VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous Institute Affiliated to JNTUH

Approved by AICTE, Accredited by NAAC and ISO 9001:2015 Certified

Shamshabad - 501 218, Hyderabad, Telangana State, India.

www.vardhaman.org

BACHELOR OF TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING

(Accredited by NBA)

URRICULUM AND SYLLABI (VCE R19)

UNDER CHOICE BASED CREDIT SYSTEM

B. Tech. - Regular Four Year Degree Program

(For batches admitted from the Academic Year 2019 - 2020)

&

B. Tech. - Lateral Entry Scheme

(For batches admitted from the Academic Year 2020 - 2021)

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous Institute Affiliated to JNTUH

PROGRAM CURRICULUM STRUCTURE

B. TECH – ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R19

I YEAR I SEMESTER

Induction Program for Two Weeks (Phase – I)

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A5001	Linear Algebra and Ordinary Differential Equations	BS	3	0	2	4	30	70	100
A5003	Applied Physics	BS	3	0	2	4	30	70	100
A5005	Communicative English	HS	2	0	2	3	30	70	100
A5501	Python Programming	ES	1	0	4	3	30	70	100
A5301	Engineering Graphics & Computer Aided Drafting	ES	1	0	4	3	30	70	100
A5006	Social Innovation	ES	0	0	2	1	30	70	100
	TOTAL		10	0	16	18	180	420	600

I YEAR II SEMESTER

Induction Program for One Week (Phase – II)

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A5002	Advanced Calculus	BS	3	1	2	5	30	70	100
A5004	Applied Chemistry	BS	3	0	2	4	30	70	100
A5502	Data Structures	ES	3	0	2	4	30	70	100
A5201	Basic Electrical Engineering	ES	3	0	2	4	30	70	100
A5008	Co-Engineering Laboratory	ES	0	0	4	2	30	70	100
A5007	Engineering Exploration	ES	0	0	2	1	30	70	100
	TOTAL		12	1	14	20	180	420	600

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PROGRAM CURRICULUM STRUCTURE

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R19

II YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		Internal	External	Total
A5009	Partial Differential Equations and Complex Variables	BS	3	1	0	4	30	70	100
A5401	Digital Logic Design	ES	3	0	2	4	30	70	100
A5402	Electronic Devices and Circuit Analysis	PC	3	0	2	4	30	70	100
A5403	Signals and Systems	PC	3	0	2	4	30	70	100
A5404	Random Variables and Stochastic Processes	PC	3	1	0	4	30	70	100
A5013	Verbal Ability and Logical Reasoning	HS	1	0	0	1	30	70	100
A5011	Gender Sensitization	MC	2	0	0	0	-	100*	100*
	TOTAL		**18**	**02**	**06**	**21**	**180**	**420**	**600**

II YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		Internal	External	Total
A5015	Managerial Economics and Financial Analysis	HS	3	0	0	3	30	70	100
A5405	Analog Electronic Circuits	PC	3	1	2	5	30	70	100
A5406	Analog Communications	PC	3	0	2	4	30	70	100
A5407	Computer Organization and Operating Systems	PC	3	0	2	4	30	70	100
A5408	Electromagnetic Theory and Transmission Lines	PC	3	1	0	4	30	70	100
A5014	Quantitative Aptitude	BS	1	0	0	1	30	70	100
A5012	Environmental Science	MC	2	0	0	0	-	100*	100*
	TOTAL		**18**	**02**	**06**	**21**	**180**	**420**	**600**

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PROGRAM CURRICULUM STRUCTURE

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R19

III YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		Internal	External	Total
A5409	Microprocessors & Microcomputer System Design	PC	2	1	2	4	30	70	100
A5410	Digital Communications	PC	3	0	2	4	30	70	100
A5411	Digital Design and Implementation using Verilog HDL	PC	3	0	2	4	30	70	100
A5412	Antennas and Wave Propagation	PC	3	1	0	4	30	70	100
	Professional Elective – I	PE	3	0	0	3	30	70	100
A5441	Internship – I	PW	0	0	4	2	100	-	100
A5016	Engineering Design Thinking	ES	0	0	2	1	30	70	100
A5018	Essence of Indian Traditional Knowledge	MC	2	0	0	0	-	100*	100*
	TOTAL		**16**	**02**	**12**	**22**	**280**	**420**	**700**

III YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		Internal	External	Total
A5413	CMOS VLSI Design	PC	3	0	2	4	30	70	100
A5414	Linear Control Systems	PC	2	1	2	4	30	70	100
A5415	Digital Signal Processing	PC	3	1	2	5	30	70	100
	Open Elective – I	OE	3	0	0	3	30	70	100
	Professional Elective – II	PE	3	0	0	3	30	70	100
A5017	Product Realization	ES	0	0	2	1	30	70	100
A5442	Mini Project	PW	0	0	4	2	100	-	100
A5019	Indian Constitution	MC	2	0	0	0	-	100*	100*
	TOTAL		**16**	**02**	**12**	**22**	**280**	**420**	**700**

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PROGRAM CURRICULUM STRUCTURE

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R19

IV YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		Internal	External	Total
A5419	Internet of Things	PC	3	0	2	4	30	70	100
A5420	Cellular and Mobile Communications	PC	2	0	2	3	30	70	100
	Professional Elective – III	PE	3	0	0	3	30	70	100
	Open Elective – II	OE	3	0	0	3	30	70	100
A5443	Internship – II	PW	0	0	4	2	100	-	100
A5444	Project Work Phase – I	PW	0	0	8	4	100	-	100
	TOTAL		**11**	**0**	**16**	**19**	**320**	**280**	**600**

IV YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
	Professional Elective – IV	PE	3	0	0	3	30	70	100
	Open Elective – III	OE	3	0	0	3	30	70	100
A5020	Management Science	HS	3	0	0	3	30	70	100
A5445	Project Work Phase – II	PW	0	0	16	8	100	100	200
	TOTAL		**9**	**0**	**16**	**17**	**190**	**310**	**500**

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PROGRAM CURRICULUM STRUCTURE

B. TECH - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS: VCE-R19

Professional Elective – I			
Code	**Course**	**Code**	**Course**
A5451	VLSI Physical Design Automation	A5452	Advanced Core Architectures
A5453	Computer Communication Networks	A5454	Electronic Measurements and Instrumentation
Professional Elective – II			
Code	**Course**	**Code**	**Course**
A5455	Low Power and High Speed VLSI Design	A5456	Embedded System Design
A5457	Image Processing and Pattern Recognition	A5458	Microwave Engineering
Professional Elective – III			
Code	**Course**	**Code**	**Course**
A5459	Mixed Signal VLSI Design	A5460	Hardware Software Co-Design
A5461	Artificial Neural Networks	A5462	Advanced Communications
Professional Elective – IV			
Code	**Course**	**Code**	**Course**
A5463	Design for Testability	A5464	Embedded Linux
A5465	DSP Processors and Architectures	A5466	Wireless Communications and Networks
Open Elective			
Code	**Course**	**Code**	**Course**
A5131	Project Planning and Management	A5531	Fundamentals of Java
A5132	Air Pollution and Control	A5532	Fundamentals of DBMS
A5133	Disaster Management	A5533	Fundamentals of Operating Systems
A5231	Transducers and Measurements	A5631	Principles of Software Engineering
A5232	Solar Energy and Applications	A5632	E-Commerce Trends
A5233	Energy Management and Audit	A5633	Fundamental of Cyber Security
A5331	Basic Mechanical Engineering	A5031	Numerical Techniques
A5332	Introduction to 3D Printing	A5032	Mathematical Programming
A5333	Fundamentals of Robotics	A5033	Special Functions
A5431	Fundamentals of IoT	A5034	Entrepreneurship Development
A5432	Principles of Analog and Digital Communications	A5035	Human Resource Management
A5433	Introduction to Signal Processing	A5036	Logistics and Supply Chain Management

SYLLABI FOR I YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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I B.TECH I SEMESTER

COURSE STRUCTURE

A5001 - LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

This course provides mathematical knowledge required to analyze problems encountered in engineering. In this course, the students are acquainted with the solution of system of linear equations, Eigen values and eigen vectors, ordinary differential equations of first and higher order and Laplace transforms. In addition, this course can be applied in many areas of engineering such as computer graphics, cryptography, wireless communication, signal processing, robotics and animation.

Course Pre/corequisites

This course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5001.1 Solve system of linear equations using rank of a matrix

A5001.2. Examine the nature of Quadratic form using Eigen values and Eigen vectors

A5001.3. Solve ordinary differential equations of first and higher order

A5001.4. Make use of ordinary differential equations to solve engineering problems

A5001.5. Apply Laplace transforms to solve ordinary differential equations

3. Course Syllabus

Theory

Theory of Matrices: Real, Complex matrices and their properties, Rank of a matrix by reducing to Echelon form and Normal form, Consistency of system of linear equations using the rank of a matrix.

Eigen Values, Eigen Vectors and Quadratic Forms: Linear transformation, Eigen values and Eigenvectors of a matrix, Properties of Eigen values and Eigen vectors of real and complex matrices (without proof), Cayley-Hamilton theorem (statement and verification), Inverse and powers of a matrix using Cayley-Hamilton theorem, Diagonalization of a matrix, Quadratic forms up to three variables: Rank, index, signature and nature of quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

Ordinary Differential Equations of First Order: Differential equations of first order and first degree: Exact equations and equations reducible to exact form using integrating factors, Linear and Bernoulli's equations. Applications: Newton's law of cooling, Law of natural growth and decay.
Higher Order Linear Ordinary Differential Equations: Linear differential equations of second and higher order with constant coefficients, Solution of non-homogeneous Linear differential equations with constant coefficients of the form $f(D)y = Q(x)$ when $Q(x) = e^{ax},\ \sin(ax+b) \text{ or } \cos(ax+b),\ x^n,\ e^{ax}V(x),\ x^nV(x)$ Equations reducible to linear differential equations with constant coefficients: Cauchy's homogeneous linear equation, Legendre's linear equation, Method of variation of parameters, Applications: $L-C-R$ Circuits and Simple Harmonic Motion.

Laplace Transforms: Laplace transforms of elementary functions , First shifting theorem, Change of scale property, Multiplication by t^n , Division by t , Laplace transforms of derivatives and integrals, Laplace transform of unit step function, Second shifting theorem, Laplace transform of periodic function, Evaluation of some kind of integrals by Laplace transforms, Inverse Laplace transforms, Finding inverse Laplace transforms by different methods, Convolution theorem(without proof), Solving ordinary differential equations by Laplace transform method.

Practice

1. Study of Basic Scilab/ Matlab Commands
2. Matrix Constructors and Operations
3. Matrix Bitwise, Relational & Logical Operations
4. Solution of System of Linear Equations
5. Eigen values and Eigenvectors of a matrix
6. Rank, index, signature and nature of quadratic forms
7. Graphics – 2D Plots
8. Solution of ordinary differential equations of first order
9. Solution of ordinary differential equations of higher order
10. Laplace transforms
11. Inverse Laplace transforms
12. Solution of ordinary differential equations using Laplace transforms

4. Books and Materials

Text Book:

1. B S Grewal, *Higher Engineering Mathematics*, 43rd Edition, Khanna Publishers, New Delhi, 2014.

Reference Books:

1. B.V. Ramana, *Higher Engineering Mathematics*, 23rd Reprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.

I B.TECH I SEMESTER

COURSE STRUCTURE
A5003 - APLLIED PHYSICS
(Common to all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

Applied Physics course is an integrated course which introduces fundamental Physics with applications to semiconductors and other electronic devices focusing on the principles of their operation. A part of the course is focused on current transport across semiconductor junctions. This interdisciplinary knowledge which includes lasers, wave optics, optical fibres and nanomaterials encourages an understanding of technological applications of physics and its importance as a subject of social and industrial relevance enabling the students to design and innovate. This course demonstrates various semiconductor materials behaviour through experiments.

Course Pre/corequisites

This course has no specific pre/co requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A5003.1. Classify materials based on their crystal structures.
A5003.2. Utilize quantum mechanics to interpret the properties of semiconducting materials.
A5003.3. Apply wave property of light to study different optical phenomenon.
A5003.4. Develop communication systems by means of lasers and optical fibers.
A5003.5. Analyze the principles of nanotechnology for electronic applications.

3. Course Syllabus

Theory

Quantum mechanics: Introduction, Planck's constant and Photo Electric Effect, de-Broglie hypothesis, dual nature of matter, matter waves.

Crystal structures: Lattice parameters, lattice constant of cubic, packing factor of SCC, BCC, FCC and diamond, Miller indices, Crystal planes and directions, Interplanar spacing of an orthogonal crystal system. Bragg's law. Crystal structures of ZnS, Silicon (diamond).

Semiconductor Physics: Types of electronic materials: Metals, semiconductors, and insulators based on Band theory of solids, Density of states, Position of Fermi level in Intrinsic and Extrinsic semiconductor, Fermi-Dirac distribution function, Carrier concentration in Intrinsic and Extrinsic semiconductors, Carrier transport: Diffusion and Drift, Hall Effect, P-N junction diode – V-I Characteristics, LED – working principle and characteristics.

Wave optics: Huygens' Principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Fraunhofer diffraction from a single slit and a circular aperture, diffraction gratings and their resolving power.

Lasers: Absorption, spontaneous and Stimulated emission, Einstein's coefficients, population inversion, pumping processes, three and four level laser systems, Ruby Laser, He-Ne laser, Semiconductor laser (homo junction), Applications of lasers

Optical fibres: Introduction to Optical fibres, total internal reflection, Acceptance angle, Numerical aperture, step and graded index fibre, Losses in optical fibres, Applications of optical fibres.

Nanoscience: Characteristics and Types (1-D, 2-D, 3-D) of nano-materials, surface to volume ratio, Top down (Ball Milling) and Bottom up (Sol-Gel - chemical Synthesis), Sputtering (Physical deposition), Graphene, CNT, Quantum Dots and applications of nanomaterials.

Practice

1. Determination of the value of Planck's constant 'h' and work function (w) by using Photo cell.
2. Determination of the energy gap of a given semiconductor.
3. Study the PN junction diode characteristics under Forward & Reverse bias conditions.
4. Verification of the type of semi-conductor material, and estimate the density of majority carriers by using Hall-Effect.
5. Determination of threshold voltage and study the V-I characteristics of LED.
6. To determine the radius of curvature of a Plano convex lens and the wavelength of Sodium light by Newton's rings method.
7. To identify the number of lines on plane transmission grating and also to measure the wavelengths of spectral lines of a Mercury (Hg) source using diffraction grating and a spectrometer.
8. Determination of the wavelength of a given source of Laser light and to identify the number of lines on plane transmission grating.
9. Evaluate the numerical aperture (NA) and acceptance angle (θa) of a given optical fiber and Estimate the transmission loss in a given optical fiber.
10. Measure the bending loss in a given optical fiber and to estimate transmission or propagation loss in a given optical fiber.

4. Laboratory Equipment/Software/Tools Required

1. Photo Emissive Cell

2. Regulated power supply (DC and AC)
3. Hall Effect Setup
4. Light Emitting Diode Kit
5. Semiconductor Laser Source
6. Spectrometer
7. Plane diffraction grating
8. Optical fiber trainer kit
9. Meters - Ammeter, Voltmeter, Digital Multimeter
10. Diodes, Resistors, Capacitors, Bread Board

5. Books and Materials

Text Books:

1. Pandey, B. K. and Chaturvedi, S. (2014), *Engineering Physics*, New Delhi: Cengage Learning India Pvt. Ltd.

Reference Books:

1. N. Subrahmanyam, BrijLal, A Textbook of Optics, S Chand, New Delhi, 2015
2. P.K. Palanisamy. Engineering Physics. Scitech, Fouth Edition, 2014.

I B.TECH I SEMESTER

COURSE STRUCTURE

A5005 - COMMUNICATIVE ENGLISH

(Common to all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	2	28	0	28	3	30	70	100

1. Course Description

Course Overview

This course has been designed to develop linguistic and communicative competencies among engineering students. Focus has been given to all the four skills of language; Listening, Speaking, Reading and Writing. Listening and speaking skills of the students are designed to be honed in the ELCS lab with the help of a lab manual focusing on Communicative English Skills: phonetics, word accent and intonation, making effective oral presentations, role- play, telephonic skills, asking for and giving directions, etc. In the ELCS lab the students are trained to work in a group, engage in peer-reviews and inculcate team spirit through various exercises related to listening to native speakers' accent and participating in speaking activities. The Reading and Writing skills of students are polished in the theory classrooms with the help of prescribed textbooks which additionally focus on grammar and vocabulary. The students are encouraged to read texts/poems which are aimed at developing their comprehension skills as well their idea of language analysis.

Course Pre/co-requisites

This course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A5005.1. Build competence in grammar and vocabulary
A5005.2. Develop students' pronunciation as well as listening capabilities
A5005.3. Develop effective academic reading skills
A5005.4. Identify learner problems in speaking and build their presentation skills
A5005.5. Construct effective academic writing skills

3. Course Syllabus

Vocabulary: Word Formation – Prefixes – Suffixes – Guessing the meanings of the words using prefixes and suffixes- Standard Abbreviations
Grammar: Articles
Reading: Presidential Address by APJ Abdul Kalam: Techniques for effective comprehension - Skimming and Scanning-Types of texts – Summarizing

Writing: Sentences – Paragraphs – Cohesion – Coherence – Logical, Lexical and Grammatical Devices – Punctuation – Types of Paragraphs: Description – Definition – Classification.

VOCABULARY: Word Formation – Prefixes – Suffixes – Guessing the meanings of the words using prefixes and suffixes- Standard Abbreviations - Synonyms – Antonyms - **:** Homonyms, Homophones, Homographs, and Foreign Words - Redundancies – Clichés - Idiomatic Expressions One Word Substitutes.

GRAMMAR

Articles – Prepositions - Changing words from one form to another – Concord – Tenses: Present, Past and Future Active and Passive Voice - Noun-Pronoun Agreement – Misplaced Modifiers

READING

Presidential Address by APJ Abdul Kalam: Techniques for effective comprehension -Skimming and Scanning-Types of texts – Summarizing - **The Road Not Taken (Robert Frost):** Reading using different strategies: Types of Reading – Extensive and Intensive-Do's and Donts of reading - **Good Manners (J C Hill):** Practice in reading different types of texts efficiently - Predicting the Content – Understanding the gist - Note Making- Understanding Coherence- Sequencing Sentences - Exercises for practice

WRITING

Sentences – Paragraphs – Cohesion – Coherence – Logical, Lexical and Grammatical Devices – Punctuation – Types of Paragraphs: Description – Definition – Classification - Letter Writing – Formats, Styles, Parts – Letters of Requisition, Letters of Inquiry, Letters of Apology - Information Transfer: Bar Charts – Flow Charts – Tree Diagrams **-** Essay writing: Introduction – Conclusion- Précis Writing: Introduction – Steps to Effective Précis writing – Guidelines.

