
2. John F. Wakerly *Digital Design Principles & Practices,* PHI/Pearson Education Asia, 3rd Ed.2005.
3. Sergio Franco, *Design with Operational amplifiers & Analog Integrated circuits,* McGraw Hill, 3rd Edition, 2002.
4. Floyd and Jain, *Digital Fundamentals,* Pearson Education, 8th Edition 2005.
5. J. Bhasker, *A VHDL Primer*, Pearson Education/ PHI, 3rd Edition.

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(20HS0815) ENTREPRENEURSHIP DEVELOPMENT

COURSE OBJECTIVES
The objectives of this course:

1. *To acquire necessary skills and knowledge required for organizing and carrying out entrepreneurial activities.*
2. *To develop the ability of analyzing and understanding business situations in which entrepreneurs act.*
3. *To develop the ability of analyzing various aspects of entrepreneurship – especially of taking over the risk, and the specificities as well as the pattern of entrepreneurship development.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Discern distinct entrepreneurial traits and identify the successful elements ofsuccessful entrepreneurial ventures.*
2. *Consider the legal and financial conditions for starting a venture and to assess the opportunities and constraints for new ventures.*
3. *Design strategies for the successful implementation of ideas.*
4. *Comprehend the evaluation of business opportunity from the prospective of an investor.*
5. *Identify the most suitable sources of finance for start-ups.*
6. *Write and execute their own business plan.*

UNIT-I
Introduction to Entrepreneurship: Concept of Entrepreneur‘s, Enterprise and Entrepreneurship; Characteristics, Qualities, Functions of entrepreneur and Advantages of Entrepreneurship; Role of entrepreneurship in Economic development, Challenges faced by entrepreneurs, Entrepreneurial scenario in India and Abroad; Elements of Social Entrepreneurship, Types of Entrepreneurs, Entrepreneurship vs Intrapreneurship.

UNIT-II
Small Business and its Importance: Introduction, Need, Classification of Micro, Small and Medium Enterprises (MSMEs), Role of MSMEs, Problems of MSMEs, Steps for Starting MSMEs, the role of government in supporting MSMEs in India.
Forms of Business Organization: Evaluation of Form of Business organization: Sole Proprietorship, Partnership, Joint Hindu Family, Joint Stock Company and Co-operative Society. Special forms of business ownership: Licensing, Franchising and Leasing.

UNIT-III
Innovation and Idea Generation in Entrepreneurship: Concept of Invention and Innovation, types of innovation, Sources of Innovation, Importance of Innovation in Entrepreneurship. Sources of new ideas, Methods of generating ideas and Opportunity recognition and idea generation in entrepreneurship.
Intellectual Property Rights (IPRs): Patents, trademarks, copyrights and trade secrets. E-commerce and Business Start-ups, Sources of information for Start-up Entrepreneurs in India. Problems of Start-ups without IPRs.

UNIT-IV

Entrepreneurial Motivation: Concept of Motivation and Factors influencing the entrepreneurs; Motivational Theories- Maslow's Need Hierarchy Theory, McClelland's Acquired Need Theory. Entrepreneurship Development Programs (EDPs) - Need and Role of EDPs. Opportunities for entrepreneurship in present scenario, Successful entrepreneurs.

Financing of Enterprises: Source of financing - Debt capital, seed capital, venture capital, Loans available for starting ventures in India, Role of government agencies in small business financing. Role of consultancy organizations.

UNIT-V

Project Planning and Feasibility Study: Meaning of Project, Project Life Cycle and Stages of Planning Process. Project Planning and Feasibility, Project proposal and report preparation.

TEXT BOOKS

1. Robert D Hisrich, Mathew J. Manimala, Michael P. Peters, Dean A. Shepherd, *Entrepreneurship*, Mc Graw Hill Education, 8th edition.
2. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, Mumbai.

REFERENCES

1. S.S. Khanka, *Entrepreneurial Development*, S. Chand and Company Limited.
2. H. Nandan, *Fundamentals of Entrepreneurship*, PHI.
3. Bholanath Dutta, *Entrepreneurship Management* – text and cases, Excel Books.
4. Holt, *Entrepreneurship,* New venture Creation, PHI.
5. Ramachandran, *Entrepreneurial Development,* Tata Mc Graw Hill, New Delhi.

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(20EC0412) ELECTRONIC CIRCUIT ANALYSIS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the analysis and design of single stage and multi stage amplifiers.*
2. *To construct feedback amplifiers, oscillators, power amplifiers, Tuned amplifiers and Multivibrators.*
3. *To simulate various analog electronic circuits and to determine their characteristics.*

COURSE OUTCOMES (COs)

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

1. *Acquire knowledge in different electronic circuits using transistor amplifier.*
2. *Analyze and design of amplifiers, feedback amplifiers, oscillators, Tunedamplifiers and Multivibrators.*
3. *Measure and simulate important parameters of various amplifiers which areused to understand the behavior of analog electronic circuits.*
4. *Identify a suitable analog electronic circuit for various applicationswith a given specification.*
5. *Function effectively as an individual and as a member in a group in thearea of analog electronic circuits.*
6. *Develop skills to communicate in verbal and written form in thearea of analog electronic circuits.*

LIST OF EXPERIMENTS:

(Minimum of Ten experiments to be conducted)

PART-A (Testing in the Hardware Laboratory)

(Minimum of 5 experiments to be conducted)

1. A two stage RC coupled amplifier
2. Darlington pair amplifier
3. Voltage series feedback amplifier
4. RC phase shift oscillator using BJT
5. Colpitts oscillator using BJT
6. Class A power amplifier (Transformer less)
7. Single tuned voltage amplifier
8. Astable Multivibrator

PART-B (using any Simulation Software)

(Minimum of 5 experiments to be conducted)

1. A two stage RC coupled amplifier
2. Darlington pair amplifier
3. Voltage series feedback amplifier
4. RC phase shift oscillator using BJT
5. Colpitts oscillator using BJT
6. Class A power amplifier (Transformer less)
7. Single tuned voltage amplifier
8. Astable Multivibrator

Additional Experiment:

One Mini project of electronic application (PCB Design)

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(20EC0413) DIGITAL COMMUNICATIONS LAB

COURSE OBJECTIVES
The objectives of this course:

1. *This course gives students deep knowledge in digital communication systems at the practical level.*
2. *This lab focuses the fundamental concepts on Pulse modulations, digital modulation techniques, source coding techniques.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Understand the background different techniques in communication systems.*
2. *Learn the modulation techniques used in Digital communication.*
3. *Conduct experiments to evaluate digital converters like PCM, DM.*
4. *Measure the Amplitude and Frequency of various Base band modulation techniques and observes the output waveforms.*
5. *Measure the Amplitude and Frequency of various Pass band modulation techniques and observes the output waveforms.*
6. *Apply channel coding techniques like Linear Block Codes and Convolutional Codes in detecting and correcting data errors in digital communication system.*

LIST OF EXPERIMENTS:
(Minimum of Ten experiments to be conducted)

1. Pulse Code Modulation.
2. Differential Pulse Code Modulation.
3. Delta Modulation.
4. Amplitude Shift Keying.
5. Frequency Shift Keying.
6. Phase Shift Keying.
7. Differential Phase Shift Keying.
8. Quadrature Amplitude Modulation.
9. QPSK Modulation and Demodulation.
10. Eye Diagrams.
11. Linear Block Codes- Encoder and Decoder.
12. Convolutional Codes- Encoder and Decoder.

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(20EC0414) LINEAR & DIGITAL IC APPLICATIONS LAB

COURSE OBJECTIVES

The Objectives of this Course:

1. *To apply operational amplifiers in linear and nonlinear applications.*
2. *To acquire the basic knowledge of special function ICs.*
3. *To design internal structure of the Digital Integrated Circuits, develop VHDL source code & verify functionality using simulation.*

COURSE OUTCOMES (COs)

On Successful Completion of this Course the Student will be able to

1. *Design and analyse the various linear & Non-Linear applications of op-amp.*
2. *Design and analyse filter circuits using op-amp.*
3. *Design and analyse oscillators and multivibrators circuits using op-amp (IC741) or IC 555.*
4. *Design and draw the internal structure of the various digital integrated circuits.*
5. *Develop VHDL/Verilog HDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.*
6. *Verify the logical operations of the digital IC's (Hardware) in the laboratory.*

PART-A

(Any **Five** Experiments to be Conducted**)**

Linear IC Applications Lab

1. Study the characteristics of Negative feedback amplifier - Inverting, Non-Inverting and Unity gain Amplifiers
2. Active Filter Applications – LPF, HPF (first order)
3. Integrator and Differentiator
4. Comparator –Applications
5. Schmitt Trigger
6. IC 555 Timer – Monostable and Astable Operation Circuit
7. Wein bridge oscillator
8. 4-Bit DAC using Op-Amp

PART-B

(Any **Five** Experiments to be Conducted**)**

Digital IC Applications Lab

1. Logic Gates- 74XX.
2. Half Adder, Half Subtractor, Full Adder, Full Subtractor & Ripple Carry Adder.

3. 3-8 Decoder -74138 & 8-3 Encoder- 74X148.
4. 8 x 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
5. 4-bit Comparator-74X85.
6. D Flip-Flop 74X74.
7. JK Flip-Flop 74X109.
8. Decade counter-74X90.

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II B.Tech – II Sem.	**L**	**T**	**P**	**C**
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(20EC0456) CISCO CERTIFIED NETWORK ASSOCIATE (CCNA)

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the advances in modern technologies.*
2. *To understand the knowledge of Computer Networks, various protocols used in Communication, Managing and configuring Cisco Switches and Routers and various WANtechnologies.*
3. *To configure a cisco switch/router with basic configuration.*
4. *To design an IPv4 and IPv6 addressing scheme to provide network connectivity for anetwork.*
5. *To configure switch security to mitigate LAN attacks.*

COURSE OUTCOMES (COs)
On Successful completion of this course, the student will be able to

1. *Understand the network simulator Packet Tracer.*
2. *Complete a Network for an Organization.*
3. *Design a network and setting passwords.*
4. *Understand various addressing schemes of a network.*
5. *Understand different protocols w.r.t switching and routing.*
6. *Implement initial settings including passwords, IP addressing and default gateway parameters on a network switch, router and end devices.*

LIST OF CONTENTS (Perform using Cisco packet tracer)

1. Networking Today
2. Study of Network Devices and Network cables in Detail
3. Protocols and Models
4. Basic Switch and End Device Configuration
5. Basic Router Configuration
6. IPv4 Addressing
7. IPv6 Addressing
8. ICMP
9. Switching Concepts
10. VLANs
11. Inter-VLAN Routing
12. STP Concepts
13. Ether Channel
14. DHCPv4
15. LAN Security Concepts
16. Switch Security Configuration
17. Routing Concepts
18. IP Static Routing

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III B.Tech. – I Sem.

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(20EC0415) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

COURSE OBJECTIVES

The objectives of this course:

1. To be proficient in the use of time varying Electromagnetic fields in 3-D co-ordinate systems.
2. To understand the use of Maxwell's equation in Electric and Magnetic field.
3. To understand the use Transmission Lines and their applications.

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. Remembering the concept of time varying electromagnetic fields in three dimensional spatial co-ordinate systems.
2. Evaluate the Maxwell's Equation in Static Electric and Magnetic Field
3. Apply Maxwell's equation in Electromagnetic field.
4. Characterize Maxwell's equation in Time varying field.
5. Understand propagation of electromagnetic waves in different media.
6. Understand the concepts and characteristics of Transmission lines.