**Reading material from Text books and Reference book*

4. Books and Materials

Text Books:

1. *Fluency in English – A Course book for Engineering Students* (by Board of Editors: Orient BlackSwan Pvt. Ltd, Hyderabad, 2016.
2. Raman, Meenakshi , Sharma, Sangeeta, *Technical Communication- Principles and Practice,* 3rd Edition, Oxford University Press, New Delhi. Print, 2015.

Reference Books:

1. Mohanraj, J., *Let Us Hear Them Speak,* Sage Texts. Print, New Delhi, 2015.
2. Hancock, M., *English Pronunciation in Use* Intermediate, Cambridge University Press. Print, Cambridge, 2009.
3. Sanjay Kumar and Pushp Lata, *Communication Skills,* Oxford University Press, 2011.
4. *Exercises in Spoken English,* Parts I-III CIEFL, Oxford University Press, Hyderabad.
5. Green, David *Contemporary English Grammar –Structures and Composition,* MacMillan India, 2014.
6. Rizvi, M. Ashraf, *Effective Technical Communication,* Tata Mc Graw –Hill, 1995.

7. Michael Swan, *Practical English Usage,* 3rd Edition, Oxford University Press, 1995.
8. Wood F. T, *Remedial English Grammar for Foreign Students,* Macmillan, 2007.
9. Zinsser William, *On Writing Well,* Harper Resource Book, 2001.
10. Liz Hamp- Lyons, Ben Heasley, *Study writing,* Cambridge University Press, 2006.

I B.TECH I SEMESTER

COURSE STRUCTURE

A5501– PYTHON PROGRAMMING

(Common to all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	14	0	56	3	30	70	100

1. Course Description

Course Overview

As an introductory course for the B. Tech, the student will be learning 'PYTHON', which is a pre-requisite to many Programming Languages. The purpose of the course is to provide the Basic programming methodology and writing programs in python This course will enable one to learn programming skills necessary to implement all the basic mathematical , scientific calculations and various operations. Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. This course will give the foundation required to learn other programming languages easily**.**

Course Pre/corequisites

This course has no Pre requisite and co requisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5501.1. Understand fundamentals of Python language.
A5501.2. Identify and construct common programming idioms: variables, loop, branch, Subroutine and input/output.
A5501.3. Use and manipulate Python lists, tuples, and dictionaries for compound data.
A5501.4. Build functions to increase code reusability.
A5501.5. Read and write data from/to files in Python.

3. Course Syllabus

Theory

Introduction to Python Programming: Features of Python, History of Python Downloading and Installing Python, Writing and Executing First Python Program. Literal Constants, Variables and Identifiers, Data Types, Input / Output Operations, Comments, Reserved Words, Indentation.

Operators, Expressions and Control Statements: Arithmetic, Comparison, Assignment, Relational, Unary, Bitwise, Shift, Logical, Membership, Identity, Operator Precedence and Associativity, Expressions. Decision Control Statements: Selection/Conditional Branching Statements – if, if-else,

Nested if, if- elif-else statements.Loop Structures/Iterative Statements: while, for, Nested loops, continue, break, pass statements.

Strings and its operations: Concatenating, Appending, Multiplying strings, Built-in String methods and functions, Slice Operation, Iterating String, String Module.

Data Structures: Lists, Tuple, Sets, Dictionaries

Functions and File Handling: Declaration and Definition, Variable Scope and Lifetime, Return Statements, Types of Arguments, Lambda function, Recursion, Random module**.**File Handling:Types of files, Opening, Closing, Reading, Writing, Merge Operations on files

Practice

Week 1:

1. Write a python program to find the area of triangle
2. Write a python program to Take in the Marks of 5 Subjects and Display the average.

Week 2:

1. Write a program that asks the user for a number of seconds and prints out how many minutes and seconds that is. For instance, 200 seconds is 3 minutes and 20 seconds. [Hint: Use the // operator to get minutes and the % operator to get seconds.]
2. Write a program that asks the user to enter a length in centimeters. If the user enters a negative length, the program should tell the user that the entry is invalid. Otherwise, the program should convert the length to inches and print out the result. There are 2.54 centimeters in an inch.

Week 3:

1. Ask the user to enter a temperature in Celsius. The program should print a message based on the temperature:
   - If the temperature is less than -273.15, print that the temperature is invalid because it is below absolute zero.
   - If it is exactly -273.15, print that the temperature is absolute 0.
   - If the temperature is between -273.15 and 0, print that the temperature is below freezing.
   - If it is 0, print that the temperature is at the freezing point.
   - If it is between 0 and 100, print that the temperature is in the normal range.
   - If it is 100, print that the temperature is at the boiling point.
   - If it is above 100, print that the temperature is above the boiling point.
2. The GCD (greatest common divisor) of two numbers is the largest number that both are divisible by. For instance, gcd(18, 42) is 6 because the largest number that both 18 and 42 are divisible by is 6. Write a program that asks the user for two numbers and computes their gcd. Shown below is a way to compute the GCD, called Euclid's Algorithm.
   - First compute the remainder of dividing the larger number by the smaller number

- Next, replace the larger number with the smaller number and the smaller number with the remainder.
- Repeat this process until the smaller number is 0. The GCD is the last value of the larger number.

Week 4:

1. Write a program to print all Armstrong numbers between given range using for loop.
2. Write a program that asks the user to enter a string. The program should then print the following:
   (a) The total number of characters in the string
   (b) The string repeated 10 times
   (c) The first character of the string (remember that string indices start at 0)
   (d) The first three characters of the string
   (e) The last three characters of the string
   (f) The string backwards
   (g) The seventh character of the string if the string is long enough and a message otherwise
   (h) The string with its first and last characters removed
   (i) The string in all caps
   (j) The string with every a replaced with an e
   (k) The string with every letter replaced by a space.

Week 5:

1. Write a program that asks the user to enter a list of integers. Do the following:
   (a) Print the total number of items in the list.
   (b) Print the last item in the list.
   (c) Print the list in reverse order.
   (d) Print Yes if the list contains a 5 and No otherwise.
   (e) Print the number of fives in the list.
   (f) Remove the first and last items from the list, sort the remaining items, and print the result.
   (g) Print how many integers in the list are less than 5.
   (h) Print the average of the elements in the list.
   (i) Print the largest and smallest values in the list.
   (j) Print the second largest and second smallest entries in the list
   (k) Print how many even numbers are in the list.

Week 6: Write a program that uses a dictionary that contains ten user names and passwords. The program should ask the user to enter their username and password. If the username is not in the dictionary, the program should indicate that the person is not a valid user of the system. If the username is in the dictionary, but the user does not enter the right password, the program should say that the password is invalid. If the password is correct, then the program should tell the user that they are now logged in to the system.

Week 7:

1. Write a python program to demonstrate various operations on tuples
2. Write a python program to demonstrate various operations on sets

Week 8:

1. Write a python program to find factorial of a given number using recursion.
2. Write a python program to find sum of individual digits of a given number using recursion

Week 9:

1. Write a python program to read contents from a file and display the contents
2. Write a python program to display the number of characters, digits and special characters present in the given file content.

Week 10:

1. You are given a file called grades.txt, where each line of the file contains a one-word student username and three test scores separated by spaces, like below:.
   a. Rathan 83 77 54
   b. Adams 86 69 90
2. Write code that scans through the file and determines how many students passed all three tests.

4. Laboratory Equipment/Software/Tools Required

1. A Computer System with Ubuntu Operating System
2. Python IDE

5. Books and Materials

Text Books:

1. *Python Programming using Problem solving Approach* – Reema Thareja, Oxford University Press Budd, Exploring Python. McGraw Hill, 2008
2. Zelle, "*Python Programming: An Introduction to Computer Science"*. Franklin, Beedle & Assoc., 2010
3. Pearson Education Publishing "*Starting Out with Python"* 3rd (2015)

Reference Books:

1. *Dive into Python 3*, Mark Pilgrim, http://www.diveintopython3.net/
2. *Think Python*, 2nd Edition, Allen B. Downey, http://greenteapress.com/wp/think- python-2e/
3. *Algorithm Design*, Jon Kleinberg and Eva Tardos, Pearson (2013)

I B.TECH I SEMESTER

COURSE STRUCTURE

A5301 - ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING
(Common to all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	14	0	56	3	30	70	100

1. Course Description

Course Overview

Engineering drawing is said to be the language of engineers. It is the graphical representation of objects & their relationships based on certain basic principles and standard conventions. It can be regarded as a powerful tool to convey ones ideas. This course is included in all engineering curricula with the aim of training the students and making them graphically literate. This course covers orthographic projections for points, lines, planes and solids in different positions, the development of lateral surfaces and the isometric projections. The students are able to create simple solid models of various domain applications. This course forms as a basis for studying the courses on Machine Drawing, Production Drawing, Building Drawing and Circuit Drawings etc.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5301.1. Construct various types of curves commonly used in engineering practice.
A5301.2. Distinguish between first, second, third and fourth angle projections of systems.
A5301.3. Estimate lateral surface of the sheet metal requirement for making regular solids.
A5301.4. Compare isometric and orthographic views of an object.
A5301.5. Select CAD tools for drafting regular solids.

3. Course Syllabus

Theory

Introduction to Engineering Drawing: Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Lettering and dimensioning, Conic Sections – General method only.

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of points, lines and planes - inclined to one plane and inclined to both the principal planes.

Projections of Regular Solids: Orthographic projections of Prism, Cylinder, Pyramid and Cone- inclined to one of the principal plane.

Development of Lateral Surfaces: Development of lateral surfaces of Regular Solids – Prism, Cylinder, Pyramid and Cone.

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple Solids. Conversion of Isometric Viewsto Orthographic Views and Vice-versa.

Practice

1. Projections of a point in all quadrants.
2. Projections of a line in first quadrant.
3. Orthographic projections of a plane parallel to one of the principal plane.
4. Orthographic Projections of a plane inclined to both the principal planes.
5. Orthographic Projections of a solid parallel to one of the principal planes.
6. Orthographic Projections of a solid inclined to one of the principal planes.
7. Development of Lateral surface of a regular prism and a cylinder
8. Development of Lateral surface of a pyramid and a cone.
9. Isometric projections of a plane.
10. Isometric projections of a simple solid.
11. Conversion of Isometric view to Orthographic views.
12. Conversion of Orthographic views to Isometric view.

4. Laboratory Equipment/Software/Tools Required

1. AUTOCAD software

5. Books and Materials

Text Books:

1. BhattN.D.,PanchalV.M.&IngleP.R.,*EngineeringDrawing*,CharotarPublishingHouse,2014.
2. BasantAgrawalB.&AgrawalC.M.,*EngineeringGraphics*,TMHPublication,2016.

Reference Books:

1. Narayana,K.L.&PKannaiah,*TextbookonEngineeringDrawing*,ScitechPublishers,2016.
2. K.BalaveeraReddyetal,*ComputerAidedEngineeringDrawing*,CBSPublications,2017.
3. Shah,M.B.&RanaB.C.,*EngineeringDrawingandComputerGraphics*,PearsonEducation,2008.

I B.TECH I SEMESTER

COURSE STRUCTURE
A5006 - SOCIAL INNOVATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	28	1	30	70	100

1. Course Description

Course Overview

Social Innovation is a no pen ended course to develop social connectedness in engineering students through social awareness and social consciousness. This can be done through live field exposure along with faculty led conceptual presentations, real case reviews; self - study assignments, literature and field survey. Through this course, the students are expected to use their engineering knowledge to provide innovative solutions to existing social problems. This course also develops critical thinking ability among the students.

Course Pre/corequisites

To create innovative solutions/approaches to existing social problems by using basic engineering knowledge.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5006.1. Measure molecular/ system properties such as surface tension, viscosity, conductance of solutions and redox potentials.

A5006.2. Apply various titrations for the estimation of strengths of solutions and hardness of water.

A5006.3. Identify different samples from a mixture by using various separation techniques.

A5006.4. Estimate rate constants of reactions from concentration of reactants/products as a function of time.

A5006.5. Evaluate the percentage of yield of chemical substances by organic synthesis.

3. Course Syllabus

Introduction to Social Innovation: Core definitions, core elements and common features of social innovation, a typology of social innovation, Awakening social consciousness.

Create Mindsets: Seven mindsets– Empathy, Optimism, Iteration, Creative confidence, making it, Embracing ambiguity, Learning from failures.

Wicked Problems: Distinguish between simple, complicated, and complex problems; describe the characteristics of wicked problems, breakdown a given problem by unpacking its complexity.

Critical Thinking for Social Innovation: Definition, engineering thinking and learning, distinguish between creativity and innovation.

Models for Creative Thinking: Appreciative Inquiry (AI), Asset Based Community Development (ABCD) and Concept of Bricolage.

Process of Social Innovation: Community study, develop questionnaire, identifying the causes of a particular problem.
Process of Social Innovation: Identify needs, record your learning's.

Process of Social Innovation: Generate ideas, select promising ideas, prototyping and testing.Social Innovation across Four Sectors - The non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

Stages of Innovation: Social organizations and enterprises, social movements, social software and open source methods, common patterns of success and failure.

5. Books and Materials

Text Books:

1. Robin Murray, Julie Caulier- Grice, Geoff Mulgan, "The open book of social innovation: Ways to Design,DevelopandGrowSocialInnovation",TheYoungFoundation,2010.
2. Julie Caulier-Grice, Anna Davies, Robert Patrick & Will Norman, The Young Foundation (2012)Social Innovation Overview: A deliverable of the project:"The theoretical, empirical and policy foundations for building social innovation in Europe" (TEPSIE), European Commission– 7thFrameworkProgramme,Brussels:EuropeanCommission,DGResearch.

Reference Books:

1. Geoff Mulgan, "Social Innovation: What it is, Why it matters and How it can be accelerated", The Young Foundation, 2007.
2. Asset Based Community Development (ABCD) Model – http://www.nurturedevelopment.org/asset-based-community-development/.
3. Diana Whitney & Amanda Trosten-Bloom, "The Power of Appreciative inquiry – A Practical Guide to Positive Change", 2nd Edition, Berrett-Koehler Publishers, Inc, 2010.

SYLLABI FOR I YEAR II SEMESTER

I B.TECH II SEMESTER

COURSE STRUCTURE
A5002 - ADVANCED CALCULUS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	2	42	14	28	5	30	70	100

1. Course Description

Course Overview

This course provides mathematical knowledge required to analyze problems encountered in engineering. This course covers Evaluation of integrals, Functions of several variables, Vector Calculus and Transform Calculus. Further, this course can be applied in many areas of engineering such as electromagnetic, gravitational fields, signal analysis and image processing.

Course Pre/corequisites

This course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5002.1 Examine the extremum of a function of several variables.
A5002.2. Evaluate definite and indefinite integrals
A5002.3. Determine Divergence and Curl of a vector point function
A5002.4. Make use of vector integral theorems to evaluate area, surface area and volumes
A5002.5. Build Fourier series and Fourier transforms of a given function

3. Course Syllabus

Theory

Mean Value Theorems and Multivariable Calculus: Rolle's Theorem, Lagrange's mean value theorem and Cauchy's mean value theorem, Taylor's and Maclaurin's series. Jacobians, Functional dependence, Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.

Multiple Integrals: Double integrals, Change of order of integration, Change of variables, Area enclosed by plane curve by double integration, Triple integrals, Change of variables, Volume of solid by triple integration. Evaluation of improper integrals: Beta and Gamma functions and their properties

Vector Differentiation: Scalar and vector point functions, Gradient, Directional derivative, Tangent plane and normal line to the surface, Divergence, Curl and their related properties, Scalar potential function, Laplacian operator.

Vector Integration: Line integral, work done, Surface integrals, Volume integrals. Vector integral theorems: Green's theorem in a plane, Stoke's theorem and Gauss divergence theorem (without proof) and related problems, Irrotational fields.

Fourier Series and Fourier Transforms: Euler's formulae, Dirichlet's conditions, Fourier series for functions having period $2l$, Fourier series for even and odd functions, Half range Fourier sine and cosine series. Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

Practice

1. Partial derivative of a given function
2. Area between curves of one variable
3. Double Integral in a rectangular domain
4. Change of variables in double integrals
5. Area using double integrals (Cartesian and Polar Coordinates)
6. Vector operations
7. Position vector, Centre of mass of a system of discrete particles
8. Equation of a plane in space, Cartesian and polar representations of vectors in the xy-plane
9. Line integrals independent of path
10. Work of a force as a line integral
11. Calculating Fourier coefficients
12. Calculating and Plotting Fourier series

4. Laboratory Equipment/Software/Tools Required

1. Scilab Software
2. Matlab Software

5. Books and Materials

Text Book:

1. B.S. Grewal, *Higher Engineering Mathematics*, 43rdEdition, Khanna Publishers, New Delhi, 2014.

Reference Books:

1. R.K.Jain and S.R.K.Iyengar, *Advanced Engineering Mathematics*, 4th Edtion, Alpha Science
2. International Limited, 2014.
3. B.V. Ramana, *Higher Engineering Mathematics*, 23rd Reprint, Tata Mc-Graw Hill Education
4. Private Limited, New Delhi, 2015.
5. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.

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I B.TECH II SEMESTER

COURSE STRUCTURE

A5004 - APPLIED CHEMISTRY

(Common to all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

This course offers a strong base in physical, organic, inorganic and general chemistry to spread over an orientation towards the molecules, general properties of materials and various instrumental techniques. In addition this course also focuses on fundamental principles of chemistry, potential applications, practical utility in order to understand engineering problems and synthesis of organic compounds.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5004.1. Extend the fundamental concepts of chemistry to describe various chemical phenomena and application.

A5004.2. Compare the properties and applications of engineering substances.

A5004.3. Apply various reactions and fundamentals of stereo chemistry to understand organic chemistry.

A5004.4. Analyze the impurities present in the water for industrial and domestic applications.

A5004.5. Utilize the instrumental techniques and titrations to measure physical and chemical properties.

3. Course Syllabus

Theory

Electrochemistry and Batteries: Electrochemistry: Introduction, Electrode- electrode potential, standard electrode potential, types of electrodes – Construction and functioning of Standard hydrogen, Calomel and Quinhydrone electrodes. Engineering Applications: Batteries: Cell and battery – Primary battery (dry cell) and Secondary battery (Lithium ion cell, lead acid battery, Nickel – Cadmium battery).

Fuel cells: Hydrogen –Oxygen fuel cell – Applications.

Stereochemistry of Carbon Compounds: Isomerism: Definition and their classification: Constitutional isomers: Definition, examples of chain, functional and positional isomers. Stereoisomers: Definition, examples of enantiomers and diastereomers. Optical activity: Definition, chiral centres. R, S nomenclature, Cahn-Ingold-Prelog rules. Geometrical isomerism of alkenes– cis, trans and E, Z configuration.

Organic Reactions And Drug Molecules: Introduction, Types of organic reactions. Substitution reactions – SN^1, SN^2. Addition reactions – hydrogenation (H_2), halogenation (X_2) and hydrogen halide (Markownikoff and Anti-Markownikoff rule) to olefins. Elimination reactions – E1 and E2.
Drugs: Structure, preparation and uses of commonly used drug molecules- paracetamol, aspirin and ibuprofen.