UNIT – I

Electrostatic Fields: Coulomb's Law and Field Intensity - Electric Fields due to Continuous Charge Distributions – Line Charge, Surface Charge, Volume Charge - Electric Flux Density - Gauss Law – Applications of Gauss Law – Point Charge, Infinite Line Charge, Infinite Sheet Charge, Uniformly Charged Sphere - Electric Potential - Relations Between E and V - Illustrative Problems.

UNIT – II

Magnetostatic Fields: Biot-Savart Law - Ampere's Circuital Law – Applications of Ampere's Circuit Law – Infinite Line Current, Infinite Sheet of Current - Magnetic Flux Density, Maxwell's Equations for Static EM Fields – Magnetic Scalar and Vector Potential - Illustrative Problems.

UNIT – III

Maxwell's Equations (Time Varying Fields): Faraday's Law - Transformer and Motional EMFs – Stationary Loop in Time Varying B Field, Moving Loop in Static B Field, Moving Loop in Time Varying Field - Displacement Current - Maxwell's Equations in Final Forms - Illustrative Problems.

UNIT – IV

EM Wave Propagation: Waves in General – Wave Propagation in Lossy Dielectrics – Plane Waves in Lossless Dielectrics – Plane Wave in Free Space – Plane Waves in Good Conductors - Power and the Poynting Vector - Reflection of a Plane wave at Normal Incidence - Reflection of a Plane wave at Oblique – Parallel Polarization, Perpendicular Polarization - Illustrative Problems.

UNIT – V

Transmission Lines: Transmission Line Parameters – Transmission Line Equations – Input Impedance, SWR and Power – The Smith Chart – Applications of Transmission Lines – Transients on transmission Lines – Microstrip Transmission Lines – Illustrative Problems.

TEXT BOOKS

1. Matthew N.O. Sadiku, *Elements of Electromagnetics*, Oxford University Pres, 6th Edition, 2014.
2. William H. Hayt Jr. and John A. Buck, *Engineering Electromagnetics*, Tata McGraw-Hill publications, 7th edition, 2006.

REFERENCES

1. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, PHI, 2nd Edition, 2000
2. John D. Krauss, *Electromagnetics*, Tata McGraw-Hill publications, 4th edition, 1991.
3. Schaum‘south line series, *Electromagnetics*, 2nd edition, Tata McGraw-Hill publications, 2006.

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(20EC0416) MICROPROCESSORS AND MICROCONTROLLERS

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic architecture of computer, evolution, and its applications*
2. *To learn the architectures of Microprocessor and Microcontroller*
3. *To learn the programming of Microprocessors and Microcontrollers using their programming model*
4. *To learn the interfacing of memory, I/O, sensors and actuators to microprocessors and microcontrollers*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the evolution of computers, processors, and its applications*
2. *Explain the various software and hardware parts of a microprocessors and computer*
3. *Understand the architectures of 8085,8086 microprocessors and 8051 microcontroller system*
4. *Analyze the programming model of 8085,8086 Microprocessors & 8051 microcontroller development environment.*
5. *Implement the techniques of interfacing memories, various I/O devices, sensors and actuators with microprocessor and microcontrollers*
6. *Design and develop various microprocessor/microcontroller-based systems for the real-life problems*

UNIT – I

Microprocessors, Microcomputers and Assembly Language: Microprocessors – Microprocessor instruction set and computer languages – From large computers to single chip microcontrollers – Application: Microprocessor controlled temperature system (MCTS)

Microprocessor Architecture and Microcomputer Systems: Microprocessor Architecture and its operation – Memory – Input and output devices – Example of a microcomputer system

UNIT – II

8085 Microprocessor Architecture: The 8085 MPU - The 8085 Microprocessor, Microprocessor communication and bus timings, Demultiplexing the bus AD7-AD0, Generating control signals and A detailed look at the 8085 MPU and its architecture– Instruction, Data format and Data Storage – Overview of the 8085 Instruction set .

UNIT – III

The 8051 Architecture: Introduction – 8051 microcontroller hardware – Input/output pins, ports and circuits – External memory – Counters and timers – Serial data input/output - Interrupts

UNIT – IV

Programming the 8051: Addressing modes - Moving data – Logical operations – Arithmetic operations – Jump and call instructions

UNIT – V

Applications: Introduction – Keyboards – Displays – D/A and A/D Conversion - Multiple interrupts

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, *Computer Organization*, McGraw Hill Eductaion Pvt. Ltd, 5th Edition, 2017.
2. Ramesh Gaonkar, *Microprocessor Architecture, programming and applications with the 8085,* Penram International Publications Pvt Ltd. 6th Edition, 2015.
3. Kenneth J Ayala, *The 8051 microcontroller*, Penram International Publications Pvt Ltd, 2nd Edition, 1997

REFERENCES

1. Ray Bhurchandi, *Advanced Microprocessors & Peripheral interfacing*, MC graw hill Publications, 3rd edition, 2012.
2. N.Senthil Kumar, M.Saravanan, S.Jeevanathan, *Microprocessor and Microcontrollers,* Oxford Publishers. 1st Edition, 2015.

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(20EC0417) DIGITAL SIGNAL PROCESSING

COURSE OBJECTIVES

The objectives of this course:

1. *To learn discrete Fourier transform, properties of DFT and its application tolinear filtering.*
2. *To understand the designs of IIR and FIR filters and its realization for a givenspecifications.*
3. *To understand the effects of finite precision representation on digital filters.*
4. *To introduce the concepts of DSP architectures and its applications.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the use of various transforms for the analysis of digital signals andsystems.*
2. *Design FIR & IIR filters that can be used in various digital systems.*
3. *Evaluate the performance of different filters and compare them.*
4. *Analyze the effects of finite precision representation in digital filters.*
5. *Find the errors that commonly occur in digital signal based communication systems and study their effects.*
6. *Understand the architectures of various digital signal processors and their applications.*

UNIT-I

Discrete Fourier Transform(DFT): Discrete Fourier transform – Relationship of the DFT to other transforms, Properties of the Discrete Fourier Transform, Linear filtering based on the DFT - Filtering long duration sequences - overlap save and overlap add method.

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms, Illustrative problems.

UNIT-II

Infinite Impulse Response Filters: Design of Analog IIR (Butterworth & Chebyshev) filters - Impulse invariance method - bilinear transformation - Design of digital filters- Frequency transformation in the analog domain, Illustrative Problems. **Realization of IIR Filter:** Direct-Form I, Direct Form II, Cascade-Form and Parallel- Form Structures.

UNIT-III

Finite Impulse Response Filters: Design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems. **Realization of FIR Filter**: Linear Phase Structure and transversal structure.

UNIT-IV

Finite Word Length Effects: Representation of Numbers - Fixed point Representation - Floating point Numbers - Quantization Noise – Error due to truncation and rounding – Input Quantization Error – Coefficient Quantization error- Zero input limit cycle oscillations – overflow limit cycle oscillations – Signal scaling.

UNIT-V

Introduction to Digital Signal Processors: Overview of Digital Signal Processors - Architecture of TMS320C50 – Bus Structure, Central Processing Unit, On-Chip Memory and On-Chip Peripherals - Architecture of TMS320C54x- Internal memory organisation, Overflow handling - Applications of PDSPs.

TEXT BOOKS

1. John G. Proakis & Dimitris G.Manolakis, *Digital Signal Processing – Principles,Algorithms & Applications*, 4th Edition, Pearson Education / Prentice Hall, 2007.

2. A. Anand Kumar, *Digital Signal Processing,* 2nd Edition, PHI Publisher, 2015.

REFERENCES

1. Emmanuel C. Ifeachor & Barrie. W. Jervis, *Digital Signal Processing,* 2nd Edition, Pearson Education / Prentice Hall, 2002.
2. A.V. Oppenheim, R.W. Schafer and J.R. Buck, *Discrete-Time Signal Processing*, 8th Indian Reprint, Pearson, 2004.
3. Sanjit K. Mitra, *Digital Signal Processing – A Computer Based Approach*, Tata Mc Graw Hill, 2007.
4. Andreas Antoniou, *Digital Signal Processing*, Tata Mc Graw Hill, 2006.
5. P. Ramesh Babu, *Digital Signal Processing*, SCITECH, 7th Edition, 2019.

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III B.Tech. – I Sem.

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(20CE0170) FUNDAMENTALS OF CIVIL ENGINEERING
Open Elective – I

COURSE OBJECTIVES

The objectives of this course

1. To impart basic knowledge on Civil-Engineering.
2. To familiarize the materials and measurements used in Civil Engineering.
3. To provide the exposure on the fundamental elements of civil engineering structures.

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Explain the usage of construction material and proper selection of construction materials*
2.Attain the knowledge of building planning and construction of buildings.
3. Understand various basic methods and techniques of surveying and its applications
4.An ability describe to the various functional units in water treatment and distribution system
5. Describe water quality criteria and standards, and their relation to public health
6.Understand the rigid pavements as per IRC & Describe different components of permanent way in Railway Track

UNIT – I

Introduction to Civil engineering: Introduction - History of Civil Engineering- Sub-Disciplines of Civil Engineering

Building materials : Classification - Properties of Building Materials- Most Common Building Materials- Uses of Building Materials- Bricks- Classification- Size and weight of bricks- Qualities of good brick- Stones- Sources of stones- Common Building Stones in India- Timber- Qualities of good timber- Common timbers used for building work- Steel-Uses of steel in building work.

UNIT – II

Building Construction: Building Components-Basic Requirements of Building Components, Planning Regulations-Foundation-Purpose of Providing a Foundation, Types of Foundations-Mortar- Functions, Types of Mortars and their Preparation-Masonry Works-Stone Masonry, Classification of Stone Masonry, Brick Masonry, Types of Brick Masonry-Concrete-Ingredients of Concrete and their Functions, Mixing of Concrete, Curing of Concrete.

UNIT – III

Surveying : Objectives of Surveying- Principles of Surveying-Equipments used in surveying-Types of Surveying- Classification of Surveying- Basic methods used in surveying- Linear and angular measurements- chain Surveying, -Levelling - Purpose of Levelling, Major parts in levelling instrument, Technical terms used in levelling -Introduction to Theodolite.

UNIT – IV

Introduction to Water Supply: Importance and Necessity of protected water supply system - Objectives of protected water supply system- Flow chart of public water supply system,

Wastewater Characteristics: Characteristics of sewage – Physical, Chemical and Biological.

Wastewater Treatment: Layout and general outline of various units in a wastewater treatment plant– Primary treatment-Screens–Grit Chamber– Skimming tanks – Sedimentation tanks.

UNIT – V

Transportation Engineering: Introduction- Planning and design aspects of transportation Engineering-different modes of transport- Pavement Design- Types of pavement ,Components and their functions - Railway Engineering - Permanent way way components , Cross section of permanent way , Functions and requirements of Rails, Sleepers and Ballast , Types of gauges, Rail fastenings.

TEXT BOOKS :

1. Sateesh Gopi, *Basic Civil Engineering, Pearson Publications,* Published by Dorling Kindersley (India) Pvt. Ltd.

2. Madan Mohan Das, Bharga b Mohan Das, Mimi Das Saikia, Et Al. Saikia, *Elements Of Civil Engineering (1st Edition),* Published by Ashoke K PHI Learning Pvt. Ltd.

3. Modi, P.N., *Water Supply & Waste Water Engineering, Vol. I & II*, Standard Book House, New Delhi, 2010.

REFERENCES :

1. S.C.Saxena and S.P.Arora, *A Text Book of Railway Engineering*, Dhanpat Rai Publications, New Delhi, 2011
2. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013
3. Punmia, B.C., Jain, A.K., and Jain.A.K, *Water Supply & Waste Water Engineering, Vol. I & II*, Laxmi Publications, 2010
4. Dr. B.C. Punmia, *Ashok Kumar Jain, Arun Kumar Jain,* Surveying-Vol I, Lakshmi Publications(P) Ltd., New Delhi, Seventeen Edition,2016.

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III B.Tech. – I Sem.

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(20EE0227) GENERATION OF ENERGY FROM WASTE
Open Elective – I

COURSE OBJECTIVES

The objectives of this course:

1. *To understand different types of waste as fuel*
2. *To introduce Pyrolysis methods and conversion processes*
3. *To understand gasification methods for biomass*
4. *To learn concepts of biomass resources, combustion types and biogas plant technology*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Analyse agro based, forest residue and industrial waste conversion processes.*
2. *Manufacture of Pyrolytic oils and gases*
3. *Manufacture of charcoal, yields and applications*
4. *Understand various types of gasifiers operation*
5. *Understand inclined and fluidized bed combustors operation*
6. *Understand types of biogas plants and biomass energy programme in India*

UNIT- I

Introduction to Energy from waste: Classification of waste as fuel – Agro based- Forest residue- Industrial waste- MSW- conversion devices- Incinerators- Gasifiers-Digestors.

UNIT- II

Bio-mass Pyrolysis: Pyrolysis- Types- Slow-Fast- Manufacture of Charcoal- methods- yields and application. Manufacture of Pyrolytic oils and gases – yields and applications.

UNIT- III

Biomass Gasification: Gasifiers- Fixed bed system- Downdraft and Updraft gasifiers- Fluidized bed gasifiers- construction and operation- Gasifier burner arrangement for thermal heating.

UNIT- IV

Biomass Combustion: Biomass stoves- Types- Inclined combustors- Fluidized bed combustors- construction and operation of above biomass combustors.

UNIT- V

Properties of Biogas: Biogas plant Technology and status – Biomass resources and their classification- Biomass conversion processes- thermo chemical conversion – Direct Combustion- Biomass gasification- Pyrolysis and liquefaction – bio-chemical conversion- anaerobic digestion- Types of biogas plants- applications-Biomass Energy Programme in India.

TEXT BOOKS

1. Non-Conventional Energy- Desai Ashok V. Wiley Eastern Ltd 2010.
2. Biogas Technology – A Practical Hand Book – Khandelwal K.C. and Mahdi SS, Vol I & II. Tata Mc Graw Hill Publishing Co Ltd.,2008.

REFERENCES

1. Food, Feed and Fuel from Biomass – Challal D.S., IBH Publishing Co Pvt Ltd.,1991.
2. Non-conventional Energy Sourcrs- GD Roy, Khanna Publishers, 6th Edition
3. Biomass & Bioenergy – Khahid Rehman Hekeem, Mohammad Jawald., Umar Rashid- Springer International Publishing Ltd.

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III B.Tech - I sem

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(20ME0322) NON- CONVENTIONAL ENERGY RESOURCES
Open Elective – I

COURSE OBJECTIVES
The objective of the course is to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES
On successful completion of the course, the student will be able to

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT-I
Fundamentals of Energy system: Energy source, various forms of renewable energy, Conservation of energy and Energy scenario, need for non-conventional energy sources, alternative energy sources, Environmental consequences of oil fuel use, Role of new and renewable sources.

Solar Radiation: Environmental Impact of solar power, Direct & Diffuse Radiation, Terrestrial and extraterrestrial solar radiation, Solar radiation on tilted surface- Measurement of Solar Radiation using Pyranometer, Pyrheliometer, and Sunshine recorder.

UNIT-II
Solar thermal conversion: Flat Plate and Concentrating Collectors – Solar direct Thermal Applications– Solar thermal Power Generation

Photo voltaic Conversion: Fundamentals of Solar Photo Voltaic Conversion – Solar Cells –Solar PV Power Generation – Solar PV Applications

UNIT-III

Wind Energy: Wind Formation - Site Selection for Wind Turbine – wind speed and power relations, power extracted from the wind.

Wind Energy System: Types of Wind Energy Systems – Components of Wind Turbine – Horizontal Vs Vertical axis turbine -Performance –Safety and Environmental Aspects.

UNIT-IV

Bio – Energy: Origin of biomass, Bioenergy conversion technology – Biomass gasifiers: classification of biomass gasifiers, Biogas plants: classification of biogas plant

Bio Fuel: Ethanol production – Biodiesel – Cogeneration - Applications of Biofuel

UNIT-V

Hydrogen Energy: production of Hydrogen-Storage and Transportation of Hydrogen, Safety aspects and Applications of hydrogen.

Other Sources of Energy: Tidal energy – Wave Energy –OTEC Cycles - Open and Closed OTEC cycles, Geothermal Energy- Types of cycles

TEXT BOOKS

1. R. K.Rajput, *Non-conventional Energy Sources and Utilization,* S. Chand Publishers, 2nd Edition, 2014.
2. G. D Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 1st Edition, 2010.
3. Nicholas Jenkins & Janaka Ekanayake, *Renewable Energy Engineering*, Cambridge University Press; 1st Edition, 2017.

REFERENCES

1. Dr. R K Singal, *Non-Conventional Energy Resources*, S.K Kataria & Sons, 4th Edition, 2014.
2. John Twidell & Tony Weir, *Renewable Energy Sources*, Routledge publisher, 3rd Edition, 2015.
3. Sukhatme. S.P, *Solar Energy, Principles of Thermal Collection and Storage*, Tata McGraw Hill Publishing Company Limited, 6th Edition, 1990.

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III B.Tech. – I Sem.

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(20CS0550) RELATIONAL DATABASE MANAGEMENT SYSTEM

Open Elective – I

COURSE OBJECTIVES

The objectives of this course:

1. *Explain different issues involved in the design and implementation of a database system.*
2. *Explain physical and logical database designs, database modelling, relational, hierarchical, and network models*
3. *Introduce data manipulation language to, update, query and manage a database*
4. *Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Develop relational algebra expressions for queries and optimize them.*
2. *Design the databases using E_R method for a given specification of requirements.*
3. *Apply Normalization techniques on given database.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.*
6. *Understand Physical Storage Media and RAID concepts.*

UNIT- I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Data Independence, Data Models, Database Languages, Database Architecture, Database Users and Administrators.

UNIT-II

Introduction to Data base design: ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets.

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins.

UNIT-III

Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values.

UNIT-IV

Introduction to Schema Refinement- Problems Caused by redundancy, Normal Forms - FIRST, SECOND, THIRD Normal forms.

Properties of Decompositions: Lossless join Decomposition, Dependency preserving Decomposition - FOURTH Normal Form, FIFTH Normal form.

UNIT- V

Recoverability: System Recovery – Media Recovery –Two Phase locking – Deadlock- Detection, Recovery and Prevention.

Physical Storage and Database Concepts: Overview of Physical Storage Media and RAID.

TEXT BOOKS

1. *Database System Concepts*,Sixth Edition,Abraham Silberschatz, Henry F. Korth and S. Sudharshan , Tata McGraw Hill, 2011.

REFERENCES

1. *DatabaseManagement Systems*, 3rd Edition,Raghurama Krishnan, Johannes Gehrke,McGrawHill Education,2003.
2. *Principles of Database and Knowledge – Base Systems*, J. D. Ullman, Vol 1 Computer Science Press.
3. *Database Systems Concepts*, Peter Rob & Carlos Coronel , Cengage Learning, 2008.
4. *Introduction to Database Systems*, C.J. Date ,Pearson Education.
5. *Database Management Systems*, G.K. Gupta ,McGrawHillEducation.

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(20HS0813) MANAGEMENT SCIENCE
Open Elective – I

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the basic concepts, principles and processes of management.*
2. *To help the students gain an understanding of the functions, responsibilities ofmanagers.*
3. *To get an awareness about the latest developments and contemporary issues in thefield of management.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Utilize appropriate theoretical frameworks to real life business and managerialproblems.*
2. *Identify appropriate operational risks and develop appropriate responses to them.*
3. *Apply human resource principles to recruit, select and manage employees to achieveorganizational goals.*
4. *Enact strategy, including contingent plans for the effective management of theorganization.*
5. *Identify, plan, and implement the projects and evaluate the performance of theprojects.*
6. *Analyze effective application of latest developments to diagnose and solveorganizational problems.*

UNIT - I
Introduction to Management: Management-Concept and meaning-Nature-Functions- Management as a science and art and both. Schools of management thought-Taylor‘s scientific theory-Henry Fayol‘s principles-Weber‘s Ideal Bureaucracy-Eltan Mayo‘s Human relations-Systems theory- Situational or Contingency theory-Social responsibilities of management.
Organizational structure and Design: Features of organizational structure-work specialization - Departmentation-Span of control-Centralization and Decentralization. **Organisational Designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of organization.

UNIT - II
Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming’s contribution to quality.

Material Management: Objectives-Inventory- Functions, types, inventory classification techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management.
Marketing Management: Concept- Meaning - Nature-Functions of Marketing- Marketing Mix- Channels of distribution -Advertisement and sales promotion- Marketing Strategies based on Product Life Cycle.

UNIT - III

Human Resources Management (HRM): HRM- Definition and meaning – nature- Managerial and Operative functions-Evolution of HRM-Human Resource Planning(HRP)- Employee Recruitment-sources of recruitment- employee selection- process and tests in employee selection- Employee training and development-On- the- job and Off- the- job training methods-Performance Appraisal systems-Concept-Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration-Objectives- Essentials of Wage and Salary Administration-Job Analysis- Process -Job Evaluation- Employee Grievances-techniques of handling Grievances.

UNIT - IV

Strategic Management: Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. **Project Management (PERT/CPM):**Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing.(Simple problems).

UNIT - V

Contemporary Issues In Management: concept of MIS – Materials Requirement Planning (MRP)-Just-In-Time(JIT)System-Total Quality Management (TQM)- Six Sigma Concept- Supply Chain Management-Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

TEXT BOOKS

1. A.R Aryasri, *Management Science*, TMH,2013
2. Stoner, Freeman, Gilbert, *Management*, Pearson Education, New Delhi,2012.

REFERENCES

1. Kotler Philip & Keller Kevin Lane: *Marketing Mangement*, PHI, 2013.
2. Koontz & Weihrich: *Essentials of Management*, 6th edition, TMH,2005.
3. Thomas N.Duening& John M.Ivancevich *Management Principles andGuidelines*, Biztantra.
4. Kanishka Bedi, *Production and Operations Management*, Oxford UniversityPress, 2004.

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(20EC0430) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
Professional Elective Course (PEC) –I

COURSE OBJECTIVES
The objectives of this course:

1. *Explain basic concepts and definitions in measurement.*
2. *Describe the bridge configurations and their applications.*
3. *Elaborate discussion about the importance of signal generators and analyzers inMeasurement.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Understand the evolution and history of units which are useful in measuring variousparameters.*
2. *Apply various methods that can be used to measure different parameters usingelectronic instruments.*
3. *Analyze the design techniques of various electronic measuring instruments.*
4. *Practice the construction of testing and measuring set up for electronic systems.*
5. *Understand the design of measuring instruments which can measure differentfrequency ranges and visualize the waveforms in communication system.*
6. *Relate the usage of various instrumentation standards.*

UNIT-I
Performance characteristics of Instruments: Static characteristics- Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration-Errors in Measurement and their statistical analysis, Dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters-DC voltmeters-multirange, and differential voltmeters, AC voltmeters –multirange,-Thermocouple type RF ammeter- ohm meters, series type, shunt type-multimeter for voltage, current and resistance measurements.