Engineering Materials:
A) High Polymers**:** Introduction, Types of Polymerization. Plastics: Thermoplastic resins & Thermosetting resins, preparation, properties and engineering applications of plastics: polyethylene, Poly vinyl chloride, Teflon, Nylon. Rubbers: Natural rubber and vulcanization. Synthetic rubbers: Buna-S, Buna-N. Fibers: Polyester- applications. Conducting Polymers: Classification, doping and applications.
B) Material Chemistry: Cement- Composition and manufacture of Port land Cement. Lubricants: Criteria of a good lubricant, classification. Refractory: Criteria of a good refractory, classification

Water treatment: Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent – expression and units of hardness. Numerical problems. Boiler troubles: Sludges, scales and Caustic embrittlement. Internal treatment of boiler feed water – Calgon conditioning – Phosphate conditioning – Colloidal conditioning – Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis. Sewage water – Steps involved in treatment of sewage.

Practice

1. Estimation of strength of hydrochloric acid by conductometric titration.
2. Estimation of strength of hydrochloric acid by potentiometric titration.
3. Estimation of Iron in Mohr's salt by potentiometric titration.
4. Estimation of hardness of water by complexometric using EDTA.
5. Determination of chloride content in water by Argentometry
6. Determination of viscosity of a given fluid by Ostwald's viscometer.
7. Determination of surface tension of a given liquid by using Stalagmometer.
8. Synthesis of Aspirin and Paracetamol.
9. Thin layer chromatography calculation of Rf values. Eg. ortho and para nitro phenols.
10. Verification of Freundlich adsorption isotherm of acetic acid on Charcoal.
11. Determination of partition coefficient of acetic acid between butanol and water.
12. Determination of the rate constant of acid catalyzed hydrolysis of methyl acetate.

4. Laboratory Equipment/Software/Tools Required

1. Digital Conductometer
2. Digital Potentiometer
3. Electrical Water Heater
4. Wall Mount Distillation Plant
5. Analytical/Digital Weighing Balance
6. Ostawald's Viscometer
7. Stalagnometer
8. Stop watch
9. Thermometer
10. RB Flask condenser
11. TLC Plates (silica coated)
12. TLC Chambers
13. Magnetic Stirrer
14. Iodine Blowers

4. Books and Materials

Text Book:

1. Jaya Shree Anireddy, Textbook of Engineering Chemistry, Wiley Precise Textbook Series, 2018.

Reference Books:

1. Jain & Jain. Engineering Chemistry: Dhanapathrai Publications., 2015.
2. S.S.Dara, Experiments and Calculations in Engineering Chemistry: S-Chand Publications, Revised edition, 2008.

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I B.TECH II SEMESTER

COURSE STRUCTURE

A5502 - DATA STRUCTURES

(Common to all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

Data Structures is a course of primary importance to the discipline of Computer Science and Engineering. It is a mathematical and logical model of organizing data and also used in designing and implementing efficient algorithms. Data structures like linked lists, stacks and queues will be discussed to implement real time applications. The course also includes non – linear data structures like Trees and Graphs which are especially used to handle large amount of data. Study of the C programming language that covers the syntax and constructs of data types, control statements, arrays, functions, pointers and structures. C-programming language Concepts are used to implement the concepts of Data Structures.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5502.1. Understand the fundamentals of C Concepts and its Constructs.
A5502.2. Apply the concepts of Arrays, functions, pointers and structures in real world applications.
A5502.3. Perform various operations on linear data structures.
A5502.4. Implement various Non Linear data structures.
A5502.5. Select appropriate searching and sorting techniques for given application.

3. Course Syllabus

Theory

C Overview: Structure of a C program, datatypes, operators, type conversion, formatted input/ out functions, Control statements.

Arrays: one dimensional arrays, two dimensional arrays, string manipulation functions. Functions: categories of user defined functions, parameter passing techniques, recursion. Pointers: declaration, initialization, pointer to pointer, dynamic memory allocation, command line arguments.

Structures: declaration, initialization, accessing the members, pointers to structures.

Introduction to Data Structures: Introduction, Classification of Data Structures, Operations on Data Structures, Time, Space Complexity and Asymptotic Notations.

Stacks: Introduction, Array Representation of Stack, Operations on Stack.
Applications of Stacks: towers of Hanoi, Infix-to- Postfix conversion, evaluating Postfix expressions.
Queues: Introduction, Array representation of Queue, Operations on a Queue, Circular Queue. Linked

Lists: Introduction, Singly Linked List: Representation of a Singly Linked List, Operations on a Singly Linked List. Doubly Linked List.
Trees: Definition, Basic Terminologies, Representation of a Binary Tree using Array and Linked List, Operations on a Binary Tree: create, insert, Tree Traversals.

Graphs: Definition, Basic Terminologies and Representation.
Searching and Sorting: linear search, binary search, bubble sort, selection sort, insertion sort, merge sort.

Practice

1. a) Write a C program to print your name and address in line by line.
   b) Write a C program to calculate simple interest
   c) Write a C program for Swapping of two numbers using a third variable.
2. a) Write a C program to find the largest and smallest number among a list of integers.
   b) Write a C program to find Multiplication of two matrices.
   c) Write a C program to demonstrate the string handling functions.
   d) Write a C program to Check whether the given string is palindrome or not without using string functions.
3. a) Write a C program to find the factorial of a number using non recursion.
   b) Write a C program to find the n^{th} Fibonacci term using non recursion.
   c) Write a C program to find the factorial of a number using recursion.
   d) Write a C program to find the n^{th} Fibonacci term using recursion.
4. a) Write a C program to Read an array of integers whose size will be specified interactively at runtime
   b) Write a C program to Pass n number of arguments at the command line and display total number of arguments and their names.
   c) Write a C program to Create a Student structure containing name, rollNo and grade as structure members. Display the name, roll No and grade of a student.
5. a) Implement stack operations using arrays.
   b) Implementing towers of Hanoi.
6. a) Converting infix expression to postfix expression
   b) Evaluate the postfix expression

7. a) Implement Queue using arrays
   b) Implement Circular Queue using arrays
8. Implement single linked list.
9. Implement double linked list.
10. Implement Traversals on Binary Tree using linked list.
11. a) Implement Linear Search
    b) Implement Binary search
12. a) Implement Bubble sort
    b) Implement Selection sort
    c) Implement Insertion sort

4. Laboratory Equipment/Software/Tools Required

1. Linux OS
2. C ++Compiler

5. Books and Materials

Text Book:

1. Reema Thareja (2014), Data Structures Using C, 2nd Edition, Oxford University Press India.

Reference Books:

1. SamantaDebasis(2012),ClassicDataStructures,2ndEdition,PrenticeHallofIndia.
2. Horowitz,Ellis,Sahni,Sartaj,Anderson-Freed,Susan(2008),FundamentalsofDataStructureinC, 2ndEdition,UniversityPress,India.

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I B.TECH II SEMESTER

COURSE STRUCTURE

A5201 - BASIC ELECTRICAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

Basic Electrical Engineering is an integrated course intended to enhance the knowledge of students in electric circuits, DC & AC machines and develop analytical skills. The course addresses the underlying concepts and methods behind Electrical Engineering. The course presents the knowledge of the Fundamentals of Electrical Engineering, basic principles, types of electrical circuit and network theorems. The principle and operating conditions of D.C. Machines (Motor & Generator), Transformers, Induction Motors and alternators will be discussed.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5201.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, Voltage and Power for complex circuits.

A5201.2 Analyze the electrical circuits using Nodal Analysis, Mesh Analysis and Network Theorems.

A5201.3 Plot and analyze the characteristics of DC machines, AC Machines and 1-Phase Transformers

A5201.4 Test the performance of DC Machines,1-Phase Transformers and AC Machines.

3. Course Syllabus

Theory

DC Circuits: Electrical circuit elements (R, L and C), Types of sources, KVL & KCL, Network reduction Techniques (Series, Parallel & Star-Delta), Mesh and Nodal Analysis, Thevenins, Nortons and Superposition Theorems (DC Excitation)

Network Parameters: Two port network parameters - Z, Y and hybrid parameters (DC Excitation)

AC Circuits: Representation of sinusoidal waveforms, Average & RMS value, Peak factor, Form factor for sinusoidal waveforms, j-notation, Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series), Active power, Reactive power, Apparent power and power factor.

Single Phase Transformers: Types, Principle & constructional details, EMF equation, operation on NO load and ON Load Condition, Phasor diagrams. Equivalent circuit, losses and efficiency, OC and SC Test.

DC Machines: DC Generators - Principle of operation, E.M.F Equation, Methods of Excitation – separately excited and self excited generators. DC Motors – Types-Principle of operation - Back E.M.F, Torque equation, torque-speed characteristics and speed control of separately excited dc motor.

AC Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, torque-slip characteristics. Construction and working of synchronous generator, No-Load Characteristics.

Practice (Any 12 Experiments):

1. Verification of Ohm's Law.
2. Verification of KVL and KCL.
3. Verification of superposition theorem.
4. Verification of Thevenin's and Norton's theorems.
5. Determination of Z and Y parameters.
6. Determination of hybrid parameters.
7. Calculation and Verification of Impedance, Voltage and Current of RL, RC and RLC series circuits.
8. Measurement of Voltage, Current and Real Power in primary and secondary circuits of a single phase Transformer.
9. Load Test on Single Phase Transformer.
10. OC & SC Tests on Single phase Transformer.
11. Torque-Speed Characteristics of a DC Compound Motor.
12. Brake test on a 3 phase Induction Motor.
13. Performance Characteristics of a Separately Excited DC Motor.
14. No-Load Characteristics of a Three-phase Alternator.

4. Laboratory Equipment/Software/Tools Required

1. Theorems boards.
2. Transformer panel.
3. DC compound Motor.
4. 3 Phase induction motor.
5. Separately Excited DC motor.
6. 3 Phase Alternator.
7. Resistors.
8. Bread boards.
9. Regulated Power Supply.

5. BOOKS AND MATERIALS

Text Books:

1. William Hart Hayt, Jack Ellsworth Kemmerly, Steven M. Durbin (2007), Engineering Circuit Analysis, 7th edition, McGraw-Hill Higher Education, New Delhi, India.
2. Vincent Deltoro, Electrical Engineering Fundamentals, 2nd edition, Prentice Hall India, 1989.

Reference Books:

1. D. P. Kothari and I. J.Nagrath, Basic Electrical Engineering, 3rd edition 2010, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill, 2009.
3. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011.

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I B.TECH II SEMESTER

COURSE STRUCTURE

A5008 - CO-ENGINEERING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

The course is intended to familiarize students to all workshops including civil, mechanical, and electrical and electronics engineering. In each of these workshops, the students are exposed to basic understanding of components, equipment, trades and methods. Civil engineering workshop focuses on surveying instruments and types of building materials and its identification. Mechanical engineering workshop focuses on fitting and carpentry trades, Tin-Smithy, foundry and plumbing. Electronic workshop focuses on basic electronic components, measuring equipment and Multisim software. Electrical workshop focuses on basic electrical wiring and installations.

Course Pre/corequisites

The course aims to facilitate the students with the basic familiarization to all engineering streams and basic knowledge over civil, electrical, mechanical and electronics.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5008.1. Identify various surveying tools and choose building materials according to field conditions

A5008.2. Analyze the basic circuit connections, maintenance and troubleshooting of house-hold equipment's

A5008.3. Make use of various electrical and electronic components to construct simple circuits and measure various physical quantities.

A5008.4. Explain basic components used in different trades.

A5008.5. Identify the associated tools used in different trades.

3. Course Syllabus

Civil Workshop

1. Field tests on cement
2. Demonstration of surveying chains
3. Different types of brick bonds
4. Types of Construction materials and identification

5. Demonstration of the odolite and total station

Electrical Workshop

1. One Lamp controlled by one way switch.
2. One Lamp controlled by two two-way switches.
3. Two Lamps controlled by two way switch (parallel connection).
4. Two Lamps controlled by one way switch (series connection).
5. Tube Light controlled by one way switch

Mechanical Workshop

1. Fitting Trade: To make a L- fit from the given M.S Flat material piece.
2. Carpentry Trade: To make a cross lap joint as per specification.
3. Tin Smithy: To make a open scoop with the given sheet metal
4. Foundry: To prepare a sand mould using a single piece pattern.
5. Plumbing: To make external threading on a given pipe

Electronics Workshop

1. Study of Basic Electronic Components (resistors, capacitors and inductors, switches, relay, breadboard), Resistor color coding, Difference between AC and DC Signals.
2. Demonstrate the use of DC Voltmeter, DC Ammeter, Multimeter and Regulated Power Supply. Verify Voltage Division and Current Division Principles by connecting simple circuits on Breadboard. Measure voltage and current using meters
3. Demonstrate the use of Cathode Ray Oscilloscope and Function Generator. Measure amplitude, time period, and frequency of an AC signal
4. Introduction to Multisim Electronic Workbench Practice - DC Operating Point and DC Analysis
5. Multisim - Transient Analysis, Use of Virtual Instruments like Meters, Function Generator and CRO

4. Laboratory Equipment/Software/Tools Required

Civil Workshop

1. Cement, Sieve
2. 30 m chain, 20 m chain
3. Bricks, Sprit level, Mason level, Straight level
4. Stone, Tiles, Bricks, Aggregates
5. The odolite, Total station

Electrical Workshop

1. one way switch, two way switch, tube light with frame, choke, connecting wires, holders, bulbs, Energy meter, Indicator

Mechanical Workshop

1. Follow a sequence of operations like filing, marking, punching, cutting and finishing.

2. Follow a sequence of operations like planning, marking, cutting, chiseling and finishing.
3. Follow a sequence of operations like marking, shearing, bending, folding, squeezing, pressing and finishing.
4. Follow a sequence of operations like preparing moulding sand, placing the pattern, filling the sand, ramming, gate cutting, placing the sprue pins and finishing.
5. Follow a sequence of operations like marking, cutting, threading and testing.

Electronics Workshop

1. Resistors, Capacitors, Inductors, Switches, Relays, Breadboard
2. DC Voltmeter and Ammeter, Multimeter and RPS
3. CRO and Function Generator
4. NI Multisim Software

5. Books and Materials

Text Books:

1. B.C.Punmia, Ashok K Jain, Arun K Jain, Surveying Vol.I, Laxmi Publications, 2016.
2. B. L. Juneja, "*Workshop Practice*", 1st Edition, Cengage Learning India Private Limited, New Delhi,2015.
3. P. Kannaiah and K.L. Narayana, *Workshop Manual*, 2nd Edition 2009, SCITECH Publications Pvt Ltd.
4. PaulScherzandSimonMonk,*"PracticalElectronicsforInventors"*,McGrawHill,4thEdition.

Reference Book(s)

1. S.K. Duggal, Building Materials, 4th edition New age Publication,2012.
2. Varghese , P.C. Building construction, Prentice Hall of India Pvt. Ltd, New Delhi, 2nd revised edition, 2016
3. K.Venkata Reddy," *Workshop Manual*", 6th Edition Reprint, BSP Publications, Hyderabad, 2018.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous Institute Affiliated to JNTUH

I B.TECH II SEMESTER

COURSE STRUCTURE

A5007 - ENGINEERING EXPLORATION

(Common for all Programs – CE, EE, ME, EC, CS & IT)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	28	1	30	70	100

1. Course Description

Course Overview

This course starts with differentiating science and engineering, scientist and engineer, followed by describing engineering graduate attributes and what engineers "do". This course offers the fundamental principles, concepts of engineering, as well as the influences of engineering on society and also hands-on and experiential learning opportunities in specific areas of engineering. This course focuses on data collection and analysis, engineering problem-solving, mathematical modeling, contemporary tools (software and hardware), professional practice and expectations (e.g. Communication, teamwork, ethics) and the diversity of fields and majors within engineering. Topics to be covered in this course include: engineering design process in multidisciplinary domain, and unique platform to showcase any idea into functional prototype, project management skills, exploring engineering skills with ethical and sustainability perspective.

Course Pre/corequisites

To design and develop a sustainable model to existing social problems by using a development platform (ARDUINO or equivalent).

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5007.1. Compare and contrast the contributions of different types of engineers in the development of a product, processor system.

A5007.2. Apply the common engineering design process to solve complex problems and arrive at viable solution

A5007.3. Explore various contemporary software and hardware tools to provide solutions for the problems.

A5007.4 Apply skills needed for success full teamwork including the basics of project management and written and oral communication.

A5007.5. Identify the key elements of professional codes of ethics as well as the ethical and societal issues related to the disciplines and their impact on society and the world.

3. Course Syllabus

Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants.
Various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes

Engineering Design Process: Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure. **Introduction to mechatronics system**, generation of multiple solution, decision matrix, Concepts of reverse engineering.

Introduction to various Platform based development: (Arduino) programming and its essentials.
Introduction to sensors, transducers and actuators and its interfacing with arduino Community study, develop questionnaire, identifying the causes of a particular problem.

Engineering Ethics: Identifying Engineering as a Profession, Significance of Professional Ethics, Code of Conduct for Engineers. Identifying Ethical Dilemmas in different tasks of engineering, Applying Moral Theories and codes of conduct for resolution of Ethical Dilemmas.

Sustainability: Introduction to sustainability, Sustainability leadership, Life cycle assessment.
Project Management: Introduction, Significance of teamwork, Importance of communication in engineering profession.
Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation.

4. Books and Materials

Text Books:

1. PhilipKosky,RobertT.Balmer,WilliamD.Keat,GeorgeWise,ExploringEngineering:AnIntroducti ontoEngineeringandDesign,AcademicPress,3rdedition,2012.
2. ByronFrancis,Arduino:TheCompleteBeginner'sGuide,CreatespaceIndependentPublishers,2016.
3. M. Govindarajan, S. Natarajan & V. S. Senthil Kumar, Engineering Ethics, 1st Edition, Phi Learning, 2009.

Reference Books:

1. Neerparaj Rai, Arduino Projects for Engineers, 1st edition, BPB Publications, 2016. 2.
2. aSimon Monk, Programming Arduino: Getting Started with Sketches, 2nd Edition, McGraw-HillEducation, 2016.
3. W. Richard Bowen, Engineering Ethics – Outline of an aspirational approach, Springer London.

SYLLABI FOR II YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous Institute Affiliated to JNTUH

II B.TECH I SEMESTER

COURSE STRUCTURE

A5009 - PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLES

(Common to EEE & ECE)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	0	0	4	30	70	100

1. Course Description

Course Overview

This course provides mathematical knowledge required to analyze problems encountered in engineering. In this course, the students are acquainted with partial differential equations, calculus of functions of single complex variable, theory of single and multi-valued functions, region of convergence of a power series and mappings in the complex plane. In addition, this course can be applied in many areas of engineering such as circuit theory, signal analysis and control theory.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5009.1. Solve partial differential equations of first and higher order

A5009.2. Test for analyticity of complex functions in the given domain

A5009.3. Build analytic function in series of complex terms

A5009.4. Evaluate real and complex integrals along a closed contour

A5009.5. Apply conformal mapping to transform complex regions into simpler regions

3. Course Syllabus

First Order Partial Differential Equations: Formation of partial differential equation by eliminating the arbitrary constants and arbitrary functions, Solutions of first order linear, quasi linear (Lagrange) equation and nonlinear (standard type) equations, Equations reducible to standard form.

Higher Oder Partial Differential Equations: Classifications of second order partial differential equations, Solving linear equations with constant coefficients by finding complementary function and particular integral and Method of separation of variables.

Differentiation of Complex Functions: Continuity, differentiability and analyticity of functions of a complex variable, Cauchy-Riemann equations in Cartesian and polar form (without proof), harmonic

and conjugate harmonic functions, Milne-Thomson method; Exponential, circular, hyperbolic and logarithmic functions of a complex variable, General and principal values of a logarithmic function.

Integration of Complex Functions: Complex integration: Line integral in complex plane, Cauchy's integral theorem and Cauchy's integral formula (without proof), Zeros and singularities of analytic function. Complex power series: Taylor's series and Laurent's series (without proof).

Calculus of Residues: Residues, Residue theorem (without proof), Evaluation of real definite integrals of the form (i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$ (ii) $\int_{-\infty}^{\infty} f(x)dx$. Conformal mapping: Translation, rotation, inversion, bilinear transformation and their properties, determination of bilinear transformation of three given points.

4. Books and Materials

Text Book:

1. B.S. Grewal, *Higher Engineering Mathematics*, 43rdEdition, Khanna Publishers, New Delhi, 2014.

Reference Books:

1. B.V. Ramana, Higher Engineering Mathematics, 23rdReprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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II B.TECH I SEMESTER

COURSE STRUCTURE

A5401 - DIGITAL LOGIC DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

This is the fundamental course in Electronics and Communication Engineering. This course will provide the fundamental background needed to understand how digital systems workandin particular digital computers. This course will be begun by covering the mathematical concepts necessary in the study of digital systems and then design and analysis of combinational circuits and show how to construct the minimal (least number of gates) circuit necessary to implement a specific function. Then move on to sequential circuits which add a concept of memory or feedback to thecombinational design and will analyze and design these circuits. Finally, some standard and common electronic components (such as counters and shift registers) will be designed and analyzed. The course is an integrated course having theory and practical components that integrates hands-on experience with LabVIEW software including logic simulation, implementation and verification of all the combinational and sequential circuits. This course forms the basis for the study of advanced subjects like Computer Architecture and Organization, Microprocessors and Interfacing and Embedded systems. It is imperative that these concepts are well understood.

Course Pre/co requisites

- Basic Gates

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5401.1. Illustrate the knowledge of Boolean algebra concepts to simplify a digital circuit

A5401.2. Construct various digital circuits used in digital systems

A5401.3. Make use of various sequential digital circuits to develop basic building blocks

A5401.4. Evaluate various experiments using Modern tools to demonstrate a given application

A5401.5. Analyze an application of digital circuit

3. Course Syllabus

Theory

Boolean Algebra and Logic Gates: Review of Boolean Algebra and De Morgan's Theorem, Logic gates, SOP & POS forms, Canonical forms, Karnaugh maps up to 5 variables, Tabulation Method, Binary codes, Code Conversion.

Combinational Logic Design: Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU. MSI devices like Comparators, Multiplexers, Encoder, Decoder

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK Flip-flops, Edge triggered FF, Ripple and Synchronous counters, and Shift registers.

Concept of Programmable Logic Devices: PAL, PLA and FPGA. Logic implementation using Programmable Devices. Finite state machines, Design of synchronous FSM.

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements.

Practice:

1. Realization of Logic gates
2. Analyze Boolean Functions using basic Logic gates and universal gates
3. Design Code Convertors
4. Realization of Boolean Functions using MUX
5. Design and Analyze of various adders
6. Design and Implementation of ALU or any other problem statement
7. Understanding FFs and verification of truth tables
8. Design and Implementation of basic counters
9. Design and Implementation of special counters
10. Basic knowledge of FPGA and their functionalities
11. Design and Analysis of RAM
12. Design of synchronous FSM

4. Laboratory Equipment/Software/Tools Required

1. LabVIEW Simulation Software, MyDAC&MyRIO Hardware Components.

5. Books and Materials

Text Book:

1. M. Morris Mano, Michael D. Ciletti (2008), Digital Design 4th Edition, Pearson Education/ PHI, India

Reference Books:

1. Charles H RothJr, Larry L Kinney 6th Edition, Fundamentals of Logic Design, Cengage Learning.
2. Ronald J Tocci, Ronald J Tocci, Neal S Widmer, Gregory L Moss, Digital Systems Principles an Applications, 10th Edition, Pearson Education International.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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II B.TECH I SEMESTER

COURSE STRUCTURE

A5402 - ELECTRONIC DEVICES AND CIRCUIT ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

This course covers fundamental topics that are common to a wide variety of electronic devices, circuits and systems. The topics include right from the inception of evolution of semiconductor devices to their real time applications. This course starts with basics of semiconductors, review of operation and characteristics of semiconductor devices. This course provides a basis for students to continue education by undertaking advanced study and research in the variety of different branches of semiconductor devices and applications.

Course Pre/co requisites

- Applied Physics (A4003)
- Basic Electrical Engineering (A5201)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5402.1. Demonstrate the principle of operation of electronic devices and circuits
A5402.2. Construct electronic circuits making use of diodes and transistors
A5402.3. Analyze amplifier and oscillator circuits and verify using appropriate simulation tools
A5402.4. Distinguish voltage amplifiers and power amplifiers
A5402.5. Analyze the effect of feedback and cascading in amplifiers

3. Course Syllabus

Theory

Diode Characteristics: Basic structure and operating principle, current-voltage characteristics, diode models.
Diode Applications: Rectifier circuits (half-wave and full-wave rectifiers, rectifiers with capacitor filter), voltage regulator (using Zener diode), clipper (limiter) circuits, clamper circuits.

Bipolar Junction Transistor: Structure, principle of operation, different configurations (such as CE, CB and CC), input and output characteristics, DC analysis - load line and operating point, biasing schemes, bias stability.

BJT Applications: Transistor as an amplifier, small-signal equivalent circuits, single-stage BJT amplifier (common-emitter mode).

Junction Field Effect Transistor (JFET): Structure, principle of operation, characteristics.
Metal Oxide Semiconductor Field-Effect Transistor (MOSFET): Structure and physical operation of n-type and p-type MOSFET; transfer and drain characteristics.
FET Applications: JFET as voltage variable resistor, MOSFET as a switch.

Multistage amplifiers and Power Amplifiers: Cascade and Cascode amplifiers, Darlington pair, various classes of operation (Class A and B) and their power efficiency.
Amplifier Applications: Block diagram of public address system.

Concept of Feedback in amplifiers: Negative feedback - Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain and bandwidth. Positive feedback – review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts).

Practice:

1. Design of regulated power supply
2. Analyze how the diode clipper circuits change the shape of the input signal under different case studies.
3. Analyze how diode clamping circuits are used as voltage doublers or voltage multipliers.
4. Bias a given BJT to work in a desired Quiescent operating point by employing different biasing techniques.
5. Design and set up an RC-coupled CE amplifier using bipolar junction transistor and to plot its frequency response. Also measure its input and output impedances.
6. Study Transfer and drain characteristics of JFET and analyze how JFET acts as voltage variable resistor.
7. Analyze how gain and bandwidth vary with multi-stage amplifiers (Cascaded CE-CE).
8. Compute the efficiency of power amplifiers under various classes of operation (class A, B and C).
9. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
10. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
11. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
12. Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts

4. Laboratory Equipment/Software/Tools Required

1. CRO

2. Function Generator
3. Regulated Power Supply
4. Multimeter
5. Multisim Software

4. Books and Materials

Text Book:

1. Robert L. Boylestad and Louis Nashelsky: *Electronic Devices and Circuit Theory*; PHI, 11e, 2013.

Reference Books:

1. Millman and Halkias: Electronic Devices and Circuits; Tata Mc Graw Hill
2. R.J. Smith and R.C. Dorf: *Circuits, Devices and Systems*; John Wiley & Sons, 1992.

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II B.TECH I SEMESTER

COURSE STRUCTURE
A5403 - SIGNALS AND SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

Signals and Systems is an introductory course essentially attempts to cover classification, representation of signals and analysis in the time domain and frequency domain of systems. It is a foundation course to advanced courses like Communication Systems, Signal Processing and is predominantly useful to Electronics and Communication Engineering in their undergraduate program. This course provides coherent and comprehensive coverage of signals and systems. It is offered as an integrated course having theory and practice that gives hands-on training using MATLAB Tool adequately supported by required hardware.

Course Pre/co requisites

- Linear Algebra and Ordinary Differential Equations.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5403.1. Understand the mathematical description of signals and representation of systems
A5403.2. Identify the spectrum of continuous-time periodic and non-periodic signals
A5403.3. Apply various transforms to analyze continuous and discrete-time systems
A5403.4. Identify the causality and stability of systems using various transform techniques
A5403.5. Examine various concepts in signals and systems using an appropriate simulation tool

3. Course Syllabus

Theory:

CLASSIFICATION OF SIGNALS: Continuous time (CT) and Discrete time (DT) signals, elementary Signals-Unit, Step, Impulse, ramp signals, singularity functions and operations on signals.
SIGNAL TRANSMISSION THROUGH LTI SYSTEMS: Classification of systems, discrete time LTI systems and continuous time LTI systems, properties of LTI system, Impulse and unit step response of a linear system.
CONVOLUTION AND CORRELATION OF SIGNALS: System analysis by convolution, graphical interpretation of convolution, correlation and convolution. Properties of correlation function, correlation functions for non-finite energy signals.

FOURIER SERIES: Trigonometric Fourier series and Exponential Fourier series, relationship between trigonometric Fourier series and exponential Fourier series, convergence of Fourier series, symmetry conditions.

FOURIER TRANSFORMS: Fourier transform (FT), Fourier transform of standard signals, Fourier transforms involving impulse function, Fourier transform of periodic signals.

PROPERTIES OF FOURIER TRANSFORMS: Properties of continuous Fourier transforms Hilbert transform and its properties. Filter characteristics of LTI system, distortion less transmission.

LAPLACE TRANSFORMS: The Laplace transform (LT), The Region of convergence (ROC) for Laplace transforms, Properties of Laplace transforms, some Laplace transform pairs.

SAMPLING: Sampling of continuous time signals, sampling theorem, reconstruction of signal from its samples, the effect of under sampling- aliasing, practical aspects of sampling.

Z - TRANSFORMS: The Z - Transform, The Region of Convergence (ROC) for Z - transform and its properties, properties of Z -transform, constraints on ROC for various classes of signals, transfer function, causality and stability, Inverse Z- transform using various methods.

INVERSE LAPLACE TRANSFORMS: Inverse Laplace transforms, Partial fraction method and long division method, Laplace transforms methods in circuit analysis, the transfer function. Analysis and characterization of LTI system using Laplace transform.

Practice:

1. Generation of Various Signals and Sequences such as Unit Impulse, Unit Step, Square, Sawtooth, Triangular, Sinusoidal, Ramp, Sinc.
2. Generate a signal y(t) = 3r(t + 3) − 6r(t + 1) + 3r(t) − 3u(t − 3). Then plot it and verify analytically that the obtained figure is correct
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Verification of linearity and time invariance properties of a given continuous/ discrete systems
6. Convolution for Signals and sequences
7. Gibbs Phenomenon
8. Auto Correlation and Cross-Correlation for Signals and sequences
9. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
10. Finding the Fourier Transform of a given Periodic signal and plotting its magnitude and phase spectrum
11. Calculation of Laplace Transforms of standard signals using symbolic functions.
12. Calculation of Inverse Laplace transforms using symbolic functions
13. Sampling Theorem Verification

4. Laboratory Equipment/Software/Tools Required

1. Simulation Software (MATLAB, Scilab, Octane etc.)

5. Books and Materials

Text Book:

1. Oppenheim A. V, Willisky (2009), Signals and Systems, 2nd edition, Prentice Hall of India, India.

Reference Books:

1. Anand Kumar, Signals and Systems, PHI Learning Pvt. Ltd.
2. B. P. Lathi (2001), Signals, Systems & Communications, BS Publications, New Delhi.

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II B.TECH I SEMESTER

COURSE STRUCTURE

A5404 - RANDOM VARIABLES AND STOCHASTIC PRCESSES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	0	0	4	30	70	100

1. Course Description

Course Overview

This is the fundamental course in signal processing and communication Engineering. This course provides a foundation in the theory and applications of probability and stochastic processes and an understanding of the mathematical techniques relating to random processes in the areas of signal processing, detection & estimation theory, and communications. This course also focuses on the application of statistical techniques to the study of random signals and noise concepts. This course forms the basis for the study of advanced subjects like Analog and Digital Communications, Radar Communications, Cellular and Mobile Communications, Digital image processing and Speech processing.

Course Pre/co requisites

1. Probability Theory

2. COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

A5404.1. Summarize the knowledge of single and multiple random variables.

A5404.2. Apply the concepts of operations on single and multiple random variables to solve the communication problems.

A5404.3. Develop the relationship between random variables and random processes.

A5404.4. Distinguish temporal and spectral characteristics of stochastic processes.

A5404.5. Analyze the random signal response of linear systems

3. COURSE SYLLABUS

Random variables: Definitionsof probability, joint probability and Conditional Probability, random variable- definition and classification, distribution and density functions- Gaussian, uniform, exponential, binomial, poisons, Rayleigh, conditional distribution and density functions.

Operations on One Random Variable: Expectation, moments, Chebychev's inequality, Markov's inequality, functions that give moments, Transformations of a random variable.

Multiple Random Variables: Joint distribution and its properties, Joint densityand its properties, conditional distribution and density, statistical independence, distribution and density of a sum of two random variables, sum of several random variables, central limit theorem (without proof).

Operations on Multiple Random Variables: Expectation, joint moments about the origin, joint central moments, joint characteristic functions, jointly Gaussian random variables,Transformations of multiple random variables, linear transformations of Gaussian random variables.

Random Process - Temporal Characteristics: Random process concept, distribution and density functions, statistical independence,stationary, time averages and periodicity, correlation functions and properties, covariance functions.

Random Process-Spectral Characteristics: Power density spectrum and its properties, relationship between PSD and autocorrelation function, cross-power density spectrum and its properties, relationship between cross-PSD and cross-correlation function.

Random signal response of linear systems: Some noise definitions, white and coloured noise, system response-convolution, mean and mean squared value of system response, autocorrelation function of response, cross correlation functions of input and output, spectral characteristics of system response.

4. Books and Materials

Text Book:

1. Peyton Z. Peebles (2009), *Probability Random variables and Random signal principles*, 4th Edition, Tata McGraw Hill, New Delhi, India.

Reference Books:

1. R. P. Singh and S.D. Sapre, Communication Systems Analog & Digital, 2nd edition, TMH -2007.
2. Athanasius Papoulis, Unni Krishna Pillai (2002), *Probability, Random variables and stochastic processes*, 4th edition, Tata McGraw Hill, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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II B.TECH I SEMESTER

COURSE STRUCTURE

A5013 - VERBAL ABILITY AND LOGICAL REASONING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	0	14	0	0	1	30	70	100

1. Course Description

Course Overview

This course provides the basic skills of verbal and logical reasoning as required by companies for Campus Recruitment and also for other Competitive exams. The contents of this course includes different techniques of solving problems on Coding and Decoding, Seating Arrangements, Syllogisms, Blood Relations, Visual reasoning and brief account on basic grammar such as Error detection, Modifiers, Articles etc

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5013.1. Identify efficient and appropriate methods to solve logical reasoning problems

A5013.2. Choose the techniques to solve puzzles on analytical reasoning

A5013.3. Apply the grammar rules for effective sentence formation.

3. Course Syllabus

Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out.

Articles and Tenses: Introduction, usage of articles, Omission of Articles, Types of tenses, Forms and Usage of tenses

Direction Sense: Introduction, Distance method, Facing Method and Shadow Method

Blood Relations: Introduction, Direct, Puzzle and Coded models

Voices and Forms of Speech: Introduction, conversion of active and passive voice, conversions of direct and indirect speech.

Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements

Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method

Visual Reasoning: Patterns, Folded Images, Cubes and Analytical Reasoning

Sentence Correction: Subject-Verb Agreement, Pronoun Antecedent, Parallelism, Verb-Time Sequence Error, Determiners and Modifiers

4. BOOKS AND MATERIALS

Text Books:

1. R.S. Aggarwal, Vikas Aggarwal, *Quick Learning Objective General English,* S.Chand, 2003.
2. *R*.S. Aggarwal, *A Modern Approach to Logical Reasoning*, Revised Edition, S Chand & Co Ltd.

Reference Books:

1. Edgar Thorpe, *Test of Reasoning for all competitive examinations*, 6th Edition, McGraw Hill Education, 2017.
2. Arun Sharma, *How to Prepare for Logical Reasoning for CAT and other Management Examination*s, 4th edition, McGraw Hill Education, 2017.
3. SimboNuga, *English Grammar and Verbal Reasoning – The Toolkit for Success*, Trafford Publishing, 2013.

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II B.TECH I SEMESTER

COURSE STRUCTURE

A5011 - GENDER SENSITIZATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	-	100*	100*

1. Course Description

Course Overview

Gender Sensitization is a course that introduces students to different dimensions of gender issues. It is one of the basic requirements for the normal development of an individual and primarily highlights the contribution of both the genders in creation and development of a well balanced society. A curriculum-based approach to bring a change is desired to inculcate sensitivity towards issues concerning the relationship between men and women, caste, declining sex ratio, struggles with discrimination, sexual harassment, new forums for justice, eve-teasing, etc., The need for this sensitivity has been felt and realized through times immemorial and in almost all kinds of human existence, across the globe.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5011.1. Interpret the problems of gender and gender related issues.
A5011.2. Identify the reasons for female feticide.
A5011.3. Examine the role of women in domestic, political and economic spheres.
A5011.4. Develop sensitivity against sexual and domestic violence.
A5011.5. Analyze the place of women in Telangana History.

3. Course Syllabus

Gender Sensitization: Why should we study it?
Socialization: Making Women, Making Men
Introduction, Preparing for womanhood, Growing up male
First lessons in caste, Different masculinities
Just Relationships: Being Together as Equals
Mary Kom and Onler, Love and Acid just do not mix
Love letters, Mothers and fathers
Further Reading: Rosa Parks-The Brave heart
Missing Women: Sex Selection and Its Consequences

Declining Sex Ratio, Demographic Consequences

Gender Spectrum: Beyond the Binary

Two or Many? ,Struggles with Discrimination

Additional Reading: Our Bodies, Our Health

Housework: The Invisible Labour

"My Mother doesn't work","Share the load"

Women's Work: Its Politics and Economics

Fact and fiction, Unrecognized and unaccounted work

Further Reading: wages and conditions of work.

Sexual Harassment: Say No!