UNIT-II
Oscilloscopes: Standard specifications of CRO-CRT features-derivation of deflection sensitivity- vertical and horizontal amplifiers-horizontal and vertical deflection systems- sweep trigger pulse- delay line-sync selector circuits, probes for CRO – active, passive, and attenuator type-triggered sweep CRO, and Delayed sweep-dual trace/beam CRO- Measurement of amplitude, frequency and phase (Lissajous method)-Digital storage oscilloscope- Digital frequency counters.

UNIT-III
Signal Generators-fixed and variable-AF oscillators-function generators-pulse, random noise, sweep, and arbitrary waveform generators, specifications and principles of working (Block diagram approach)-Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

UNIT-IV
Review of DC Bridges: Wheatstone bridge, Wein Bridge, errors and precautions in using bridges
AC bridges: Measurement of inductance-Maxwell‟s bridge, Anderson Bridge-Measurement of capacitance- Schearing Bridge. Kelvin Bridge-Q-meter.

UNIT-V

Sensors and Transducers: Active and passive transducers-Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) -Temperature (resistance thermometers, thermocouples, and thermistors)- Velocity- Acceleration-Vibration.

TEXT BOOKS

1. H.S.Kalsi, *Electronic Instrumentation,* second edition, Tata McGraw Hill, 2004.
2. K. Lal Kishore, *Electronic Measurements & Instrumentations*, Pearson Education,2009.

REFERENCES

1. A.D. Helfrick and W.D.Cooper, *Modern Electronic Instrumentation andMeasurement Techniques*, PHI, 5th Edition, 2002.
2. Ernest O Doebelin and Dhanesh N Manik, *Measurement Systems Application andDesign*, TMH, 5th Edition, 2009.
3. Oliver and Cage, *Electronic Measurement and Instrumentation*, TMH.
4. Robert A.Witte, *Electronic Test Instruments, Analog and Digital Measurements*,Pearson Education, 2nd Ed., 2004.
5. David A. Bell, *Electronic Instrumentation & Measurements*, PHI, 2nd Edition, 2003

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(20EC0431) INFORMATION THEORY AND CODING
Professional Elective Course (PEC) –I

COURSE OBJECTIVES
The objectives of this course:

1. *To introduce the principles and applications of information theory.*
2. *To guide the student through the implications and consequences of fundamental theories and laws of information theory and coding theory with reference to the application in modern communication and computer systems.*
3. *To teach coding schemes, including error correcting codes.*
4. *To explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problems.*

COURSE OUTCOMES (COs)
After the completion of the course, student will be able to

1. *Explain the concept of information.*
2. *Analyze the concept of entropy and error control coding.*
3. *Determine channel capacity.*
4. *Apply coding techniques to define channel capacities and properties using Shannon's Theorems.*
5. *Construct efficient codes for data on imperfect communication channels.*
6. *Analyse error correction and detection in receiver section.*

UNIT - I
Information Theory: Introduction-Measure of information-Information content of message - Average Information content of symbols in Long Independent Sequences-Average Information content of symbols in Long dependent sequences.

UNIT - II
Source Coding: Source coding theorem - Prefix Codes -Kraft McMillan Inequality property Encoding of the Source Output - Shannon’s Encoding Algorithm - Shannon Fano Encoding Algorithm - Huffman codes, Extended Huffman coding.

UNIT - III
Information Channels: Communication Channels-Channel Models-Channel Matrix-Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of Binary Symmetric Channel, Binary Erasure Channel, Murogas Theorem, Continuous Channels.

UNIT - IV
Error Control Coding: Introduction-Examples of Error control coding-methods of Controlling Errors-Types of Errors-Types of Codes-Linear Block Codes: Matrix description of Linear Block Codes-Error Detection and Error Correction Capabilities of Linear Block Codes-Single Error Correcting Hamming Codes.

UNIT - V

Cyclic Codes: Algebraic Structure of Cyclic Codes-Encoding using an (n-k) Bit Shift register-Syndrome Calculation-Error Detection and Correction.

Convolution Codes: Convolution Encoder-Time domain approach-Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system

TEXT BOOKS

1. Murlidhar Kulkarni, *Information Theory And Coding*, Wiley India, 1st Edition, 2018.
2. Shu Lin and D.J. Costello Jr., *Error Control Coding*, Prentice Hall, 2nd Edition, 1983.

REFERENCES

1. M. Mansurpur, *Introduction to Information Theory*, McGraw Hill, 1987.
2. N. Abramson, *Information and Coding*, 1st Edition, McGraw Hill, 1963.
3. R.B. Ash, *Information Theory*, Prentice Hall, 1970.

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(20EC0432) BIO-MEDICAL ELECTRONICS
Professional Elective Course (PEC) –I

COURSE OBJECTIVES
The objectives of this course:

1. *Understand the various physiological parameters both electrical and non-electricalmethods of recording and also method of transmitting these parameters.*
2. *Learn about the various assist devices used in the hospitals.*
3. *Understand the equipment used for physical medicine and various recently developed diagnostic and therapeutic techniques.*
4. *Understand the working of ventilators.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Understand the Bio potentials in medical domain.*
2. *Know the working of Non-Electrical Parameter measurement devices.*
3. *Understand the operations of medical Health Assist Devices.*
4. *Apply the telemedicine and telemetry for patient in Medical field.*
5. *Know the working principle of Measuring, Recording and Monitoring equipment*
6. *Know the different types of ventilators, electronic components and its working.*

UNIT - I

Electro-Physiology and Bio-Potential Recording: The origin of Bio-potentials; bio potential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT - II

Bio-Chemical and Non-Electrical Parameter Measurement: pH, PO2, PCO2, colorimeter, Auto analyser, Oximeters, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT - III

Assist Devices: Cardiac pacemakers, DC Defibrillator, Dialyser, Heart lung machine107.

UNIT - IV

Physical Medicine and Biotelemetry: Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radio pill, electrical safety

UNIT - V

Recent Trends in Medical Instrumentation: Thermograph, Endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine.

Ventilators: Mechanics of respiration, Artificial Ventilation, Ventilators, Types of ventilators, Ventilator terms, Classification of ventilators, Pressure-Volume-Flow diagrams, Modern ventilators, High frequency ventilators, Humidifiers, Nebulizers, and Aspirators.

TEXT BOOKS

1. Leslie Cromwell, *Biomedical instrumentation and measurement*, Prentice Hall of India,New Delhi, 2007.
2. John G. Webster, *Medical Instrumentation Application and Design*, 3rd Edition, Wiley India Edition, 2007.

REFERENCES

1. Khandpur, R.S., *Handbook of Biomedical Instrumentation*, TATA McGraw-Hill, New Delhi,2003.
2. Joseph J.Carr and John M.Brown, *Introduction to Biomedical equipment Technology*, JohnWiley and Sons, New York, 2004.

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(20EC0418) MICROPROCESSORS AND MICROCONTROLLERS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the structure of assembly language and embedded C programming.*
2. *Develop programs using various instructions and addressing modes of 8051 microcontroller*
3. *Design and simulate the interfacing of peripherals to microcontroller board.*

COURSE OUTCOMES (COs)

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

1. *Understand arithmetic, logical and string operations using assembly language programming.*
2. *Develop embedded C language programs for various applications using 8051 microcontroller*
3. *Explore the provided example code and online resources for extending knowledge about the capabilities of the 8/16-bit microcontrollers*
4. *Implement project intended solution for project based learning.*
5. *Know the procedure for test, debug, and deploy the 8051 microcontroller-based systems.*
6. *Design and develop own microprocessor/microcontroller-based solutions for the real-world problems.*

Note: Minimum **Ten** Experiments to be conducted (9 from Part A, B and one from Part C)

Part A: 8085 Microprocessor Programming

1. a) 8-bit addition operations
   b) 8-bit subtraction operations
2. a) 8-bit Multiplication operations
   b) 8-bit Division operations
3. Logical operations on an 8-bit number

Part B: 8051 Microcontroller Programming

1. Interfacing LED
2. Interfacing Push button
3. Interfacing 7 segment display
4. Interfacing ADC
5. Interfacing Sensors
6. Interfacing Actuators

Part C: Mini projects

1. 4-way Traffic light control system.
2. Three floor elevator system.
3. Automatic streetlight control system.
4. Intruder alert system.
5. Automatic Tollgate system.
6. Water level control system.
7. Digital alarm clock.
8. Electronic code lock.
9. Automatic gardening system.
10. Self-developed project

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(20EC0419) DIGITAL SIGNAL PROCESSING LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To perform basic signal processing operations such as Linear Convolution, Circular convolution, Auto Correlation, Cross Correlation and Frequency analysis in MATLAB.*
2. *To implement FIR and IIR filters in MATLAB and DSP Processor.*
3. *To study the architecture of DSP processor.*
4. *To design a DSP system to demonstrate the Multi-rate signal processing concepts.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the various fundamental signal processing operations.*
2. *Analyze the use of convolution and correlation in signal processing.*
3. *Measure the similarity between the sequences.*
4. *Design the FIR and IIR Filters.*
5. *Analyze the Multirate Signal Processing.*
6. *Apply various transforms for Discrete-Time sequences.*

LIST OF EXPERIMENTS
(Minimum of 10 experiments has to be conducted)

Cycle- I :MATLAB based Experiments
(Minimum of 6 experiments has to be conducted)

1. Generation of elementary Discrete-Time sequences.
2. Perform linear convolution and Circular convolution.
3. Computation of Auto correlation and Cross Correlation.
4. Computation of DFT and IDFT of given DT signal.
5. Design of Low Pass and High Pass IIR filter.
6. Design of Band Pass and Band Reject IIR filter.
7. Design of Low Pass and High Pass FIR filter.
8. Design of Band Pass and Band Reject FIR filter.
9. Analysis of Decimation Process.
10. Analysis of Interpolation Process.

Cycle- II: Processor Based Experiments

(Minimum of 4 experiments has to be conducted)

1. Study the architecture of Digital Signal Processor.
2. Implementation of linear Convolution of the given sequence.
3. Implementation of circular Convolution of the given sequence.
4. Implementation of Fast Fourier Transform (FFT).
5. Implementation of DFT and IDFT of a given signal.

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(20HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS

Skill Advanced Course / Soft skill course

COURSE OBJECTIVES

The objectives of this course:

1. To improve the students' fluency in English, through a well-developed vocabulary
2.To enable them listening spoken English at normal conversational speed by English speakers
3. To respond appropriately in different social-cultural and professional contexts
4.To develop drafting skills among the students.
5. To develop Inter-personal and Intra-personal Skills

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. Use fluency in English for all kinds of professional communication
2. Enhancing job required skills for getting success in their professions
3.Improving Effective Speaking Abilities for their business or professional correspondence
4. prepare effective Interview techniques to get job in the present scenario
5.Using the appropriate skills in all kinds of professional activities
6. Use effective communicative approaches by preparing job application, report and other kinds of spoken and written correspondences.

UNIT I
COMMUNICATIVE COMPETENCY

1. Functional English
2. Reading Comprehension
3. Vocabulary for competitive purpose
4. Spotting Errors

UNIT II
TECHNICAL WRITING

5. Cover Letter
6. Curriculum vitae
7. Report writing

UNIT III
PRESENTATIONAL SKILLS

8. Impromptu Speech
9. Oral presentation
10. Power point presentation
11. Poster presentation

UNIT IV
CORPORATE SKILLS

12. Problem Solving
13. Team Work
14. Leadership Skills

UNIT V
GETTING READY FOR JOB

15. Group Discussion
16. Interview skills

Minimum requirements for English for Corporate Communication Skills Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.

2. English for Corporate Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component):

Computer network, LAN with minimum 60 multimedia systems with the following

Specifications

i) a) Intel(R) core (TM) i3
   b) Speed 3.10 GHZ
   c) RAM – 4 GB
   d) Hard Disk – 320 GB

ii) Headphones with High quality

Software

Walden Info Tech Software

REFERENCES

1. Effective Tech Communication, Rizvi, Tata McGraw – Hill Education, 2007.
2. Communication skills, Sanjay Kumar &Pushpalatha, Oxford University Press, 2012.
3. Writing Tutor. Advanced English Learners' Dictionary, 9th Edition, Oxford University Press, 2015.
4. Powerful Vocabulary Builder, AnjanaAgarwal, New Age International Publishers, 2011.
5. Listening Extra, Miles Craven, Cambridge University Press, 2008.

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(20HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
Mandatory Course

COURSE OBJECTIVES
1. To impart basic principles of thought process, reasoning and inference.
2. To connect society and nature through sustainability.
3. To know Holistic life style of yogic science and wisdom capsules in Sanskrit literature.
4. To introduce Indian knowledge system and Indian perspective of modern scientific world-view
5. To learn the basic principles of Yoga and holistic health care system.

COURSE OUTCOMES
1. To connect up the basic principles of thought process.
2. To understand Holistic life style of yogic science and wisdom capsules in Sanskrit literature.
3. To analyze the society and nature through sustainability.
4. To explain Indian knowledge system and Indian perspective of modern science.
5. To use the basic principles of Yoga and holistic health care system.

UNIT – I
Part-1

Basic structure of Indian Knowledge System: Introduction to vedic Knowledge - 4 ved(The Rig Veda ***:*** The Book of Mantra, The Yajur Veda : The Book of Ritual, SamaVeda:The book of Chants & songs and The Atharva Veda : The Book of Spell - The Age of the 4 Vedas The structure of the Vedic books.

Part-2

4Upaved (Ayurved, Dhanurved, GandharvaVed&SthapthyaAdi.,) The Vedas place in Hindu Philosophy

UNIT – II
Part-1

Vedangas: Introduction to Vedangas – The Importance of Vedangas - 6 Six Philosophical system (Shisha, Kalppa, Nirukha, VYkaran, Jyothish&Chand) Vedangas compared to Limbs of Human body.

Part-2

Upanga : Introduction to Upanga - Meaning of Upangas of Veda – Subsidiary parts of the veda - (Dharma Shastra, Meemamsa, Purana&TharkaShastra)

UNIT – III

Part-1;Modern Science and Indian KnowledgeSystem : India`s Contribution to Science and Technology(From Ancient to Modern) - Development in Different Branches of Science and Technology.

Part-2: Yoga and Holistic Healthcare: Introduction to Yoga – Its History – Importance of Yoga - Yogic concepts of Holistic Health care – Potentiality of Yoga – Personality development through Yoga.

UNIT – IV

Part-1: Philosophical Tradition: Introduction to Indian Philosophy (Charvaka Philosophy, Samkhya Philosophy, Yoga Philosophy, Nyaya Philosophy, Mimansa Philosophy, Vaisesika Philosophy, Buddhist Philosophy and Jaina Philosophy.

Part-2: Indian Linguistic Tradition: Introduction to Linguistics - Aspects of Linguistic Behaviour (Phonology, morphology, syntax and semantics)

UNIT – V

Indian Artistic Tradition : Introduction to Indian Arts – Religious and cultural diversities – Stylistic Variations - Chitrakala,Vasthukala, Sangeetha, NruthyaSahithya and Jyothisha – Tradition to Modern - Casestudies

TEXT BOOKS:

1. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, BharatiyaVidyaBhavan, Mumbai. 5th Edition,2014
2. S.C. Chaterjee& D.M. Datta, *An Introduction to Indian Philosophy*, University of Calcutta, 1984

REFERENCES :

1. V N Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad,Arnakulam
2. Ramakrishna Mission *Yoga Sutra of Patanjali*, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with VyasaBhashya*, VidyanidhiPrakashan, Delhi2016
3. R N Jha, *Science of Consciousness Psychotherapy and Yoga Practices*, Vidyanidh Prakashan, Delhi2016
4. Krishna Chaitanya, *Arts of India*, Abhinav Publications,1987

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(20EC0421) ANTENNAS AND WAVE PROPAGATION

COURSE OBJECTIVES

The objectives of this course:

1. *To learn the Fundamentals of electromagnetic: radiation, wave equation, retardedpotential, short current element, near and far fields, Poynting's theorem.*
2. *To Design of antenna arrays: principle of pattern multiplication.*
3. *To understand broadside and end fire arrays, array synthesis, coupling effects andmutual impedance, parasitic elements, Yagi-Uda antenna.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the basic principles of all types of antennas calculate the far field region.*
2. *Analyze different types of antennas and their parametric integral expressions for agiven current source for various frequency ranges.*
3. *Calculate electromagnetic fields of a given vector potential for practical antennas.*
4. *Implement pattern multiplication principle for some practical array antennas such asdipole, Yagi - uda, and horn antenna.*
5. *Apply the radiation patterns of antennas through measurement setups.*
6. *Learn various modes of wave propagation and their parameters.*

UNIT-I

Antenna & Radiation Parameters: Antenna Basics & Parameters – Radiation Pattern, Radiation Intensity, Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam Efficiency. Matching, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole and Quarter wave monopole and its radiation parameters.

UNIT-II

VHF, UHF and Microwave Antennas –I: Folded Dipoles, Arrays with Parasitic Elements – Yagi-Uda Arrays. Helical Antennas, and its modes, Normal Mode, Axial Mode. Horn Antennas – Types, Optimum Horns- Design considerations of Pyramidal Horns, Illustrative Problems.

UNIT-III

VHF, UHF and Microwave Antennas – II & Antenna Measurements: Micro strip Antennas – Introduction, features, advantages and limitations, Rectangular patch antennas – Geometry, characteristics of Micro strip antennas, Introduction to Reflector Antenna, parabola reflectors, pattern characteristics, Feed Methods.

Antenna Measurements – Introduction, Concepts – Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (by comparison, Absolute).

UNIT-IV

Antenna Arrays: Point sources - Definition, Patterns, arrays of 2 Isotropic sources – Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – BroadsideArrays, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison of BSA & EFA, Binomial Arrays, Illustrative problems.

UNIT-V

Wave Propagation: Different modes of wave propagation, Structure of Ground wave propagation, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Illustrative problems.

TEXT BOOKS

1. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, *Antennas and wavepropagation*, TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.
2. C.A. Balanis, *Antenna Theory- Analysis and Design*, John Wiley & Sons, 2nd Edition.2001.

REFERENCES

1. K.D. Prasad, Satya Prakashan, *Antennas and Wave Propagation*, 4th Ed.,Tech. IndiaPublications, New Delhi, 2001.
2. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, PHI,2nd Edn, 2000.
3. E.V.D. Glazier and H.R.L. Lamont, *Transmission and Propagation - The ServicesText Book of Radio*, vol. 5, Standard Publishers Distributors, Delhi.
4. F.E. Terman, *Electronic and Radio Engineering*, McGraw-Hill, 4th edition, 1955

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(20EC0422) EMBEDDED SYSTEMS AND IOT

COURSE OBJECTIVES

The objectives of this course:

1. *To Describe the hardware and software components and development cycle of embedded systems.*
2. *To provide an overview on the ICT ecosystem and enabling environment to foster Internet of Things (including technology, standards, system management and applications) deployments.*
3. *Define the infrastructure for supporting IoT deployments.*
4. *To provide an understanding of the technologies and the standards relating to the Internet of Things.*
5. *To develop skills on IoT applications.*

COURSE OUTCOMES

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

1. *Enumerate and describe the components of an embedded system.*
2. *Understand the technology and standards relating to IoTs.*
3. *Understand the Networking in IOT and Arduino.*
4. *Learn the language and Identify the components and develop an IoT Applications.*
5. *Understand Sensors, Actuators, and Configuration of Raspberry Pi and develop python code on Raspberry Pi for IoT application.*
6. *Apply the knowledge and skills acquired during the course to design, build and test acomplete, working IoT system involving prototyping, programming and data analysis for IoT Application.*

UNIT – I

Introduction to embedded systems: Introduction - Classification – Applications – Architecture – Harvard and Von-Neuman architectures - RISC vs CISC design philosophy - Embedded processors and their types – Communication Interfaces - Onboard (I2C, SPI, UART, 1-wire interface, parallel interface) & External (RS-232 & RS-485, USB, IEEE 1394, IrDA, Bluetooth, Wi-Fi, ZigBee, GPRS) - Application specific circuitry - Reset, Brownout protection, Oscillator, RTC & Watchdog timer - Embedded firmware - Overview of design process of embedded systems – Programming languages and tools for embedded design.

UNIT – II

IoT Introduction & Concepts: Introduction to Internet of Things - Physical Design of IoT - Logical Design of IoT - IoT Enabling Technologies - IoT Levels & Deployment Templates.

Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Logistics -Agriculture – Industry - Health & Lifestyle.

UNIT – III

IoT and M2M: Introduction – M2M – Difference between IoT an M2M - Software Defined Networking - Network Function Virtualization for IoT.

Introduction to Arduino: Arduino Board and I/O pins, LCD and Keyboard Programming – Counter and Timer Programming – Interrupt Programming – ADC and Sensor Programming – I2C interfacing with DAC programming – Stepper Motor Interfacing with programming– DC motor with PWM Programming.

UNIT – IV

Developing Internet of Things: IoT Design Methodology - Logical Design using Python -Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages.

UNIT – V

IoT Physical Devices & Endpoints: IoT Device – Raspberry Pi Board - Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming raspberry Pi with Python – Other IoT devices – Designing and developing IoT applications for real world problems.

TEXT BOOKS

1. Shibu K V, *Introduction to Embedded systems*, Tata McGraw-Hill Education, 1st Edition, 2009.
2. Vijay Madisetti - Arshdeep Bahga, *Internet of Things a Hands-on Approach*, Arshdeep Bahga & Vijay Madisetti , 1st Edition, 2014.
3. Make: Getting Started with Arduino, 3e: The *Open Source Electronics Prototyping Platform Paperback* – 16 January 2015 by Massimo Banzi and Michael Shiloh

REFERENCES

1. Raj Kamal, *Embedded Systems*, Tata McGraw-Hill Education, 2nd Edision, 2011.
2. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd,1st Edition, 2014,
3. Daniel Kellmereit - Daniel Obodovski, *The Silent Intelligence: The Internet of Things*, DnDVentures, 1st Edition, 2013.
4. Muhammad Ali Mazidi, Shujen Chen, Eshragh Ghaemi "*Arduino Programming from Beginning to Advanced",* Amazon Kindle, 1st Edition, 2021.