Sexual harassment, not eve-teasing, Coping with everyday harassment

Further Reading: "Chupulu"

Domestic Violence: Speaking Out

Is home a safe place?,When women unite (Film)

Rebuilding lives,Further Reading: New Forums for justice.

Thinking about Sexual Violence

Blaming the Victim- "I Fought for my life…"

Further Reading: The caste face of violence.

Knowledge: Through the Lens of Gender

Point of view

Gender and the structure of knowledge

Further Reading: Unacknowledged women artists of Telangana

Whose History? Questions for Historians and Others

Reclaiming a Past

Writing other Histories

Further Reading: Missing pages from modern Telangana history

4. Books and Materials

Text Book:

1. "Towards a World of Equals: A Bilingual Textbook on Gender". Telugu Akademi, Hyderabad, 2015

Additional Resources:

1. www.worldofequals.org.in

SYLLABI FOR II YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5015 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course addresses the concepts, principles and techniques of Managerial Economics and Accounting. It covers the fundamentals of Managerial Economics and its various aspects. Apart from Capital budgeting and its techniques, Accounting gives clear idea about concepts and conventions of accounting, accounting procedures like journal, ledger and trial balance used to construct financial statements.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5015.1. Explain the concepts of Managerial Economics and Accounting.
A5015.2. Analyze interrelationship among various economic variables and it's impact.
A5015.3. Classify the market structure to decide the fixation of suitable price.
A5015.4. Apply capital budgeting techniques to select best investment opportunity.
A5015.5. Apply accounting principles to construct financial statements.

3. Course Syllabus

INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND ANALYSIS: Managerial Economics - Meaning, Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand - Meaning, Types, Demand Determinants, Law of Demand and its assumptions & exceptions.

ELASTICITY OF DEMAND & DEMAND FORECASTING: Elasticity of Demand - Meaning, Types, Measurement and Significance. Demand Forecasting - Meaning, Need, Methods of demand forecasting.

PRODUCTION ANALYSIS: Production – Meaning, Production function, Production function with one variable input, Iso-quants and Iso-costs, MRTS, Least Cost Combination of Inputs, Law of returns to scale.

COST &BREAKEVEN ANALYSIS: Cost- Meaning, Cost Concepts - Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Marginal cost, Sunk cost. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Significance and limitations of BEA.

INTRODUCTION TO MARKETS: Market – Meaning, structure, Types of competition - Features of Perfect competition, Monopoly, Monopolistic Competition and Oligopoly - Price-Output Determination in case of Perfect Competition, Monopoly.
PRICING: Objectives and Pricing policies - Methods of Pricing -Cost plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

CAPITAL BUDGETING: Nature and scope of capital budgeting, features of capital budgeting proposals, methodsof Capital Budgeting - **Traditional methods**-Payback Method, Accounting Rate of Return (ARR).
DISCOUNTED CASH FLOW METHODS - Net Present Value Method, Profitability Index, Internal rate of return (simple problems).

INTRODUCTION TO FINANCIAL ACCOUNTING: Accounting Principles - Concepts, Conventions - Double-Entry Book Keeping - Journal, Ledger, Trial Balance.
PREPARATION OF FINANCIAL STATEMENTS: Final Account problems with simple adjustments.

4. BOOKS AND MATERIALS

Text Books:

1. Varshney &Maheswari(2003), *Managerial Economics*, Sultan Chand.
2. Ambrish Gupta (2011), *Financial Accounting for Management: An Analytical Perspective*, 4th Edition, Pearson Education, New Delhi.

Reference Books:

1. A.R. Aryasri (2011), *Managerial Economics and Financial Analysis*, TMH, India.
2. D.M.Midhani (2009), *Managerial Economics*, Himalaya Publishing House, Mumbai.

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5405 - ANALOG ELECTRONIC CIRCUITS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	2	42	14	28	5	30	70	100

1. Course Description

Course Overview

Today the growth of any industry is dependent upon electronics to a great extent. This Course deals with mathematical analysis of wave shaping circuits and generation of non-sinusoidal wave forms by multivibrator circuits and their design is covered extensively so as to apply in the electronics and communication systems. It also focuses on process of learning about signal condition, signal generation, filtering, timing and control using various IC circuitry. With modern digitization where there is a need to work with digital data and hence digital to analog and analog to digital converters are needed in connecting physical world to the more sophisticated digital world.

Course Pre/co requisites

1. Electronic Devices and Circuit Analysis (A5402)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5405.1. Understand the working and analysis of electronic circuits

A5405.2. Apply the knowledge of Kirchhoff's voltage and Current laws to observe the response of various Electronic circuits.

A5405.3. Analyze the functioning of various Electronic Circuitry, including wave shaping circuits, signal generation, filtering, timing and control circuits.

A5405.4. Design Signal Processing and Generation circuits for the given specifications.

A5405.5. Acquire hands-on laboratory experience in designing and testing various Electronic Circuits.

3. Course Syllabus

Theory

WAVE SHAPING CIRCUITS: High pass (differentiator) and low pass (integrator) RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs, RL response for step input.

SIGNAL GENERATORS: Design and analysis of fixed bias and self-biased Bistablemultivibrator, design and analysis of collector coupled Monostable and A stable multivibrator.

OPERATIONAL AMPLIFIER AND ITS APPLICATIONS: Basic information of Op-Amp IC741, the ideal Op-Amp, Op-Amp characteristics - DC and AC. Op-Amp Applications – Review of inverting and non-inverting amplifiers, Integrator and differentiator, Summing Amplifier, Schmitt trigger. Active filters: Low pass, high pass (1^{st} and 2^{nd} order).

TIMERS & PLL: Introduction to IC 555 timer, description of functional diagram, Monostable and Astable operations, Introduction to PLL, Block diagram, monolithic PLL and applications of PLL.

DATA CONVERTERS: Digital to Analog Converters (DAC) - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Analog to Digital converters(ADC) – Flash type, Single slope, successive approximation, dual slope.

Practice:

1. Design of analog wave shaping circuit for different time constants.
2. Analyze how the High pass RC circuits used as differentiator or Peaking Circuit.
3. Analyze how the Low pass RC circuits used as Integrator or Triangular wave generator.
4. Design of BistableMultivibrator as a Memory element.
5. Design of Monostable Multivibrator as a Pulse Width generator.
6. Design of AstableMultivibrator as a Square Wave generator.
7. Analyze how Op-Amp can be used as Amplifier (Inverting, Non-Inverting and Summing).
8. Design and analyze Practical Differentiator and Integrator using Op-Amp for different input signals.
9. Design and analyze 1^{st} and 2^{nd} order Butterworth filters and plot the frequency response.
10. Design and analyze Missing pulse detector and frequency divider using IC555 in Monostable mode of operation.
11. Design Adjustable duty cycle rectangular wave generator and frequency shift keying generator IC555 in Astable mode of operation.
12. Analyze the Lock in range and Capture range of Phase Locked Loop using IC565.
13. Design and analyze R-2R ladder type Digital to Analog Converter using IC 741
14. Design and analyze Parallel Comparator type Analog to Digital Converter using Op-Amps and 8 to 3 priority encoder.

4. Laboratory Equipment/Software/Tools Required

1. CRO
2. Function Generator
3. Regulator Power Supply
4. Multisim

5. Books and Materials

Text Books:

1. Jacob Millman, Herbert Taub, Mothiki S. Prakash Rao (2008), Pulse, Digital and Switching Waveforms, 3rd edition, Tata McGraw Hill, New Delhi.
2. D. Roy Choudhury, Shail B. Jain (2012), Linear Integrated Circuit, 4th edition, New Age International Pvt. Ltd., New Delhi, India.

ReferenceBooks:

1. Anand Kumar (2005), Pulse and Digital Circuits, Prentice Hall of India, India.
2. Mothiki S. Prakash Rao (2006), Pulse and Digital Circuits, Tata McGraw Hill, India.
3. Sergio Franco (1997), Design with Operational Amplifiers and Analog Integrated Circuits, McGraw Hill, New Delhi.
4. Ramakant A. Gayakwad, (2012), OP-AMP and Linear Integrated Circuits, 4th edition, Prentice Hall / Pearson Education, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5406 - ANALOG COMMUNICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

In this course, an introduction to analog (classical) communications with emphasis on Amplitude Modulation (AM), Frequency Modulation (FM) and Pulse modulation techniques and analyzing all the modulation schemes in time-domain and in frequency-domain. This course aims at developing statistical techniques and skills needed to evaluate the performance of analog communication system in presence of noise and realize these skills through a simple communication system design.

Course Pre/co requisites

1. Random Variables and Stochastic Processes (A5404)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5406.1. Explain analog and pulse modulation techniques in time and frequency domain.

A5406.2. Construct linear,non-linear modulators and demodulators.

A5406.3. Analyze the fundamental communication system parameters like power and bandwidth etc.

A5406.4. Analyze the communication system performance in presence of the noise.

A5406.5. Demonstrate various concepts in analog communications using appropriate trainer kits and simulation tool.

3. Course Syllabus

Theory

AM: Introduction to communication system, need for modulation, Amplitude modulation- time domain and frequency domain of AM signal-power relations in AM, Generation of AM waves, square law modulator, Switching modulator, Detection of AM waves: Square law detector, Envelope detector.

DSBSC: Time domain and frequency domain description, balanced modulator, Ring modulator, Coherent detection of DSBSC modulated waves.

SSB: SSB modulation frequency domain description, frequency discrimination method for generation of SSB modulated wave, time domain description, phase discrimination method for generating SSB, Demodulation of SSB waves: coherent detection.

VSB: Introduction to VSB, Time domain representation of VSBSC, Generation of VSB modulated wave, Synchronous detection, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Applications of different AM systems, Frequency division multiplexing.

Angle Modulation: Basic concepts of Frequency Modulation: Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow band FM, Wideband FM, Constant Average Power, Transmission Bandwidth of FM Wave –Comparison of FM&AM

Generation and Demodulation of FM: Direct method: VCO, Indirect Method: Armstrong Method, detection of FM waves: Balanced slope detector, Phase locked loop.

NOISE: Introduction, Noise in DSBSC, Noise in SSBSC, Noise in AM, Noise in FM, Pre-emphasis & de-emphasis.

PULSE MODULATION: Analog pulse modulation, PAM (Single polarity, double polarity) Generation & demodulation of PWM, Generation and demodulation of PPM

TRANSMITTERS AND RECEIVERS:

Transmitters: Classification of Transmitters, AM transmitter, Effect of feedback on performance of AM transmitter, FM Transmitter, frequency stability in FM transmitter.

RECEIVERS: Introduction, TRF receiver, Super heterodyne receiver, Receiver characteristics, Local oscillator, Image frequency, Choice of IF,AGC, FM Receiver, Comparison with AM Receiver.

Practice

1. Amplitude Modulation and Demodulation
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency Modulation and Demodulation
5. Pre-emphasis and De-emphasis
6. Pulse amplitude modulation and Demodulation
7. Pulse width modulation and demodulation.
8. Time division multiplexing and demultiplexing
9. Frequency synthesizer
10. AGC Characteristics
11. Squelch circuit.
12. Characteristics of Mixer

4. Laboratory Equipment/Software/Tools Required

1. CRO

2. Function Generator
3. Regulator Power Supply
4. Trainer Kits
5. MATLAB Software

5. Books and Materials

Text Book:

1. S.S.Haykin, Communication Systems, 2nd Edition, Wiley Eastern.

Reference Books:

1. Taub and schilling, Principles of Communication Systems, Tata McGraw-Hill
2. George Kennedy, Electronic Communication Systems, Tata McGraw-Hill.

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5407 - COMPUTER ORGANIZATION AND OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

The course gives a bottom up view of how a computer works. It begins with an overview of digital logic and the goal is to develop a clear understanding of the basic organization of computing systems. It covers logical basis of computer structure, machine representation of instructions, data flow of control and basic machine instructions then builds up the main architectural and system elements of a typical modern computer. In addition, this course is an integrated and covers the Operating Systems techniques to implement operating systems in real time. The concepts covered will be functions of operating systems, process management, processor scheduling, main-memory management and virtual memory management is to related UNIX commands and system calls.

Course Pre/co requisites

1. Digital Logic Design (A5401)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5407.1. Identify the basic components of a digital computer with their functions.

A5407.2. Interpret and demonstrate the Process Synchronization, resource control and scheduling for operating system.

A5407.3. Apply system call functions to develop process static diagram & multithreaded models.

A5407.4. Analyze types of memories in memory hierarchy and functions of memory management.

A5407.5. Design functional units of a processor for a simple computer.

3. Course Syllabus

Theory

Structure of Computers: Functional units, Computer types, Basic operational concepts, Von-Neumann architecture, Bus structures, Characteristics of multiprocessors, Interconnection structures, Shared memory multiprocessors, Data representation-fixed and floating point.

Machine Instructions: Computer registers, Instruction codes, Instruction cycle, computer instructions, instruction formats, addressing modes, RISC and CISC differences.

Computer Arithmetic: Fixed point-addition and subtraction, multiplication and division algorithms, floating point arithmetic operation.

Operating Systems Overview: Definition, Operating system services, Types of Operating system, systems calls, system programs.
Process Concepts: Definition, Process control block, Process state diagram.
Process Scheduling: Queues, Types of schedules, Algorithms, Multithreaded models and advantages

Process Synchronization: Interprocess communication-pipes, messages, shared memory, Critical section problem, Peterson's solution, semaphores, Classic problems of synchronization-producer-consumer, Readers and Writers problem, Dining philosopher's problem, Monitors-solution and advantages.

Memory Management: Memory hierarchy, Introduction to cache and main memory, Swapping, Contiguous memory allocation- first, best and worst fit algorithms, Non-contiguous memory allocation, paging-hardware, structure of the page table, page-replacement algorithms, virtual memory, demand paging, segmentation, allocation of frames, thrashing.

Practice

1. Program to create a child process using fork, exec& wait
2. Program to implement FCFS scheduling
3. Program to implement SJF scheduling
4. Program to implement priority scheduling
5. Program to implement round robin scheduling
6. Program to implement Two way process communication using pipes
7. Program to implement shared memory
8. Program to implement message queue
9. Program to implement best-fit memory algorithm (contiguous)
10. Program to implement paging (non-contiguous)
11. Program to implement FIFO page replacement
12. Program to implement LRU page replacement

4. Laboratory Equipment/Software/Tools Required

1. Personal computer
2. UNIX operating system

5. Books and Materials

Text Books:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2009), Operating System Concepts, 8th Edition, Wiley India Private Limited, New Delhi.

Reference Books:

1. Carl Hamacher, ZvonksVranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2. Sumitabha Das (2006), UNIX Concepts and Applications, 4th Edition, McGraw-Hill Education.

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5408 - ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	100

1. Course Description

Course Overview

This course will enable in understanding static and time-varying electromagnetic fields and electromagnetic waves and transmission line, which are of essential importance in modern communications.

Course Pre/co requisites

- Linear Algebra and Ordinary Differential Equations (A5001)
- Applied Physics (A5003)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5408.1. Understand the concepts of coordinate systems and vector algebra, calculus to interpret Electric and Magnetic field distributions in free space, materials and transmission lines

A5408.2. Apply the basic laws of Electromagnetism to determine Electric and Magnetic field intensities for various charge and current distributions

A5408.3. Apply Maxwell's equations to determine boundary conditions across various media

A5408.4. Analyse the behaviour of EM waves in different media

A5408.5. Design the transmission line elements for impedance matching under various load conditions

3. Course Syllabus

ELECTROSTATICS: Coulomb's law, Electric field intensity, Field due to different charge distributions, Electric flux and Flux density, Gauss law and its applications, Electric potential. Maxwell's equations for electrostatic fields, and illustrative problems.

MAGNETO STATICS: Biot-Savarts law, Amperes circuital law and applications, Magnetic flux and magnetic flux density, Maxwell's equations for magneto static fields.

TIME VARYING FIELDS & MAXWELLS EQUATIONS: Faradays law, Inconsistency of Amperes law and displacement current density, Maxwell's equations in differential, integral and word statements.

BOUNDARY CONDITIONS: Conditions at a boundary surface: dielectric-dielectric and dielectric – conductor interfaces, illustrative problems.

EM WAVE CHARACTERISTICS: Wave motion in free space, perfect, Lossy dielectrics and good conductors, Poynting theorem, polarization.

TRANSMISSION LINES: Equivalent model, parameters, equations, Infinite line concepts, distortion and its condition, Input impedance of open and short circuited transmission lines, reflection coefficient and VSWR, Elementary treatment of Smith chart.

4. Books and Materials

Text Book:

1. Matthew N. O. Sadiku (2008), Elements of Electromagnetics, 4th edition, Oxford UniversityPress, New Delhi.

Reference Books:

1. William H. Hayt Jr. John A. Buck (2006), Engineering Electromagentics, 7th edition, Tata McGraw Hill, India.
2. E. C. Jordan, K. G. Balmain(2000), Electromagnetic Waves and Radiating Systems, 2nd edition, Prentice Hall of India, New Delhi.
3. John. D. Kraus (2007), Electromagnetics, 6th edition, McGraw Hill, New Delhi.

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5014 - QUANTITATIVE APTITUDE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	0	14	0	0	1	30	70	100

1. Course Description

Course Overview

This course provides the basic skills required in solving the problems of Aptitude required by various companies for Campus Recruitment and competitive tests. The contents of course include solving problems on different concepts such as – Permutations and Combinations, Averages, Percentages and Logarithms etc.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5014.1 Interpret data using graphs and charts.

A5014.2 Apply the concepts of ratios, proportions and percentages to solve problems.

A5014.3 Solve problems on Logarithms, permutations, combinations, clocks, and calendars.

3. Course Syllabus

Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages

Average, Mixtures and Alligation: Averages, Weighted average, Difference between mixture and alligation, Problems on Mixtures and allegation

Percentages, Simple Interest (SI) and Compound Interest(CI): Fundamentals of Percentage, Percentage change, SI and CI, Relation between SI and CI.

Data Interpretation: Introduction, Tabulation, Bar Graph, Pie Charts, Line Graphs, Combined Graphs.

Profit and Loss, Partnerships: Basic terminology in profit and loss, Types of partnership, Problems related to partnership

Logarithms: Fundamental formulae of logarithms and problems, finding number of terms on expanding a given number.

Permutations and Combinations: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination.

Clocks: Introduction, Finding angle between hands of clock, Gain or loss of time

Calendar: Calendars method- 1, Calendars method -2

4. Books And Materials

Text Book:

1. R.SAggarwal, Quantitative Aptitude for competitive examinations

Reference Books:

1. Abhijit Guha, Quantitative Aptitude for competitive examinations
2. Dinesh Khattar, The Pearson guide to Quantitative Aptitude.