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(20EC0423) MICROWAVE THEORY & TECHNIQUES

COURSE OBJECTIVES

The objectives of this course:

1. *To develop the knowledge on transmission lines for microwaves, cavity resonatorsand wave guide components and applications.*
2. *To understand the scattering matrix parameters and its use.*
3. *To understand the microwave tubes and microwave test bench for measuredifferent parameters like attenuation, VSWR, etc.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand the basics of microwaves and illustrate the various parameters.*
2. *Design and simulate waveguide components for various applications.*
3. *Compare between the conventional waveguides & microwave tubes.*
4. *Analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides,transmission lines, filters and other passive components, active devices.*
5. *Understand the measurement of various parameters related to microwaves andwaveguides.*
6. *Design and analyze the microwave devices that suits for different applications.*

UNIT- I

Introduction of Microwave: Introduction to Microwaves - History of Microwaves, Microwave Frequency bands, Applications of Microwaves. - Concept of Mode, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations. Power Transmission and Power Losses in Rectangular Guide - Features of TEM, TE and TM Modes, Losses associated with microwave transmission.

UNIT- II

Microwave Parameters: Analysis of RF and Microwave Transmission Lines - Coaxial line, Rectangular waveguide, Circular waveguide, Cavity resonator, Strip line, Micro strip line. Microwave Network Analysis - Equivalent voltages and currents for non-TEM lines, Ferrite Components – Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

UNIT- III

Waveguide Components and Applications: Coupling Mechanisms–Probe, Loop, Aperture types. Waveguide Discontinuities - Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators, Waveguide Phase Shifters. Scattering Matrix– Significance, Formulation and Properties. S- Matrix Calculations for – 2 port Junction, E- plane and H-plane Tees, Magic Tee. Directional Couplers.

UNIT- IV

Microwave Tubes: Microwave tubes – O type and M type classifications. O-type tubes: 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process. Reflex Klystrons – Structure, Principle of working and Applegate Diagram, Mathematical Theory of Bunching.

M-Type Tubes: Introduction- Magnetrons: Cross-field effects – Hull Cut-off and Hartree Conditions- Travelling Wave tube.

UNIT- V

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Precautions. Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

TEXT BOOKS

1. Samuel Y. Liao, *Microwave Devices and Circuits*, PHI, 3rd Edition,1994.
2. Herbert J. Reich, J.G. Skalnik, P.F. Ordungand H.L. Krauss, *Microwave Principles*,CBS Publishers and Distributors, New Delhi, 2004.

REFERENCES

1. R.E. Collin, *Foundations for Microwave Engineering*, IEEE Press, John Wiley,2nd Edition,2002.
2. M.L. Sisodia and G.S.Raghuvanshi, *Microwave Circuits and Passive Devices*,Wiley Eastern Ltd., New Age International Publishers Ltd.,1995.
3. Peter A. Rizzi, *Microwave Engineering Passive Circuits*, PHI,1999.
4. F.E. Terman, *Electronic and Radio Engineering*, McGraw-Hill, 4th Edition, 1955.

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(20EC0433) FIBER OPTIC COMMUNICATIONS
Professional Elective Course (PEC) –II

COURSE OBJECTIVES
The objectives of this course:

1. *To understand Optical Fiber Communications.*
2. *To understand the Ray Theory, single& amplitude; multimode fibers, fiber materials,losses, dispersion in OFC.*
3. *To understand the connectors, splices, couplers, LASER, LED sources.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.*
2. *Understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.*
3. *Learn the various optical source materials and optical receivers such as LED structures, quantum efficiency, Laser diodes, PIN, APD diodes, noise performance in photo detector, receiver operation and configuration.*
4. *Analyze the use of analog and digital links such as the various criteria like power loss wavelength to be considered for point-to-point link in digital link system.*
5. *Learn the fiber optical network components, variety of networking aspects, and operational principles WDM*
6. *Analyze the different techniques to improve the capacity of the system.*

UNIT-I
Introduction: The general Optical Communication System, Advantages & disadvantages of Optical fiber communication, Ray Theory transmission: Optical Fiber Structure, Total internal reflection, Angle of incidence, Refractive Index, Numerical Aperture, Skew Rays, Single mode & multimode fibers, Step index & graded index fibers,

Transmission Characteristics of Optical Fibers: Attenuation, Absorption losses, scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave Guides- Information Capacity determination, Group Delay, Intermodal dispersion.

UNIT-II
Fiber Optical Sources and Coupling: Direct and indirect Band gap materials, LED structures, Light source materials, Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition, Rate equations, External Quantum efficiency, Resonant frequencies, Temperature effects.

UNIT-III
Fiber Optical Receivers: PIN and APD diodes, Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise, Comparison of Photo detectors. Fundamental Receiver Operation, pre-amplifiers, Error Sources, Receiver Configuration

UNIT- IV

Optical Fiber System Design & Technology: System specification, Point-to- links, link power budget, Rise Time Budget, Bandwidth Budget, Power Budget (Adaptors, Attenuators and its effects must be explained) and Receiver Sensitivity, Link Budget calculations, Optical Multiplexing & Demultiplexing techniques, Optical Amplifiers and its Applications.

UNIT- V

Optical Networks: Basic networks, Broadcast-and-select WDM networks, Wavelength-routed networks, Performance of WDM+EDFA systems, Optical CDMA, Ultra high capacity networks.

TEXT BOOKS

1. Gerd Keiser, *Optical Fiber Communication*, McGraw –Hill International, Singapore, 3rd ed.,2000.
2. J.Senior, *Optical Communication, Principles and Practice*, Prentice Hall of India, 1994.

REFERENCES

1. Max Ming-Kang Liu, *Principles and Applications of Optical Communications*, TMH, 2010.
2. S.C. Gupta, *Text book on optical fiber communication and its applications*, PHI, 2005.
3. Satish Kumar, *Fundamentals of Optical Fiber communications*, PHI, 2008.

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(20EC0434) WIRELESS SENSOR NETWORKS
Professional Elective Course (PEC) –II

COURSE OBJECTIVES
The objectives of this course:

1. *To provide an overview about sensor networks and emerging technologies.*
2. *To study about the node and network architecture of sensor nodes and its execution environment.*
3. *To understand the concepts of communication, MAC, routing protocols.*
4. *To learn about topology control and clustering in networks with timing synchronization.*
5. *To study about sensor node platforms and understand the simulation and programming techniques.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks*
2. *Understand the architectures, operating systems, execution environments and network architecture gateway concepts.*
3. *Illustrate the Physical layer and transceiver design considerations and analyze the MAC protocols for wireless sensor networks.*
4. *Understand the mediation device protocol, wakeup radio concepts, address and name management.*
5. *Understand the infrastructure establishment, topology control and joint routing and information aggregation.*
6. *Understand the sensor network platform and tools state-centric programming.*

UNIT - I

OVERVIEW OF WIRELESS SENSOR NETWORKS: Challenges for wireless sensor networks, characteristic requirements of wireless sensor networks, enabling technologies for wireless sensor networks, advantages of sensor networks, sensor network applications.

UNIT- II

ARCHITECTURES: Single-node architecture, hardware components, energy consumption of sensor nodes, operating systems and execution environments, network architecture, sensor network scenarios, optimization goals and figures of merit, gateway concepts.

UNIT -III

NETWORKING SENSORS : Physical Layer and Transceiver Design Considerations, MAC Protocols for WSN, Low Duty Cycle Protocols and Wakeup Concepts – S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols– Energy-Efficient Routing, Geographic Routing.

UNIT -IV

INFRASTRUCTURE ESTABLISHMENT: Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT -V

SENSOR NETWORK PLATFORM AND TOOLS: Sensor node hardware, Berkeley motes, programming challenges, node-level software platforms, node-level simulators, state-centric programming.

TEXT BOOKS

1. Holger Karl, Andreas Willig, "*Protocols And Architectures for Wireless Sensor Networks*", John Wiley, 1st Edition, 2005.
2. Sudhakar, Feng Zhao & Leonidas J. Guibas, "*Wireless Sensor Networks- An Information Processing Approach*", Elsevier, 1st Edition 2007.
3. Jun Zheng, Abbas Jamalipour, "*Wireless Sensor Networks- A Networking Perspectivel"*, John Wiley & Sons, 1st Edition, 2009.

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati,,"*Wireless Sensor Networks Technology*", Protocols, And Applications‖, John Wiley, 1st Edition 2007.
2. Anna Hac, "*Wireless Sensor Network Designs*", John Wiley, 1st Edition 2003.
3. Waltenegus Dargie , Christian Poellabauer*,,"Fundamentals of Wireless Sensor Networks*‖", John Wiley & Sons, 1st Edition, 2010.

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(20EC0435) MIXED SIGNAL DESIGN
Professional Elective Course (PEC) –II

COURSE OBJECTIVES
The objectives of this course:
1. *Study the mixed signal of submicron CMOS circuits*
2. *Understand the various integrated based filters and topologies*
3. *Learn the data converters architecture, modeling and signal to noise ratio*
4. *Study the integrated circuit of oscillators and PLLs*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
4. *Apply the concepts for mixed signal MOS circuit.*
5. *Analyze the characteristics of IC based CMOS filters.*
6. *Design of various data converter architecture circuits.*
7. *Analyze the signal to noise ratio and modeling of mixed signals.*
8. *Design of oscillators and phase lock loop circuit.*

UNIT – I
SUBMICRON CMOS CIRCUIT DESIGN: Submicron CMOS: Overview and Models, CMOS process flow, Capacitors and Resistors. Digital circuit design: The MOSFET Switch, Delay Elements, An Adder. Analog Circuit Design: Biasing, Op-Amp Design, Circuit Noise

UNIT - II
INTEGRATOR BASED CMOS FILTERS: Integrator Building Blocks- low pass filter, Active RC integrators, MOSFET-C Integrators, gm- C integrators, Discrete time integrators. Filtering Topologies: The Bilinear transfer function, The Biquadratic transfer function, Filters using Noise shaping.

UNIT – III
DATA CONVERTER ARCHITECTURES: DAC Architectures- Resistor string, R-2R ladder Networks, Current Steering, Charge Scaling DACs, Cyclic DAC, and Pipeline DAC. ADC Architectures- Flash, Two-step flash ADC, Pipeline ADC, Integrating ADC‘s, Successive Approximation ADC.

UNIT – IV
DATA CONVERTER MODELING AND SNR: Sampling and Aliasing: A modeling approach, Impulse sampling, The sample and Hold, Quantization noise. Data converter SNR: An overview, Clock Jitter, Improving SNR using Averaging, decimating filter for ADCs, Interpolating filter for DACs, Band pass and High pass sinc filters - Using feedback to improve SNR.

UNIT - V
OSCILLATORS AND PLL: LC oscillators, Voltage Controlled Oscillators. Simple PLL, Charge pumps PLLs, non- ideal effects in PLLs, Delay Locked Loop.

TEXT BOOKS

1. CMOS Mixed Signal Circuit Design by R.Jacob Baker, Wiley India, IEEE Press, reprint 2008.
2. CMOS Circuit Design, Layout and Simulation by R.Jacob Baker, Wiley India, IEEE Press, Second Edition, reprint 2009.
3. Design of Analog CMOS Integrated Circuits by Behzad Razavi, McGraw Hill, 33rd Re- print, 2016.

REFERENCES

1. "CMOS Analog Circuit Design" by Phillip Allen and Douglas R. Holberg.
2. "Analog Design Essentials" by Willy M. C. Sansen, "Design of Analog CMOS Integrated Circuits" by Behzad Razavi.
3. R.J.Baker, H. W. Li, D. E. Boyce, CMOS Circuit Design, Layout, and Simulation, PHI , 2002

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(20CE0147) FUNDAMENTALS OF URBAN PLANNING
Open Elective – II

COURSE OBJECTIVES
The objectives of this course

1. *To understand the concept of balanced town by ensuring that new and existing facilities are complimentary to each other*
2. *To provide sustainable buildings by considering the environmental, social and economic conditions*
3. *To create awareness about the traffic management within the town*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. ***Recognize** issues related to town planning and **discuss** the objectives, necessity and stages of town planning*
2. ***Summarize** importance of zoning, can **classify** various town planning practices and can conduct surveys for town planning*
3. ***Classify** the residential building, list the agencies involved in improving house and review the problems associated with residential housing*
4. ***Discuss** the issues associated with slums and **recognize** the methods to improve condition of slums*
5. ***Interpret** norms laid down for public and industrial building and can **summarize** building bye-laws*
6. ***List** and **discuss** various urban roads and the concepts of traffic management in a town*

UNIT – I
Introduction to Town Planning: Objects of town planning - Necessity of town planning - Principles of town planning - Stages of Town Planning - Origin and growth of towns - Development of towns - Modern town planning in India - Socio - Economic aspects of town planning - Selection of site for an ideal town – Cost of town planning.

UNIT – II
Surveys & Planning: Various types of surveys to be conducted for town planning project - Data to be collected in different types of town planning survey - Types of planning - A brief note on urban, rural and regional planning.

Zoning: Definition - Objects and principles of zoning - Advantages of zoning - Special Economic Zone (SEZ) - Maps for zoning.

UNIT – III

Housing: Classification of residential building as per HUDCO norms - Low Cost Housing - Housing policy - Different types of housing agencies involved in housing - Investment in Housing - Housing Problems in India.

Slums: Causes - growth - Characteristics - Effects - Slum clearance and re-housing - Prevention of slum formation - Financial assistance for slum clearance.

UNIT – IV

Public Buildings & Industries: Classification - Location - Design Principles of public building - Grouping of public buildings - Effects of Industries on towns and cities - Classification of industries – Requirements of an industry - Regulation of their location.

Building Bye-Laws: Objectives of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner - Applicability of bye-laws - Principles underlying building bye-laws.

UNIT – V

Urban Roads: Objectives – Requirements - Classification - Types of street systems - Through and bypass roads - Outer and inner ring roads - Expressways - Freeways.

Traffic Management: Objectives - Traffic surveys - Traffic congestion - Traffic control - Parking - Road accidents - Traffic capacity of roads - Road intersections - Traffic islands - Roundabouts - Traffic signals - Road signs - Road markings - Street lighting in a town.

TEXT BOOKS

1. Rangwala, *Town Planning,* Charotar Publishing,30th edition, 2018
2. G K Hiraskar, *Fundamentals of Town Planning*, Dhanpat Rai Publications, New Delhi, 17th edition, 2018

REFERENCES

1. Abirb and yopadhyay, *Text book of Town Planning*, Books & Allied (P) Ltd, 2000
2. Peter Hall and Mark Tewdwr-Jones, *Urban and Regional Planning*, Routledge Publications, 5th edition, 2010
3. Catanese A J, *Urban Planning*, McGraw Hill Publications, 2nd edition, 2014

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(20EE0235) INDUSTRIAL INSTRUMENTATION
Open Elective – II

COURSE OBJECTIVES:
The objectives of this course are:

1. *To Analyse the Common errors that occur in measurement systems, and their classification.*
2. *To understand the characteristics of signals, their representation, and signal modulation techniques.*
3. *To learn the Methods of Data Transmission, Telemetry, and Data acquisition.*
4. *To study working principles of different Signal Analyzers and Digitalmeters.*
5. *To learn about several types of transducers and their use for measurement of non-electrical quantities.*

COURSE OUTCOMES: (COs)
On successful completion of this course, the student will be able to

1. Identify and explain the types of errors occuring in measurement systems.
2. Differentiate among the types of data transmission and modulation techniques.
3. Apply digital techniques to measure voltage, frequency and speed.
4. Analyse the working principles of different Signal Analyzers and Digitalmeters.
5. Understand the operation of several types of transducers.
6. Choose suitable Transducers for the measurement of non-electrical quantities.

UNIT-I:
Characteristics of Signals and their representation: Measuring Systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics; Errors in Measurement Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signals and their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II:
Data Transmission, Telemetry and DAS: Methods of Data Transmission–General Telemetry System .Frequency Modulation (FM), Pulse Modulation (PM), Pulse
Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Data Acquisition Systems –Components of Analog DAS–Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing –Digital DAS–Block Diagram—Modern Digital DAS (Block Diagram)

UNIT-III:

Signal Analyzers, Digital Meters: Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, QMeter. Peak Reading and RMS Voltmeters, Digital Voltmeters- Successive Approximation, Ramp and Integrating Type- Digital Frequency Meter- Digital Multimeter- Digital Tachometer

UNIT-IV:

Transducers: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle of Operation of Resistive, Inductive, Capacitive Transducers, LVDT, Strain Gauge and its Principle of Operation, Gauge Factor, Thermistors, Thermocouples, Synchros, Piezo electric Transducers, Photovoltaic, Photo Conductive Cells, Photodiodes.

UNIT-V:

Measurement of Non-Electrical Quantities: Measurement of strain, Gauge Sensitivity, Measurement of Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXTBOOKS:

1. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co., 2012.
2. Transducers and Instrumentation, D.V.S. Murty, Prentice Hall of India,2nd Edition,2004.

REFERENCE BOOKS:

1. Modern Electronic Instrumentation and Measurement technique, A. Dhelfrick and W.D. Cooper, Pearson/Prentice Hall of India., 1990.
2. Electronic Instrumentation, H.S. Kalsi Tata McGraw-Hill Edition, 2010.
3. Industrial Instrumentation–Principles and Design, T.R. Padmanabhan, Springer.

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(20ME0354) GENERAL MECHANICAL ENGINEERING
Open Elective – II

COURSE OBJECTIVES

Objective of this course is to

1. *Impart knowledge on Selection of Engineering materials and Mechanical Handling Equipment.*
2. *Understand about Automation, CAD, CAM and CIM.*
3. *Know the various Industrial Robot applications.*
4. *Learn about advanced manufacturing systems like NC, CNC and DNC system.*
5. *Study the construction details of the Automobile systems like engines.*
6. *Learn about Refrigeration and Air conditioning systems.*

COURSE OUTCOMES

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

1. *List the Selection of Engineering materials and Mechanical Handling Equipments.*
2. *Apply Automation, CAD, CAM and CIM in the manufacturing.*
3. *Explicate the various Industrial Robot applications.*
4. *Classify various Machining processes like NC, CNS and DNC system and determine the best suitable process to machine a component.*
5. *Recognize the different parts of the automobile system and know the importance of IC Engines in automobiles.*
6. *Distinguish various types of Refrigeration and Air conditioning systems.*

UNIT-I

Materials selection process: Mechanical properties of materials, Materials classification: metals, ceramics, Polymers, Biomaterials, Materials selection process steps

Mechanical Handling Equipment- Introductions to belts, conveyors, power transmission devices.

UNIT-II

CAD/CAM: Role of computers in manufacturing - CAD, Design process – CAM - CIM, Scope of CIM - Advantages - Benefits.

Introduction to Automation: Automation, Need - Types - Basic Elements - Strategies and Levels of Automation.

UNIT-III

Introduction to Industrial Robotics: Classification of Robot Configurations, functional line diagram - Principle components - Degrees of freedom – Joints - Advantages, Applications.

Machine Tools: Conventional Machine Tools, Types - Traditional Vs NC machining – Advanced Machine Tools, Classifications - NC, CNC and DNC systems – Advantages, Disadvantages.

UNIT-IV

I.C. Engines- Definition of Engine and Heat Engine, I.C Engine Classification –Parts of an IC Engine, Working of Two Stroke and Four Stroke Engines.

Automobile Engineering: Layout of Automobile, Types, Components - Vehicle chassis, frame and body construction

UNIT-V

Refrigeration: Introduction to Refrigeration- Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems.

Air conditioning: Introduction to Air conditioning - Classifications of Air conditioning systems-window air conditioning system, split conditioning system, Central air conditioning system.

TEXT BOOKS

1. Mikel P.Groover *Automation, Production systems and Computer Integrated Manufacturing Systems, Pearson Higher Education, Inc., 3rd Edition, 2014.*
2. R. K. Rajput, *Engineering Materials and Metallurgy*, S. Chand Publishers, 3rd Edition, 2008.
3. C.P. Arora & Domkundwar, *Refrigeration and Air conditioning*, McGraw Hill, 3rd Edition, 2010.

REFERENCES

1. Kirpal Singh, *Automobile Engineering*, Vol.1 & Vol.2, Standard Publishers Distributors, 13th Edition, 2013
2. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012

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(20CS0551) JAVA PROGRAMMING
Open Elective – II

COURSE OBJECTIVES
The objectives of this course:

1. *Introduce standard tools and techniques for software development.*
2. *Understand the object oriented approach for automated software build process.*
3. *Introduce the concepts of AWT framework.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Implement simple abstract data types and design abstraction functions.*
2. *Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.*
3. *Apply object-oriented design patterns for problem solving.*
4. *Implement Exception handling with synchronization.*
5. *Execute programs on Multithreading and String handling concepts.*
6. *Design applications with an event-driven graphical user interface.*

UNIT- I
The Java Language: Importance of Java -Programming Paradigms -The History and Evolution of Java -Java Byte Code.

Introduction of OOP: Abstraction, Encapsulation, Inheritance, Polymorphism-Understanding static -Varargs -Data Types -Type Casting -Java Tokens - Java Statements -Arrays.

UNIT- II
Introducing Classes –Class Fundamentals -Declaring Objects -Introducing Methods Introduction to Constructors -Garbage Collection-Introducing final -Inheritance - Method Overriding -abstract classes -Packages and Interfaces.

UNIT- III
Exception Handling - Exception Fundamentals - Exception Types -Uncaught Exceptions - Using try and catch - Nested try Statements -throw -throws –finally -Creating Your Own Exception Subclasses - Chained Exceptions.

UNIT-IV

Multithreaded Programming - The Java Thread Model -Thread Priorities -The Thread Class and the Runnable Interface - Creating Multiple Threads -Using isAlive( ) and join( ) –Synchronization- String Handling.

UNIT- V

Generics-A simple Generic Example-General form of Generic class -Generic Interfaces Collection Framework-Collections overview, Collection class, Collection interfaces.

Introducing the AWT - Using AWT Controls-Layout Managers -Introducing Swing -Exploring Swing.

TEXT BOOKS

1. Herbert Schildt, *The Complete Reference Java,* Eighth Edition , McGraw Hill.
2. Y Daniel Liang, *Introduction to Java programming* — Que E &T.

REFERENCES

1. P.J. Deitel and H.M. Deitel, *Java for Programmers,* Pearson education.
2. Bruce Eckel, *Thinking in Java*, Pearson Education.

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(20HS0814) INTELLECTUAL PROPERTY RIGHTS
Open Elective – II

COURSE OBJECTIVES
The objectives of this course:

1. *To provide an understanding of the concept and significance of intellectual property rights*
2. *To understand the concept of trademarks, copy rights, patents and the need for their protection*
3. *To comprehend the concept of competition, unfair competition and the latest developments in the laws pertaining to intellectual property rights*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights*
2. *Identify different types of intellectual properties, ownership rights and the scope of the protection*
3. *Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work*
4. *Able to identify, apply, and assess ownership rights, registration processes for IP rights*
5. *To discern the approaches for intellectual property management and intellectual property audits*
6. *Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level*

UNIT-I
INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual propertyrights.