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II B.TECH II SEMESTER

COURSE STRUCTURE

A5012 - ENVIRONMENTAL SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	0	100	100

1. Course Description

Course Overview

This course enables the students engage with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world. The course requires that students should identify and analyze natural and human-made environmental problems, evaluate the relative risks associated with these problems. It provides the scope to examine alternative solutions for resolving or preventing them. It is essentially a multidisciplinary approach that brings out an appreciation of our natural world and human impact on its existence and integrity. Its components include Biology, Geology, Chemistry, Physics, Engineering, Sociology, Health, Anthropology, Economics, Statistics, Computers and Philosophy.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5012.1. Outline the important components of environment

A5012.2. Identify global environmental problems to come out with the best possible solutions

A5012.3. Make use ofenvironmental laws for the protection of forest and wildlife

A5012.4. Apply environmental ethics to maintain harmonious relation between nature and human being

A5012.5. Analyze the major environmental effects of exploiting natural resources

3. Course Syllabus

Introduction : Environment Definition, The multidisciplinary nature of environmental studies, importance of environmental education.

Ecosystems : Ecosystem Definition. Structure of an ecosystem: Producers, Consumers and Decomposers. Function of ecosystems: Food chains, food webs and energy flow in an ecosystem. Ecological pyramids: Pyramid of number, Pyramid of biomass and Pyramid of energy.

Natural Resources: Classification of resources: Renewable and Non-renewable resources.

Forest resources: Uses and over exploitation of forests. Dams and their effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water, conflicts over water.

Food resources : Problems with Chemical fertilizers and pesticides. Bio fertilizers (organic farming) and their importance.

Energy resources: Renewable energy resources: solar energy, wind energy and geothermal energy.

Biodiversity and Its Conservation : Introduction and definition. Genetic diversity, species diversity and ecosystem diversity.

Values of biodiversity : Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values. Man-wildlife conflicts. In-situ conservation of biodiversity. Ex-situ conservation of biodiversity.

Environmental Pollution: Definition, causes, effects and control measures of Air Pollution, Water pollution, Noise pollution, Global warming, Acid rains and Ozone layer depletion. Role of an individual in prevention of pollution.

Social Issues and the Environment: Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion, crazy consumerism. Water conservation, Rainwater harvesting.

A brief study about: Mission Kakatiya, water man of India Dr. Rajendra singh, Anna hazare watershed management development programme and environmental ethics. Environment Protection Act.

4. Books and Materials

Text Book:

1. Anubha Kaushik, C.P. Kaushik. Perspectives in Environmental Studies. 4th edition, New age international publishers, 2014.

Reference Books:

1. ErachBharucha. Textbook of Environmental Studies for Undergraduate Courses. 1st edition, Universities press, 2005.
2. Benny joseph. Environmental studies. 3rd edition, McGraw Hill Education (India) Private Limited, 2018.

SYLLABI FOR III YEAR I SEMESTER

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5409 - MICROPROCESSORS & MICROCOMPUTER SYSTEM DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	1	2	28	14	28	4	30	70	100

1. Course Description

Course Overview

This course provides a comprehensive introduction to microprocessors (8086), microcontrollers (8051), ARM (LPC2418) systems and their architectures with an emphasis on its interfacing with external devices. Focus is on 8086 & 8051 families which includes internal architecture, pin diagram, instruction set, register organization, addressing modes, operating modes, interrupt structure, assembly language programming and etc. Various aspects of hardware design, such as interfacing of memory and different types of I/O devices will be covered in detailed. It also emphasis on ARM Processor, different interfaces and data transfer schemes. The course is accompanied by laboratory experiments directly linked to the lecture topics for hands-on learning of the material. This course will be useful to students as a first level course for embedded systems domain and provides an opportunity to develop RISC type embedded systems starting with electronic components, data sheets and progressing through construction of hardware and firmware.

Course Pre/co requisites

- Computer Organization and Operating Systems (A5407)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5409.1. Explain the fundamentals of microprocessor, controller & ARM systems to investigate existing designs.

A5409.2. Utilize the assembly language programming proficiency to assemble and run on host machine.

A5409.3. Identify the required driver circuitry to microprocessor, controller & ARM system I/O ports to interface external devices.

A5409.4. Build and integrate the required hardware & software modules for a functional model.

A5409.5. Compare & contrast the processor and controller for the implementation of real time applications.

3. Course Syllabus

Theory

INTRODUCTION TO 8086: Architecture of 8086 microprocessor, register organization, 8086 flag register and its functions, addressing modes of 8086, various modes of operation, Memory decoding schemes.

THE 8051 ARCHITECTURE: Introduction, 8051 micro controller hardware, external memory interfacing, counter, timer and Interrupt programming.

8086 & 8051 ASSEMBLY LANGUAGE PROGRAMMING: Assembly language instructions involving evaluation of arithmetic expressions, branch, call instructions, sorting, string manipulation, Simple programs.

I/O INTERFACES AND ITS DEVICE DRIVER MECHANISMS: 8255 (Programmable Peripheral Interface), various modes of operation and interfacing to Microprocessor, CMOS 4511 or TTL 7447, L293D, ULN2003, ADC0808/0809, DAC0800, Keypad and Alphanumeric Displays (LCD) interfacing with 8051.

ARM ARCHITECTURE: ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

INSTRUCTION SET: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

THUMB INSTRUCTION SET: Register Usage, Other Branch Instructions, Data Processing Instructions, Single - Register and Multi Register Load - Store Instructions, Stack, Software Interrupt Instructions

Practice:

1. To find GCD and Factorial of given operand, ASCII operations and also to authenticate the password of length 3 bytes.
2. To find the sum of a series, squares & cubes of 8-bit or 16 bit numbers in a given array of 5 numbers.
3. To perform code conversion i.e. conversion of unpacked to packed BCD and vice versa.
4. To find the largest and smallest number in an array of data & to arrange a given series of numbers in ascending and descending order.
5. To perform string manipulation operations on the string stored in the memory
6. To generate 5ms delay with and without interrupt for timer & Count no of pulses in the external clock using counter in 8051.
7. To interface 8255 to 8051 and observe the following:
    a. Blink all LEDs connected to port B on/off with 2ms delay
    b. Blink LEDs alternatively connected to port A with 10 ms time delay.
8. To interface stepper motor to 8051 and observe the following:
    a. 5 rotations in clockwise direction
    b. 5 rotations in anticlockwise direction
    c. Continuous rotation in clockwise direction at much faster speed
9. To interface D/A converters to 8086/8051 and observe the following:
    a. Square wave
    b. Ramp signal
    b. Sinusoidal wave

10. To observe traffic signals by interfacing controller to 8086/8051 & observe the changes in signals like Red, Green, Amber & straight, left, right, pedestrian etc.
11. To perform the arithmetic and logical operations for the given data
12. To change the mode of operation of ARM using MRS/MSR instructions.
13. To program blinks the LEDs continuously with a small delay.
14. To read/write words, half-words, bytes, half bytes from/to RAM.

4. Laboratory Equipment/Software/Tools Required

- Dos Box .74 with MASM & Keil µvision
- ESA 8086/88 trainer boards, ESA 8051 boards.
- LPC2148 Development Boards &Keil µvision

5. Books and Materials

Text Books:

1. Douglas V. Hall (2007), *Microprocessors Interface*, 2nd edition, Tata McGraw Hill, New Delhi.
2. Kenneth J. Ayala (2008), *The 8051 Microcontroller*, 3rd edition, Cengage Learning, India.
3. Andrew N. Sloss, Dominic Symes and Chris Wright (2008), ARM Systems Developer's Guides - Designing & Optimizing System software, Elsevier, New Delhi, India.

Reference Books:

1. Walter A. Triebel, Avtar Singh (2003), *The 8088 and 8086 Microprocessors* 4th edition, Prentice Hall of India, New Delhi.
2. Mazidi (2000), *The 8051 Microcontroller and Embedded System*, Prentice Hall of India, New Delhi.
3. Deshmukh (2004), *Microcontrollers*, Tata McGraw Hill Edition, New Delhi.

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5410 - DIGITAL COMMUNICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

This course provides complete knowledge of sampling, quantization and encoding to convert the analog signals into digital form. Various analog to digital conversion techniques like PCM and Delta Modulation along with the refined forms like DPCM and ADM are also discussed. In addition to baseband transmission of digital data over the channel, carrier modulation schemes like ASK, FSK, PSK, DPSK and QPSK are analyzed. It focuses on source coding techniques like Huffman coding, Shannon fano coding for reducing redundant data and channel coding techniques such as linear block codes, cyclic codes and convolution codes for error detection and correction.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5410.1. Develop the basic concepts of modulation, sampling, need for digital data transmission with an insight into practical applications.

A5410.2. Compare and contrast ASK, FSK, PSK digital carrier modulation schemes in terms of occupied bandwidth, complexity etc., and extend these into QPSK for improved spectral efficiency

A5410.3. Apply the basics of information theory to calculate channel capacity and other measurements.

A5410.4. Analyze the differences between the usage of systematic linear block codes and convolutional codes for non-burst and burst channel applications

A5410.5. Examine various concepts of digital communications using trainer kits and simulation tool

3. Course Syllabus

Theory

INTRODUCTION: Introduction, elements of a digital communication system, PCM, quantization noise and SNR, Non uniform quantization, DPCM, DM, ADM, comparison of PCM and DM systems, noise in PCM systems, Noise in DM System.

DIGITAL CARRIER MODULATION SCHEMES: Introduction to Band pass Transmission, Generation and detection of coherent binary ASK signalling schemes, binary PSK signalling schemes, binary FSK signalling schemes, DPSK, QPSK.

PROBABILITY OF ERROR: Probability of error Calculations for ASK, FSK and PSK, comparison of digital modulation schemes-bandwidth requirements.

INFORMATION THEORY: Introduction, measure of information, Entropy, Rate of information, Joint entropy and conditional entropy, mutual information, channel capacity, Shannon's theorem.

SOURCE CODING: Source coding theorem, Shannon - fano coding, Huffman coding, efficiency calculations.

CAPACITY OF GAUSSIAN CHANNEL: Continuous channel, Shannon Hartley theorem, bandwidth-S/N trade off.

LINEAR BLOCK CODES: Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, single error correcting Hamming codes, Binary cyclic codes, Algebraic structure of cyclic codes, syndrome calculation, error detection and error correction.

CONVOLUTIONAL CODES: Encoding of convolutional codes, time domain approach, transform domain approach. Graphical approach: code tree, trellis and state diagram, maximum likelihood decoding of convolutional codes, sequential decoding of convolutional codes.

Practice

1. Time Division Multiplexing and De multiplexing
2. Pulse code Modulation and Demodulation
3. Differential Pulse code Modulation and Demodulation
4. Delta modulation and Adaptive Delta modulation
5. Amplitude Shift Keying
6. Frequency Shift Keying
7. Phase Shift Keying
8. Differential Phase Shift keying
9. Quadrature Phase Shift keying
10. Convolutional coder and decoder
11. Error detection and correction of cyclic code.
12. Convolutionally decode binary data using VITERBI algorithm.

4. Laboratory Equipment/Software/Tools Required

1. Computer System (PCs)
2. MATLAB Software
3. Digital Storage Oscilloscope
4. Function Generator
5. Dual Regulator Power Supply
6. Pulse code Modulation and demodulation trainer kit
7. Differential pulse code Modulation and demodulation trainer kit
8. Delta modulation and adaptive delta modulation trainer kit

9. Frequency shift keying trainer kit
10. Phase shift keying trainer kit
11. Quadrature phase shift keying trainer kit
12. Amplitude shift keying trainer kit

5. Books and Materials

Text Books:

1. K. Sam Shanmugam (2006), Digital and Analog Communication Systems, John Wiley & Sons, New Delhi.
2. R.P.Singh and S.D.Sapre, Communication Systems, second edition, TMH Publishing Company Limited, New Delhi.

Reference Book:

1. Taub and Schilling, Principles of Communication systems, TMH Publishing Company Limited, New Delhi.

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5411 - DIGITAL DESIGN AND IMPLEMENTATION USING VERILOG HDL

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

Verilog HDL is an essential course to start career in VLSI design. Verilog HDL language is used for the design of digital integrated circuits. This course describes four levels of abstraction - behavioural, data flow, gate level, and switch level to represent the same Verilog HDL module. This course also emphasizes on synthesis and simulation constructs of Verilog HDL. Moreover, the students will get acquainted with Cadence Digital Design Tools and other open source EDA tools.

Course Pre/co requisites

1. Digital Logic Design (A5401)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5411.1. Demonstrate the knowledge of constructs and conventions of Verilog HDL.

A5411.2. Build combinational and sequential digital systems using gate and switch primitives

A5411.3. Design digital systems using data flow and behavioral constructs in Verilog

A5411.4. Conduct experiments using EDA tool to demonstrate the constructs of Verilog HDL

A5411.5. Design an application of digital system using Verilog in teams and make an effective oral presentation and documentation

3. Course Syllabus

Theory

Introduction to Verilog: Evolution of CAD, emergence of HDLs, typical HDL-based design flow

Hierarchical Modeling Concepts: Design methodology, levels of abstraction, module, instances, and components of a simulation.

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

Gate-Level Modeling: Gate primitives, delays, strengths and contention resolution

Data-flowModeling: Continuous assignments, delay specification, expressions, operators and operands

Behavioral Modeling-1: Structured procedures, initial and always, blocking and non-blocking statements, delay control, event control.

Behavioral Modeling-2: conditional statements, multiway branching, loops, sequential and parallel blocks

Switch-Level Modeling: Switch modeling elements, delay specification on switches, examples.**Tasks, Functions and UDPs:** Differences between tasks and functions, declaration, combinational and sequential UDPs

Practice:

1. Introduction to EDA Tool
2. Gate-level Modelling: Adders, Multiplexers and Decoders, Instantiation of gate primitives and modules, Design of latches and flip-flops with gate primitives.
3. Data flow description of adders, multiplexers and decoders
4. Behavioural Modelling: Design Verilog HDL modules using conditional statements (if and if-else), multiway branching (case, casex and casez), looping statements (while, for, repeat and forever)
5. Design multiplexers using combinational UDPs and flip-flops using sequential UDPs
6. Design a Verilog HDL module for Multiplier using Carry Look Ahead Adders
7. Design a microcontroller using ALU unit, Data Memory Unit, Program Memory Unit and Control Unit.
8. Design a Verilog HDL module for FIFO memory
9. Design a Verilog HDL module of Car Parking System
10. Design a Verilog HDL module of a Digital Delay Timer

4. Laboratory Equipment/Software/Tools Required

1. Computers
2. Xilinx ISE 14.5
3. Cadence Design tools

5. Books and Materials

Text Book:

1. Samir Palnitkar (2013), Verilog HDL – A Guide to Digital Design and Synthesis, 2nd Edition, Pearson Education, New Delhi, India.

Reference Books:

1. T. R. Padmanabhan, B. Bala Tripura Sundari (2004), Design through Verilog HDL, Wiley & Sons Education, IEEE Press, USA.
2. Donald E. Thomas, Philip R. Moorby, Donald B. Thomas, The Verilog HDL, 5th Edition, Kluwer Academic Publication, 2002.
3. Stephen. Brown, ZvonkoVranesic (2005), Fundamentals of Logic Design with Verilog, Tata McGraw Hill, India.

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5412 - ANTENNAS AND WAVE PROPAGATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	100

1. Course Description

Course Overview

This course explains the design and operation of transmission and receiving antennas for various applications. Further different modes of wave propagation of electromagnetic wave will be discussed.

Course Pre/co requisites

1. Electromagnetic Theory and Transmission Lines (A5408)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5412.1. Understand the fundamental parameters of antennas and wave propagation mechanisms

A5412.2. Apply the relevant antenna theory to various antennas suitable for different applications

A5412.3. Analyze the performance of different antenna structures with their specifications

A5412.4. Design various types of antennas for given specifications and application

A5412.5. Apply the concepts of wave propagation to solve for performance metrics of wireless systems like radio horizon, skip distance etc

3. Course Syllabus

ANTENNA BASICS: Introduction, Radiation Mechanism -Basic Antenna Parameters, Half wave dipole - Field, current pattern, Power Radiated, radiation resistance, effective aperture and directivity, Related Problems.

ANTENNA ARRAYS: Two element arrays, Multiplication of patterns, Linear Array with n -isotropic point sources of equal amplitude and spacing (Broadside, End fire Arrays), EFA with Increased Directivity, Related Problems.

BROADBAND ANTENNAS: The Helical Antenna - Significance, Geometry, helix modes. Design considerations of Log Periodic Antennas.

RF ANTENNAS: Paraboloidal Reflectors – Feed systems, Introduction to Microstrip Antennas.

WAVE PROPAGATION: Introduction, modes of Propagation, Ground Wave Propagation, Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, Virtual Height, MUF– Calculations, LUHF, Skip Distance, Optimum working Frequency, Space Wave Propagation – LOS.

4. Books and Materials

Text Books:

1. Kraus, John D., Ronald J. Marhefka, and Ahmad Khan. *Antennas and Wave Propagation*. New Delhi: Tata McGraw Hill Education, 2011.
2. Balanis, Constantine A. *Antenna theory: analysis and design*. : Wiley-Interscience, 2005

Reference Books:

1. K. D. Prasad, SatyaPrakashan, Antennas and Wave Propagation, Tech India Publications, New Delhi.
2. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
3. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
4. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill, 2005
5. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill, 1984

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5451 - VLSI PHYSICAL DESIGN AUTOMATION

(PROFESSIONAL ELECTIVE – I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course provides the concepts of design optimization algorithms and their application to physical design automation.This course enables students to decompose large mapping problem into pieces, including logic optimization with partitioning, placement and routing.

Course Pre/co requisites

1. Digital Logic Design (A5401)
2. Linear Integrated Circuits

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5451.1. Analyze the concepts of Physical Design Process such as partitioning, Floorplanning, Placement and Routing,simulation and synthesis.

A5451.2.Analyze physical design problems and employ appropriate automation algorithms for partitioning, floor planning, placement and routing

A5451.3. Analyze circuits using both analytical and CAD tools

A5451.4. Solve the performance issues in circuit layout.

A5451.5. Formulate CAD design problems using algorithmic methods.

3. Course Syllabus

INTRODUCTION TO VLSI DESIGN FLOW

VLSI design automation tools- algorithms and system design. Structural and logic design. Transistor level design. Layout design. Verification methods. Design managementtools.

LAYOUT, PLACEMENT AND PARTITIONING

Layout Compaction, Design rules, Problem formulation, Algorithms for constraint graph compaction, Placement and partitioning, Circuit representation, Placement algorithms, Partitioning.

FLOOR PLANNING AND ROUTING

Floor planning concepts, Shape functions and floor plan sizing, Types of local routing problems, Area routing, Channel routing, Global routing, Algorithms for global routing.

SIMULATION AND LOGIC SYNTHESIS

Simulation, Gate-level modeling and simulation, Switch-level modeling and simulation, Combinational Logic Synthesis, Binary Decision Diagrams, Two Level Logic Synthesis.

HIGH LEVEL SYNTHESIS

Hardware models for high level synthesis, internal representation, allocation, assignment and scheduling, scheduling algorithms, Assignment problem, High level transformations.