UNIT-II
TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III
LAW OF COPY RIGHTS: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
LAW OF PATENTS: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV
TRADE SECRETS: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secretelitigation.
UNFAIR COMPETITION: Misappropriation right of publicity, Falseadvertising.

UNIT-V

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: new developments in trade mark law; copy right law, patent law, intellectual property audits -International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS:

1. *Intellectual property right*, Deborah, E. Bouchoux, cengage learning
2. *Intellectual property rights: Protection and Management.* India, Nityananda KV, Cengage Learning India Private Limited.

REFERENCES:

1. *Intellectual property right - Unleashing the knowledge economy*, Prabuddha ganguli, Tata McGraw Hill Publishing CompanyLtd.
2. *Law relating to Intellectual Property rights.* India. Ahuja VK IN: Lexis Nexis
3. *Intellectual Property Rights,* India. Neeraj P &Khushdeep D, PHI learning pvt limited.

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(20EC0424) ANTENNA AND WAVE PROPAGATION LAB (VIRTUAL LAB)

COURSE OBJECTIVES

The objectives of this course:

1. *To study and design the antennas based on the requirement of the application using software tool and Practical Antenna.*
2. *To understand different High frequency antennas and its radiation pattern.*
3. *To design and analyse different parameters of an antenna based on the radiation characteristics.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Understand different parameters associated with antenna design.*
2. *Analyze Antenna model for High frequency applications.*
3. *Learn to plot the radiation pattern characteristics.*
4. *Understand the simulation tools and hardware used for antenna design.*
5. *Calculate different antennas parameters through hardware and software.*
6. *Design antennas for various real time applications.*

LIST OF EXPERIMENTS

PART-A: Simulation Experiments
(Minimum of 5 experiments)

1) To study and plot the radiation pattern of Simple Dipole Antenna.
2) To study and plot the radiation pattern of Half Wave Dipole Antenna.
3) To study and plot the radiation pattern of Loop Antenna.
4) To study and plot the radiation pattern of Yagi-Uda Antenna.
5) To study and plot the radiation pattern of Helical Antenna.
6) To study and plot the radiation pattern Parabolic Reflectors Antenna.
7) To study and plot the radiation pattern of Horn Antenna.

PART- B: Hardware Experiments
(Minimum of 5 experiments)

1) To study the variation of field strength and plot the radiation pattern of Half Wave dipole antenna.
2) To study the variation of field strength and plot the radiation pattern of Array antenna.
3) To study the variation of field strength and plot the radiation pattern of Yagi-Uda antenna.
4) To study the variation of field strength and plot the radiation pattern of Microstrip antenna.
5) To study the variation of field strength and plot the radiation pattern of Helical Antenna.
6) To study the variation of field strength and plot the radiation pattern Reflector Antenna.
7) To study the variation of field strength and plot the radiation pattern of Horn Antenna.

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(20EC0425) EMBEDDED SYSTEMS AND IOT LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Configure Raspberry Pi, Understand Arduino, Sensors, Actuators & get started with python on Raspberry Pi.*
2. *Understand how cloud services work.*
3. *Design IoT applications in different domain and be able to analyze their performance.*

COURSE OUTCOMES

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

1. *Identify the requirements for the real-world problems.*
2. *Conduct a survey of several available literatures in the preferred field of study.*
3. *Interpret and enhance software/ hardware skills.*
4. *Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.*
5. *Understand use of cloud for remote monitoring and control of IoT enabled systems.*
6. *Design and development of IoT enabled technologies which are cost effective and socially relevant.*

Note: Perform **Ten** Experiments (From experiments 1 to 4 using both Arduino and Raspberry Pi) and any **one**-use case

Programs:

1. Interfacing LED's
2. Interfacing Push buttons.
3. Interfacing Sensors.
4. Interfacing Actuators.
5. Interfacing Camera.
6. Interfacing Serial communication devices
7. CRUD operations on input device data in cloud server.
8. Controlling output devices over internet.
9. Notification alert over internet.
10. Location Tracking.

Use cases:

1. Smart Communication - Designing and developing devices which would help in easing communication channels between various communication devices and points.
2. Healthcare & Biomedical devices - Designing and developing devices that would help inmanaging healthcare better.
3. Agriculture & Rural Development - Designing and developing devices keeping in mind the need to enhance the primary sector of India - Agriculture and the lives of our Rural Population.
4. Smart Vehicles - Creating intelligent devices to improve commutation facilities, quality of travel experience and overall travel safety features hardware.
5. Food Processing - Creating state of art solutions to manage and process our agriculture produce.
6. Robotics and Drones – Designing and developing drones and robots that can solve some of the pressing challenges of India such as handling medical emergencies, search and rescue operations, etc.
7. Waste management – Providing IoT solutions could be in the form of waste segregation, disposal, and improved transportation system.
8. Clean water – Creating innovative devices to improve distribution, management and purification of water.
9. Security & Surveillance – Creating state-of-the-art safety and security technologies for India.
10. Renewable Energy – Innovative solutions that help manage and generate renewable sources more efficiently using IoT.
11. Miscellaneous – Providing IoT solutions in tertiary sectors like Hospitality, Financial Services, Entertainment, Tourism, Retail,etc.

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III B.Tech. – II Sem.

L	T	P	C
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(20EC0426) MICROWAVE MEASUREMENTS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To study and analyze microwave components by measuring various parameters.*
2. *To be able to measure wave parameter like impedance, frequency, wavelength usingmicrowave bench and VSWR/power meter.*
3. *To study various Digital and Hybrid modulation and demodulation schemes.*
4. *To analyze radiation pattern of horn antenna*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Identify and demonstrate the working of various microwave components.*
2. *Analyze Microwave Passive Devices by conducting experiments and measuring variousparameters.*
3. *Analyze Microwave Active Devices by conducting experiments and measuring variousparameters.*
4. *Perform standing wave analysis and measure scattering coefficients of variousmicrowave components.*
5. *Assess the amount of bandwidth/bit rate required in each modulation scheme andcompare the schemes.*
6. *Evaluate the antenna performance by finding different parameters.*

LIST OF EXPERIMENTS
(All experiment should be conducted)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength measurements using slotted section.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.
10. Radiation pattern measurements of Horn Antennas (at least two antennas).

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(20EC0457) ROBOTICS (Skill advanced Course / Soft skill course)

COURSE OBJECTIVES

The objectives of this course:

1. *Expose students to the history and current developments in the field of robotics.*
2. *Strengthen students' grasp of the mathematics and physics involved in the design, construction, and control of robots, with a focus on linear algebra and geometry.*
3. *Introduce students to fundamental concepts of electrical and mechanical engineering that will help them better understand the design and development challenges in the field of robotics*
4. *Help students develop and deepen their grasp of programming concepts and their programming skills.*
5. *Give students hands-on practice in building and programming an actual robot*
6. *Engage students in an engineering design task that sharpens their analytical, planning, presentation, and teamwork skills*
7. *Provide a challenging, highly engaging and personally rewarding learning experience.*

COURSE OUTCOMES (COs)

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

1. *Discuss the history, concepts and key components of robotics technologies.*
2. *Describe and compare various robot sensors and their perception principles that enable a robot to analyse their environment, reason and take appropriate actions toward the given goal.*
3. *Analyse and solve problems in spatial coordinate representation and spatial transformation, robot locomotion, kinematics, motion control, localization and mapping, navigation and path planning.*
4. *Apply and demonstrate the learned knowledge and skills in practical robotics applications.*
5. *Plan, design and implement robotic systems, algorithms and software capable of operating in complex and interactive environments.*
6. *Effectively communicate engineering concepts and design decisions using a range of media.*

Theory:

Module-1: Introduction to robotics

- Robots in industrial automation
- Why industrial robots?
- Economic aspects
- Human aspects
- Safety aspects

Module 2: Mechanical Structure of robotics

• Mechanics / Kinematics
  o Serial kinematic
  o Parallel kinematic
  o Performance data
  o Load diagram

Module 3: Sensing, Actuation & End Arm Tooling:

- Actuators
  - Electric actuators
  - Hydraulic actuators
  - Pneumatic actuators
- Sensors
  - Tactile sensors
  - Optical sensors
  - Encoders
- End Arm Tooling (EOAT)

Module 4: Robot Control & Programming:

- Controller architecture
- Motion planning & execution
  - Motion in coordinate systems
  - Linear/ Circular motion (interpolation)
    - Programming
      - Teach-in programming
      - Lead-through (Play-back) programming
      - Offline programming
      - PTP-Motion
  - CP-Motion

Module 5: IGUS Robots

- Introduction into IGUS robot technology
- CPRog Controller:
  - Architecture, menu structure, commands, motion, basic functions; safety instructions

Module 6: IGUS Robots Programming:

- CPRog Controller: Variables, Variable settings, calculation with variables; loops; logical functions, Wait conditional

Hands-on sessions:

Part-A: Basic Movements

1. Moving the robot in different coordinate systems
2. Pick and Place movement
3. Drawing a Square on a Paper
4. Drawing Inner frames on a Paper
5. Writing your name on a Paper
6. Draw a Circle on a Paper
7. Working with programming structures of Igus programming

Part-B: Industrial Applications

1. Drilling two adjacent holes
2. Deburring
3. Cube welding
4. Custom object shape welding
5. Palletizing
6. Pick and Place Matrix operation
7. Robot collaboration

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(20HS0864) HUMAN VALUES & PROFESSIONAL ETHICS

COURSE OBJECTIVES

The objectives of this course:

1. *Create awareness on Human Values.*
2. *Impart knowledge on an Engineering Ethics*
3. *Instill morality, accountability in an engineering experimentation*
4. *Create awareness on an assessment of safety, risk and rights*
5. *Develop knowledge on global issues*
6. *Create an awareness on Human Values and Engineering Ethics, Engineers social responsibility in an experimentation, appreciate the rights of others and ethics in global issues.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Identify and analyze human values in their relevant field*
2. *Assess their own engineering ethics and have the social consciousness*
3. *Get knowledge on codes of ethics and on an utilitarian thinking*
4. *Identify safety, risks and an ethical concern in research and intellectual contexts*
5. *know necessity of computer and an environmental ethics, give a picture on weapons development*
6. *Upon completion of the course, the student should be able to apply the ethics in society, discuss an ethical issues related to engineering and realize the responsibilities and rights in the society*

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 – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Necessity of Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics - Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III

Engineering As Social Experimentation- Engineering as Experimentation--Engineering Projects VS. Standard Experiments, Engineers as responsible Experimenters–Conscientiousness- Comprehensive Perspective - Moral Autonomy - Accountability, Industrial Standards, Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities And Rights- Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk, Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V

Global Issues-Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

TEXTBOOKS:

1. R S Nagarajan, *Professional Ethics and Human Values*, New Age International (P) Limited Publishers,3rd Edition,2006
2. M.Govindarajan, S.Natarajananad, V.S.SenthilKumar,*Engineering Ethics includes Human Values* - PHI Learning Pvt. Ltd- 2nd Edition,2009

REFERENCES:

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1. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, *Engineering Ethics – Concepts and Cases*, Cengage Learning, 2nd Edition, 2009
2. John R Boatright, *Ethics and the Conduct of Business*, Pearson Education, New Delhi, 1st Edition,2003
3. Edmund G Seebauer and Robert L Barry, *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, Oxford, 4th Edition,2001
4. PSR Murthy, *Indian Culture, Values and Professional Ethics*, BS Publication, 2nd Edition, 2013