4. Books and Materials

Text Books:

1. S.H. Gerez, "Algorithms for VLSI Design Automation", John Wiley & Sons, 2002.
2. N.A. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwer Academic Publishers, 2002

Reference Books:

1. Sadiq M. Sait, Habib Youssef, “VLSI Physical Design automation: Theory and Practice”, World Scientific 1999.
2. Steven M.Rubin, “Computer Aids for VLSI Design”, Addison Wesley Publishing 1987.
3. M.Sarrafzadeh, “Introduction to VLSI Physical Design”, McGraw Hill (IE), 1996

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III B.TECH I SEMESTER

COURSE STRUCTURE
A5452 - ADVANCED CORE ARCHITECTURES
(PROFESSIONAL ELECTIVE – I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

The course introduces you to Advance Core Architecture (ACA) covers advance topics in computer architecture focusing on multi core, and multiprocessor architectures and their implementation issues (architect's perspective). A range of levels are explored from deep submicron CMOS characteristics, micro architecture, compiler optimization, parallel programming, run-time optimization, performance

Course Pre/co requisites

- Microprocessors & Microcomputer System Design (A5409)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5452.1. Apply the knowledge of Parallel Processor design to improve performance in its application.
A5452.2. Analyze Hardware for Arithmetic Operations.
A5452.3. Analyze the performance of different scalar Computers.
A5452.4. Develop the Pipelining Concept for a given set of Instructions.

3. Course Syllabus

Pipeline and vector processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Computer Arithmetic: Addition and Subtraction, Hardware Implementation, Multiplication Algorithms and Hardware Implementation, Division Algorithms and Hardware Implementation, Floating Point Arithmetic Operations.

Parallel Computer Models: Evolution of Computer Architecture, System Attributes to Performance, Shared Memory Multiprocessors, Distributed Memory Multicomputer, Vector Super Computers, SIMD Super Computers

Multicore Architectures and Vector: Simultaneous multithreaded (SMT) architectures, SMT Architecture Alternatives, SMT architecture: OS impact and adaptive architectures, OS impact and adaptive architectures, Multi-core Architectures, Single Instruction Multiple Data (SIMD) MMX, SSE,

Pipelining and Superscalar Techniques: Linear Pipeline Processors: Asynchronous and Synchronous models, Clocking and Timing Control, Speedup, Efficiency and Throughput, Pipeline Schedule Optimization, Instruction Pipeline Design: Instruction Execution Phases, Mechanisms for Instruction Pipelining, Dynamic Instruction Scheduling, Branch Handling Techniques.

4. Books and Materials

Text Books:

1. Kai Hwang (2000), Advanced Computer Architecture- Parallelism, Scalability, Programmability, The McGraw Hill Companies, New Delhi.
2. Hennessy and Patterson, Computer Architecture- A Quantitative Approach, 4th or later Edition (ISBN-13: 978-0123704900 ISBN-10: 0123704901 Edition: 4th)

Reference Books:

1. David E. Culler, J. P. Singh, Anoop Gupta, Harcourt Asiam, Morgan Kaufmann (1999), Parallel Computer Architecture, Elsevier, India.
2. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, The McGraw Hill Companies, New Delhi, India.
3. Rajararnan, C. Siva Ram Murthy (2000), Parallel Computers - Architecture and Programming, Prentice Hall of India, New Delhi.

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5453 - COMPUTER COMMUNICATION NETWORKS

(PROFESSIONAL ELECTIVE – I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course provides a comprehensive overview of computer communication networks, with emphasis on analysis and modelling. Basic communications principles are reviewed as they pertain to communication networks. Networking principles include layered network architecture, switching techniques, multiple accesses, Wired and Wireless LAN, framing, transport protocols for emerging high-speed networks.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5453.1. Define multiple access and describe its use in the data link layer

A5453.2. Apply the concepts of Computer Networks and Networks Models for Data Communication.

A5453.3. Analyze networking architecture and infrastructure for wired and wireless link.

A5453.4. Distinguish each layer in the TCP IP model with those in the OSI model

A5453.5. Inspect different versions of Internet Protocol

3. Course Syllabus

Data Communication, Networks: Interconnection of Networks, Layered tasks, OSI Model, Layers in OSI model, TCP/IP Suite, Addressing, Transmission Media, Guided media, Unguided media

Switching Techniques: Circuit switched networks, Datagram Networks, virtual circuit networks, structure of a switch, Telephone networks, Dial up modem, DSL, Cable TV for data transmission

Data link control: Framing, Flow and Error control, Protocols, Noiseless channels and Noisy channels, HDLC, point to point protocol, Multiple Accesses, Random access, Controlled access.

Wired and Wireless LANs: Wired LANIEEE standards, Standard Ethernet, Changes in the standards, Fast Ethernet, Gigabit Ethernet, Wireless LANs IEEE 802.11,Architecture,Addressing Mechanism Bluetooth, Architecture, Bluetooth Layers,L2CAP,Other Upper layers.

Network Layer: Internetworking, IPv4, Datagram, Fragmentation, IPv6, Packet Format, Extension Headers, Transition from Ipv4 to Ipv6,dual Stack, Tunneling,Header Translation, Transport layer: Process to process Delivery,UDP Operation Use of UDP.

4. Books and Materials

Text Book:

1. B Forouzan, "Data Communication AndNetworking, 4thEd, TMH 2006.

Reference Books:

1. James F. Kurose, Keith W. Ross, "Computer Networks", Pearson education, 2nd Edition, 2003.
2. Wayne Tomasi, "Introduction to Data communication and Networking", Pearson education 2007
3. Andrew S.Tanenbaum , "Computer Networks", Pearson education 4th Edition 2009.

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5454 - ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(PROFESSIONAL ELECTIVE – I)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course provides an overall understanding of the elements and processes, including sources of errors, and digitally acquiring these measurements. Along with an overview of instrumentation principles, the physical principles and electrical characteristics for several common instrument transducers are studied. The electronic signal conditioning circuits required for converting the electrical changes in the transducers to signal which can be interpreted accurately by a microprocessor or an embedded controller are analyzed effectively. This course also gives an integration of hardware and software in designing computer controlled processes and/or systems with the aid of sensors, transducers, data acquisition board, and instrument control.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5454.1. Design various measuring devices making use of knowledge on Ammeter, Voltmeter, Multimeter and performance characteristics of electrical & non- electrical instruments.

A5454.2. Inspect the functional operation of oscilloscopes, signal analyzers for the measurement of various signals and lissajous patterns.

A5454.3. Analyze the various AC and DC bridge circuits to find unknown values of R, L, C to minimize errors in measurements.

A5454.4. Apply different methods of transducers to measure various non-electrical parameters.

A5454.5. Apply Data Acquisition Systems for Instrumentation in industrial applications

3. Course Syllabus

CHARACTERSTICSOFINSTRUMENTS: Block schematicofmeasuringsystem,Performancecharacteristicso finstruments – staticanddynamiccharacteristics,Errorsinmeasurement.

MEASURINGINSTRUMENTS:DC voltmeters – multirange, range extension, solid state and differential voltmeters, DC Ammeter - multirange, range extension, Arytonshunt, ohmmeters-series type and shunt type, AC Voltmeter, thermo couple type RF ammeter.

DIGITAL VOLTMETERS: Dual slope and Successive Approximation type DVM
CATHODERAYOSCILLOSCOPE(CRO): Introduction to CRT, vertical amplifiers, horizontal deflection system, simple CRO.

SPECIALPURPOSEOSCILLOSCOPES: Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope, measurement of phase and frequency (lissajous patterns).
DC and AC BRIDGES: Introduction to DC and AC Bridges, Measurement of resistance Wheat's stone bridge, Kelvin's double bridge, measurement of Inductance using Maxwell's inductance bridge, Anderson's bridge, measurement of capacitance using Schering bridge, Wagner's ground connection, errors and precautions in using bridges.

TRANSDUCERS: Classification, selecting a transducer, Resistive transducer, Resistive position transducer, Strain Gauges: Bounded, unbounded; LVDT, instrumentation amplifier, photo voltaic cell, thermistors, sensistors.

MEASUREMENT OF NON - ELECTRICAL QUANTITIES: Measurement of displacement, Measurement of Humidity, Velocity, Force, Pressure, Temperature -Measurements, analog and digital data acquisition systems, interfacing and bus standards, programmable logic controllers and its industrial applications**.**

4. Books and Materials

Text Books:

1. H.S.Kalsi, Electronic Instrumentation, 3rd edition, Tata McGraw-Hill Education
2. K Sawhney (2007), Electrical and Electronic Measurements and Instrumentation, 18th edition, Dhanpat Rai & Co, New Delhi.

Reference Books:

1. D. Helfrick, W.D. Cooper (2002), Modern Electronic Instrumentation and Measurement Techniques, 5th edition, Prentice Hall of India, New Delhi.
2. David A. Bell (2003), Electronic Instrumentation & Measurements, 2nd edition, Prentice Hallof India, New Delhi.
3. D.V.S Murthy (2004), Transducers and Instrumentation 1st edition Prentice Hall of India, New Delhi.

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5016 - ENGINEERING DESIGN THINKING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	28	1	30	70	100

1. Course Description

Course Overview

Engineering Design Thinking is an extension to Engineering Exploration course studied at first year level. This course links the primary fields of engineering and explores the engineering design process from conceptual design and optimal choice evaluation to prototyping and project construction. This course provides insights into particular design challenges within their specific fields of engineering and enables the learners to apply the knowledge in real time - designing, constructing and testing a prototype (actual physical build) to solve a real-world engineering problem. In extent, this course is an excellent roadmap for the design engineers seeking to broaden their engineering knowledge to design concepts to their current work.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5016.1. Interpret the problem-solving skills and product design skills

A5016.2. Apply foundational knowledge of the primary fields of engineeringand scientific concepts to find the solution

A5016.3. Identify various techniques and applications of the engineering design process

A5016.4. Inspect the design and assess a prototype that solves an engineering problem

A5016.5. Interpret the solutions and document the findings/reflections

3. Course Syllabus

Introduction

Definition of design, design process, different problem types, characteristics of novice and informed designers, enhance negotiation and iteration in design

Case Studies

Recognized organizations for design and innovation, shopping cart case study, benefits of failure in design

Human Centered Design

Introduction to HCD (Human Centered Design), HCD as a Mindset, personas and scenarios, best practice working with communities

Specification Development

Definition of specification, three examples of ways to generate specifications, how to manage specifications, functional decomposition

Prototyping

Three kinds of prototypes, how prototypes can be used in the design process, how to use prototypescan be used to elicit input from users

Ideation, Innovation & Creativity

Concept Selection , Interpretation of Creativity and Innovation, Brain storming Expanding the Design Space, case study using decision matrix .

Teamwork and Leadership in Design

Professional Preparation, Recognizing differences in teammates, VRE Model, Best Model for Leadership, Conflict Vs. Effectiveness, Code of Cooperation, Project (Team) and individual Artifacts, Evaluating Teams.

Design for Robustness

Review the design, Brainstorm potential failure models, List potential effects of failure & potential causes for each failure, Rank failures, Develop action plan, Implement fixes, Revisit potential failure risks.

4. Books and Materials

Text Books:

1. Oakes, Leone, and Gunn (2004). *Engineering Your Future*. Okemos, MI: Great Lakes Press.
2. Crismond, D. (2007). *Contrasting strategies of beginning and informed designers: One representation of learning progressions in engineering design*.
3. Ryan Jacoby and Diego Rodriguez, Innovation, *Growth, and Getting to Where You Want to Go, Design Management Review* Vol. 18 No. 1
4. G.Pahl and W.Beitz," *Engineering design: A systematic approach*", Springer 2nd Editon.
5. Dean Nieusma (2012), "*Seeing Social Power: Technology Design for User Empowerment*," Great Lakes Press.
6. Avery, C. M. (2001). *Teamwork is an Individual Skill: Getting Your Work Done When Sharing Responsibility*. San Francisco, CA: Berrett-Koehler Publishers, Inc.
7. Astin, A. W., &Astin, H. S. (2000). *Leadership reconsidered: Engaging higher education in social change*. Battle Creek, MI: W. K. Kellogg Foundation.

Reference Books:

1. Ali k.Kamrani, EmadAbouel Nasr, "*Engineering design and Rapid Prototyping*", Springer.
2. Ken Hurst," *Engineering design principles*", Elesiever,2nd edition.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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III B.TECH I SEMESTER

COURSE STRUCTURE

A5018 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	0	100	100

1. Course Description

Course Overview

The course focuses on introducing Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system to the students. The course is intended to develop the understanding of Traditional Knowledge in terms of various government acts and modern society and science among students.

Course Pre/corequisites

This course has no specific pre/co requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5018.1 Interpret the nature and characteristics of traditional knowledge.

A5018.2 Understand the essence of protecting traditional knowledge through various acts.

A5018.3 Utilize the traditional knowledge in the contemporary world.

A5018.4 Create an awareness of traditional medicine and health practices.

A5018.5 Apply the knowledge of traditional art forms and culture in the present scenario.

3. Course Syllabus

Basic structure of Indian Knowledge System : Introduction to traditional knowledge and basic structure of Indian Knowledge System: Features of Indian Traditions: Nature and Characteristics of traditional knowledge-scope and importance-kinds of traditional knowledge-traditional knowledge Vs western knowledge.

Role of Government in Harnessing TK : Philosophical Tradition and Protection of traditional knowledge: Significance of traditional knowledge protection-value of traditional knowledge in global economy-role of government to harness traditional knowledge –Various Acts regarding protection of Traditional Knowledge.

Modern Science and Indian Knowledge System : Modern Science and Indian Knowledge System:Historical Background- the global problem today-Indian contributions to global science.

Yoga and Holistic Health care: AYUSH, The role of traditional medicine and its impact on the contemporary society.

Indian Artistic Tradition : Traditional art forms and culture- the journey of Indian art from traditional to modern era.

4. Books and Materials

Text Books:

1. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
2. Swami Jitatmanand, *Modern Physics and Vedant*, BharatiyaVidyaBhavan

Reference Books:

1. Swami Jitatmanand, *Holistic Science and Vedant*, BharatiyaVidyaBhavan
2. Fritzof Capra, *The Wave of life Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata
3. GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, VidyanidhiPrakashan, Delhi 2016
4. RN Jha, Science of Consciousness *Psychotherapy and Yoga Practices*, VidyanidhiPrakashan, Delhi 2016 P B Sharma (English translation), ShodashangHridayan
5. Krishna Chaitanya, *Arts of India*, Abhinav Publications, 1987
6. R. Nagaswamy, *Foundations of Indian Art*, Tamil Arts Academy, 2002

SYLLABI FOR III YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5413 - CMOS VLSI DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

This course is primarily designed for students to learn fundamentals of MOSFET based digital circuit design through hands on experience. It covers basic theories and techniques of digital VLSI design in CMOS technology. This course gives knowledge about the design, analysis, simulation of circuits used as building blocks in VLSI devices. It gives knowledge about different processes used for fabrication of an IC. It explains the characteristics of MOS transistor and its device equations. The course leverages switch-level abstraction of transistors to learn the design of static CMOS logic, transmission gate logic, and dynamic logic, but then delves into some details of transistor operation to understand circuit delays and power dissipation. A course project using state-of-the-art computer aided design (CAD) tools in VLSI gives students hands-on exposer to the most current technology/process.

Course Pre/Co Requisites

1. Digital Logic Design (A5401)
2. Electronics Devices and Circuit Analysis (A5402)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5413.1. Analyze the electrical properties of MOS devices and different processes used for fabrication of ICs.

A5413.2. Analyze the characteristics and operation of simple static CMOS circuits to complex functions.

A5413.3. Construct and analyze the operation of transmission gate (TG) based logic circuits.

A5413.4. Analyze charge sharing problem and data synchronization in dynamic circuits.

A5413.4. Use modern CAD tools for design, analysis and simulation of various circuits used as building blocks of VLSI systems.

3. Course Syllabus

Theory

MOS Transistor Theory: Introduction, MOS device design equations–threshold voltage-body effect, channel length modulation, MOS models. **CMOS Inverter:** Basic circuit and DC Operation- DC Characteristics, Noise Margins, Layout Considerations.

CMOS Inverter Switching Characteristics: Switching intervals, high-to-low time, low-to-high time, maximum switching frequency, transient effects on the VTC, RC modelling, propagation delay, inverter design, power dissipation.

Static Logic Gates: Complex logic functions, CMOS NAND and NOR Gates-DC characteristics, transient characteristics, complex logic gates, exclusive-OR and equivalence gates, adder circuits, SR and D-type latch, the CMOS SRAM cell, Schmitt trigger circuit, tri-state output circuit, pseudo-nMOS logic gates, compact XOR and equivalence gates

Transmission Gate Logic Circuits: The TG as a tri-state controller, electrical analysis- logic-1 transfer, logic-0 transfer, RC modelling, TG-based switch logic gates, TG registers, the D-type flip-flop, nFET based storage circuits.

Dynamic Logic Circuits: Pre-charge/Evaluate logic, charge leakage**,** charge sharing, the Dynamic RAM cell, clocks and synchronization-shift register, TGs as control elements, extension to general clocked systems, clocked-CMOS logic, clock generation circuits.

Practice:

1. Analyze the DC characteristics of NMOS & PMOS transistors
2. Analyze the DC and Transient Characteristics of CMOS Inverter
3. Design of CMOS Logic Gates - NAND, NOR, XOR and XNOR
4. Design of CMOS Static Full Adder
5. Design of SR and D-Type Latch using CMOS Static Logic
6. Design of CMOS SRAM Cell
7. Analyze the Voltage Transfer Characteristics of Schmitt Trigger
8. Analyze the characteristics of Pseudo NMOS Inverter
9. Design of Multiplexer using Transmission Gates
10. Design of Full Adder using Transmission Gates
11. Design of D-Type Flip Flop using Transmission Gates
12. Design of Dynamic Logic Circuits – NAND and NOR Gates

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with Linux Operating System
2. Cadence Virtuoso Analog Design Environment.

5. Books and Materials

Text Book:

1. John .P. Uyemura (2011), CMOS LOGIC CIRCUIT DESIGN, Springer International Edition, India.

Reference Books:

1. Neil H. E. Weste, Kamran Eshraghian (2001), Principles of CMOS VLSI Design – A System Perspective, 2nd Edition, Pearson Education Asia, India.
2. Kenneth William Martin (2000), Digital Integrated Circuit Design- Oxford University Press.

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III B.TECH II SEMESTER

COURSE STRUCTURE
A5414 – LINEAR CONTROL SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	1	2	28	14	28	4	30	70	100

1. Course Description

Course Overview

From this course students can understand the principles and applications of control system in daily life. This course will introduce time-domain systems dynamic control fundamentals and their design issues. Emphasis will be on linear, time-invariant, multi-input multi-output continuous time systems. Topics include open and closed-loop state-space representations, analytical solutions, computer simulations, stability, controllability, observability, and controller/observer design.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5414.1. Compare the various types of controllers and control systems.
A5414.2. Build the mathematical models for a given system.
A5414.3. Identify the stability of control systems by using various methods.
A5414.4. Analyze the time and frequency response of control systems.
A5414.5. Analyze the performance of control systems using modern tools

3. Course Syllabus

Theory

Basics in Control System and Transfer Function: Introduction of Control Systems, Various types of systems (Open Loop and closed loop) and their differences- Classification and Feed-Back Characteristics of control system-Effects of feedback.

Mathematical Models of Control System Components: Differential equations, block diagram reduction techniques, Signal Flow Graph representation, Reduction using Mason's gain formula.

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

Stability Analysis: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.
Polar Plots, Nyquist Plots-Stability Analysis.

Design of Controllers: Compensation techniques – Lag, Lead, and Lead-Lag Controllers design, PID Controllers, Design using Root-loci method, Bode plot method.

State Space Analysis: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Practice:

1. Block Diagram Reduction of Linear Systems Using MATLAB.
2. Time response analysis of Linear Systems Using MATLAB
3. Frequency response analysis of Linear Systems Using MATLAB
4. Stability Analysis of Linear Systems with the help of Root Locus and Bode plot Using MATLAB
5. Stability Analysis of Linear Systems with the help of Nyquist and Polar plots Using MATLAB.
6. State Space Model for Classical Transfer Function Using MATLAB.
7. Designing Lag and Lead Compensators for given system by using MATLAB
8. Time Response analysis of Second Order System using trainer kit.
9. Study the Effect of P, PD, PI, PID controllers on second order systems using trainer kit.
10. Magnitude and phase plot of Lag and lead compensators using trainer kit.

Laboratory Equipment/Software/Tools Required

1. MATLAB Software

4. Books and Materials

Text Book:

1. J.Nagrath, M .Gopal (2011), Control Systems Engineering, 5th edition, New Age International (P) Limited, New Delhi, India.

Reference Books:

1. K. Ogata (2008), Modern Control Engineering, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi.
2. N. K. Sinha (2008), Control Systems, 3rd edition, New Age International Limited Publishers, New Delhi

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5415 - DIGITAL SIGNAL PROCESSING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	2	42	14	28	5	30	70	100

1. Course Description

Course Overview

This course introduces fundamental concepts, algorithms and applications of digital signal processing. Starting from a description of how signals can be represented as digital waveforms and how systems may be modelled as digital filters; the course investigates the processing and analysis of signals using the most common approaches and algorithms. The familiarity with the Fourier and Laplace transforms and concepts such as linearity and shift invariance is used in the description and analysis of linear analog systems. This idea is extended to the field of discrete time systems. Major parts of the course will concentrate on signal analysis using Fourier transforms, linear system analysis, Filter design and a few more advanced topics. While this course deals largely with the theory of DSP, we will use a powerful software package, MATLAB, to look at applications of this theory, particularly Fourier analysis and digital filter design.

Course Pre/Co Requisites

1. Signals and Systems (A5403)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5415.1. Interpret the concepts of Discrete time signals, systems and multirate signal processing

A5415.2. Analyze digital systems using various transform techniques.

A5415.3. Design and implement FIR and IIR filters for given specifications.

A5415.4. Examine digital signal processing algorithms using simulation tool.

3. Course Syllabus

Theory

DISCRETE TIME SIGNALS & SYSTEMS:

Discrete time signals & systems, linear time-invariant systems (LTI), stability and causality of LTI systems, Discrete Time systems described by Difference Equations, Frequency domain representation of discrete time signals & Systems. Review of Z-Transforms, Discrete Time Transfer Function.

DISCRETE FOURIER TRANSFORM

Discrete Fourier transforms: Frequency domain sampling, Relationship of DFT to other transforms, Properties of DFT, linear filtering using DFT, Direct Computation of the DFT, Fast Fourier transforms (FFT) - Radix-2 FFT algorithm, Inverse FFT.

DESIGN OF FIR DIGITAL FILTERS

Symmetric and anti-symmetric FIR filters, Design of linear phase FIR Digital Filters using Windows, Design of linear phase FIR Digital Filters by Frequency Sampling method. Realization of FIR systems: Direct form structure, Cascade form structures.

DESIGN OF IIR DIGITAL FILTERS:

IIR filter design by Approximation of Derivatives, IIR filter design by impulse invariance, IIR filter design by bilinear transformation, Characteristics of commonly used analog filters (Butter worth and Chebyshev), Frequency transformations, comparison of IIR & FIR filters. Realization of IIR systems: Direct form structures, cascade form structures, Parallel form structures.

MULTIRATE DIGITAL SIGNAL PROCESSING

Introduction, Down sampling, Decimation. Up sampling, Interpolation, Sampling Rate Conversion, Filter Design, and Implementation for Sampling-Rate Conversion.

Practice:

1. Generation of various sequences.
2. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding
3. Verification of linearity and time invariance properties of a given continuous/discrete time system.
4. Convolution between sequences.
5. To find frequency response of a given system given DT domain system.
6. To find DFT/IDFT of given discrete time signal.
7. Convolution using DFT
8. Implementation of FFT of given sequence.
9. Design of FIR filter using windowing technique and verify the frequency response of the filter.
10. Design of IIR filters for a given sequence and verify the frequency response of the filter
11. Generation of sinusoidal signal
12. Linear and Circular Convolution
13. Find DFT/IDFT of given discrete time signal
14. Implementation of FFT of given sequence.
15. Design of FIR filter using windowing technique and verify the frequency response of the filter
16. Design of IIR filters for a given sequence and verify the frequency response of the filter

4. Laboratory Equipment/Software/Tools Required

1. Computers

2. MATLAB Software
3. CC Studio

5. Books and Materials

Text Book:

1. John G. Proakis, Dimitris G. Manolakis (2007), Digital Signal Processing, Principles, Algorithms, and Applications, Pearson Education / PHI, India.

Reference Books:

1. M. H. Hayes (2007), Schaums Outlines of Digital Signal Processing, Tata McGraw Hill, India.
2. Robert J. Schilling, Sandra L. Harris (2007), Fundamentals of Digital Signal Processing using Matlab, Thomson Publications,India.
3. Dimitris G. Manolakis, Vinay Ingle (2011), Applied Digital Signal Processing, Cambridge University Press, Newyork.

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5455 - LOW POWER AND HIGH-SPEED VLSI DESIGN

(PROFESSIONAL ELECTIVE – II)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course introduces various strategies and methodologies for designing low power circuit and high speed systems. It describes the many issues facing designers at architectural, logic, circuit and device levels and presents some of the techniques that have been proposed to overcome these difficulties. This course is a dynamic research area driven by battery–powered portable computing and wireless communications products. It has become critical to the continued progress of high–performance and reliable microelectronic systems. The course addresses the concepts, principles and techniques to reduce the power in VLSI systems and also high speed in VLSI design

Course Pre/co requisites

1. CMOS VLSI Design

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5455.1. Analyze the physics of power dissipation in MOSFET and identify related limits.

A5455.2. Analyze the power estimation techniques using various approaches in low power circuit design.

A5455.3. Develop low voltage CMOS circuits using low power design techniques.

A5455.4. Analyze the various types of clocked logic styles

A5455.5. Design clocking styles for high speed VLSI design

3. Course Syllabus

PHYSICS OF POWER DISSIPATION IN CMOS: Introduction, sources of power dissipation, designing for low power. Physics of power dissipation in MOSFET devices-MIS structure, long channel and sub-micron MOSFET, Gate induced Drain leakage, Power dissipation in CMOS-Short circuit dissipation, dynamic dissipation, and load capacitance. Low power VLSI design limits-Principles of Low power design, hierarchy of limits, fundamental limits, material, device, circuit and system limits.

POWER ESTIMATION IN CMOS CIRCUITS: Introduction, modelling of signals, probabilistic techniques for signal activity estimation- switching activity in combinational logic, switching activity in sequential

circuits. Estimating Average Power in Combinational and sequential circuits using Monte-Carlo based approach.

SYNTHESIS FOR LOW POWER: Algorithm level transforms for low power, architecture driven voltage scaling, power optimization using operation reduction and substitution.

DESIGN AND TEST OF LOW - VOLTAGE CMOS CIRCUITS: Introduction, leakage current in deep sub - micrometer transistors, low voltage circuit design techniques using reverse Vgs, multiple threshold voltages, self adjusting threshold scheme, MTCMOS, DTMOS, multiple supply voltages.
SOFTWARE DESIGN FOR LOW POWER: Introduction, sources of software power dissipation, software power estimation.

CLOCKED LOGIC STYLES: Introduction, Single-Rail Domino Logic Styles, Dual-Rail Domino Structures, Latched Domino Structures, Non Clocked Logic Styles, Static CMOS, DCVS Logic, Non-Clocked pass Gate Families, adiabatic logic.
CLOCKING STYLES: Introduction, Clock Jitter, Clock Skew, Clock Generation, Clock Distribution, Asynchronous Clocking Techniques.

4. Books and Materials

Text Books:

1. Kaushik Roy, Sharat C. Prasad (2000), *Low-Power CMOS VLSI Circuit Design,* Wiley India, NewDelhi.
2. Kerry Bernstein, Keith M. Carrig, "*High Speed CMOS Design Styles*", Kluwer Academic Publishers, 2002.

Reference Books:

1. Anantha P. Chandrakasan, Robert W. Brodersen (1998), *Low - Power CMOS Design*, IEEE Press, USA.
2. Christian Piguet (2006), *Low-Power CMOS Circuits: Technology, Logic Design and CAD Tools*, CRC Taylor& Francis, USA
3. Evan Sutherland, Bob Stroll, David Harris,"*Logical Efforts, Designing Fast CMOScircuits"*, Kluwer Academic Publishers, 1999
4. David Harris, "*Skew Tolerant Domino Design*", IEEE Journal of Solid State Circuits, 2001.

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III B.TECH II SEMESTER

COURSE STRUCTURE
A5456 - EMBEDDED SYSTEM DESIGN
(PROFESSIONAL ELECTIVE – II)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

In today's world, embedded systems are everywhere - homes, offices, cars, factories, hospitals, plans and consumer electronics. Their huge numbers and new complexity call for a new design approach, one that emphasizes high-level tools and hardware/software tradeoffs, rather than low-level assembly-language programming and logic design. This course presents the traditionally distinct fields of software and hardware design in a new unified approach. It covers trends and challenges, introduces the design and use of single-purpose processors ("hardware") and general-purpose processors ("software"), describes memories and buses, illustrates hardware/software tradeoffs using a digital camera example, and discusses advanced computation models, control systems, chip technologies, and modern design tools.

Course Pre/co requisites

- Advanced Core Architectures (A5452)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5456.1. Identify various design challenges & optimizing metrics
A5456.2. Describe RT-level custom single-purpose processor design
A5456.3. Examine the development environment for ASIPs & DSPs
A5456.4. Interface various peripherals to Standard Single Purpose Processors
A5456.5. Analyze composing of memory along with cache mapping techniques

3. Course Syllabus

Embedded systems overview: Design challenge - optimizing design metrics, Processor technology, IC technology, Design technology, Tradeoffs

Custom Single-purpose processors - Hardware: Introduction, Combinational Logic, Sequential logic, Custom single-purpose processor design, RT-level custom single-purpose processor design

General-purpose processors - Software: Introduction, Basic architecture, Operation, Programmer's view, Development environment, Application-specific instruction-set processors (ASIP's), Selecting a microprocessor

Standard single-purpose processors - Peripherals: Timers, counters, and watchdog timers, UART, Pulse width modulator, LCD controller, Keypad controller, Stepper motor controller, Analog-digital converters, Real-time clocks

Memory: Memory write ability and storage permanence, Common memory types, Composing memories, Memory hierarchy and cache

Case study of digital camera example: Introduction, Introduction to a Simple Digital Camera, Requirements Specification, 8051-based design

4. Books and Materials

Text Book:

1. Frank Vahid, Tony Givargi, Embedded System Design-A Unified hardware/Software Introduction, Wiley Edition, India.

Reference Books:

1. SantanuChatopadhyay, Embedded System Design (Paper Back-1), 2nd Edition, PHI Publishers, 2013.

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5457 - IMAGE PROCESSING AND PATTERN RECOGNITION

(PROFESSIONAL ELECTIVE – II)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Visual information plays an important role in many aspects of our life. Much of this information is represented by digital images. Digital image processing is ubiquitous, with applications including television, tomography, photography, printing, robot perception, and remote sensing. It is an introductory course to the fundamentals of digital image processing. It emphasizes general principles of image processing, rather than specific applications. We expect to cover the following topics: image acquisition and display, color representations, image sampling and quantization, point operations, linear image filtering and correlation, image transforms and sub-band decompositions, contrast and color enhancement, image restoration, and image compression.Pattern recognition is the process of recognizing patterns by using machine learning algorithm. Pattern recognition can be defined as the classification of data based on knowledge already gained or on statistical information extracted from patterns and/or their representation. One of the important aspects of the pattern recognition is its application potential.

Course Pre/co requisites

- Signals and Systems (A5403)
- Digital Signal Processing (A5415)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5457.1. Apply the concepts of image enhancement algorithms and restoration techniques to improve the quality of image

A5457.2. Analyze the images by applying various transformation techniques.

A5457.3. Identify a practical solution to image processing problems like storage space and channel bandwidth in communication by using compression.

A5457.4. Estimate the shape and the pattern of images by using segmentation techniques and color image processing.

A5457.5. Extraction of Features/attributes for pattern recognition

3. Course Syllabus

DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS: Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sampling and Quantization, Relationships Between Pixels. 2-D Fourier Transform, Properties, FFT, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar transform.

IMAGE ENHANCEMENT IN THE SPATIALA AND FREQUENCY DOMAIN: Introduction, Gray Level Transformations, Histogram Processing, Arithmetic and Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters.

IMAGE RESTORATION AND COMPRESSION: Image Degradation/Restoration Process, Noise Models, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filters. Fundamentals, Image Compression Models, Elements of information Theory, Error Free Compression, Lossy Compression.

COLOR IMAGE PROCESSING: Pseudo-color Image Processing, Full-color Image Processing.

FEATURE EXTRACTION AND DIMENSION REDUCTION: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.Color, Texture, Shape, Local features, spatial and frequency domain, Principal Component Analysis**.**

PATTERN RECOGNITION: The Unsupervised Clustering Algorithm, K-NN, Support Vector Machine, Neural Networks and Deep Learning -Overview

4. Books and Materials

Text Books:

1. R. C. Gonzalez, R. E. Woods (2002), *Digital Image processing*, 3rd edition, Addison Wesley/ Pearson education, New Delhi, India.
2. R.O.Duda, P.E. Hart and D.G. Stork, Pattern Classification, John Wiley,2001.

Reference Books:

1. A. K. Jain (1997), *Fundamentals of Digital Image processing*, Prentice Hall of India, New Delhi.
2. Rafael C. Gonzalez (2004), *Digital Image processing using MATLAB*, Richard E. Woods and Steven Low price Edition, Pearson Education Asia, India.
3. William K. Pratt, (2004), *Digital Image Processing*, 3rd edition, John Wiley & Sons, New Delhi, India.
4. Arthur R. Weeks, Jr. (1996), *Fundamentals of Electronic Image Processing,* SPIE Optical Engineering Press, New Delhi, India.
5. K.Fukunaga, Statistical Pattern Recognition; Academic Press 2000.

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5458 - MICROWAVE ENGINEERING

(PROFESSIONAL ELECTIVE – II)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

The Course is intended to provide the foundation for microwave engineering to the UG students. The course will provide an overview of microwave applications in communications and in other areas. In particular, a detailed discussion on microwave frequency ranges and their importance in modern era. This course will also provide the analysis of microwave transmission lines like waveguides (rectangular), various microwave components like T-junctions, circulator, isolator etc. and different microwave sources like Klystron, Magnetron and Gunn diode are discussed in detail to enable the student to design microwave sub-systems and systems. Measurement of various parameters like power, frequency and attenuation will also be covered.

Course Pre/co requisites

1. Electromagnetic Theory and Transmission Lines (A5408)
2. Antennas and Wave Propagation (A5412)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5458.1. Apply the knowledge of Electromagnetics and Basic Engineering Mathematics on Microwave components and sources

A5458.2. Apply the waveguide mode characteristics to measure the performance of microwave transmission lines and waveguide components

A5458.3. Analyze various microwave transmission lines, components, sources and validate their performance.

A5458.4. Design the end-to-end Microwave/ RF communication links

A5458.5. Evaluate the performance of microwave sources and components

3. Course Syllabus

MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides –solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations

Related Problems Rectangular Guide- Power Transmission and Power Losses Impossibility of TEM mode. Microstrip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor. Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients. Related Problems.

WAVEGUIDE COMPONENTS AND APPLICATIONS: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Waveguide Multiport Junctions – E plane and H plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2 Hole, Bethe Hole types. Related Problems Ferrites– Composition and Characteristics, Faraday Rotation; Ferrite Components – Gyrator, Isolator, Circulator. Scattering Matrix– Significance, Formulation and Properties. S Matrix Calculations for – 2 port Junction, E plane and H plane Tees, Magic Tee, Directional Coupler, Circulator and Isolator. Related Problems.

MICROWAVE TUBES: Limitations and Losses of conventional tubes at microwave frequencies. 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 and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and o/p Characteristics, Effect of Repeller Voltage on power O/P. Related Problems. HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

M-TYPE TUBES: Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.
MICROWAVE SOLID STATE DEVICES: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Gunn Oscillation Modes. LSA mode Avalanche Transit Time Devices.

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometers. Measurement of Attenuation, Frequency standing wave measurements – measurement of low and High VSWR, Cavity Q. Impedance Measurements. Introduction to Network Analyser

4. Books And Materials

Text Books:

1. Samuel Y. Liao (1994), Microwave Devices and Circuits, 3rd edition, Prentice Hall of India, New Delhi.

2. Sa R. E. Collin (2002), Foundations for Microwave Engineering, 2nd edition, IEEE Press, John Wiley, India.
3. M. Kulkarni (1998), Micro Wave and Radar Engineering, Umesh Publications, New Delhi.

Reference Books:

1. M. L. Sisodia, G. S. Raghuvanshi (1995), Microwave Circuits and Passive Devices, Wiley Eastern Ltd., New Age International Publishers Ltd.
2. Peter A. Rizzi (1999), Microwave Engineering Passive Circuits, Prentice Hall of India, New Delhi.
3. Herbert J. Reich, J. G. Skalnik, P. F. Ordung, H. L. Krauss (2004), Microwave Principles, CB Publishers.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5017 - PRODUCT REALIZATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	28	1	30	70	100

1. Course Description

Course Overview

The accelerating demand for rapid product design and manufacturing, calls for constant technological innovation. The art of launching latest technological concepts and creating better products for future is achieved by strong Engineering judgment. Current research in this area includes lean product development, integration of knowledge and learning into design through product realization and rapid prototyping. In a similar note an initiative is taken to further explore and implement concepts like product realization and concurrent engineering1 Design and manufacturing tasks are central to mechanical engineering as these experiences begin in the freshman year and last until a real world component is designed and manufactured at a senior level. This process introduces the students to the concept of problems having more than one valid solution and to methods for generating parametric solutions to problems 2. Thus, a curriculum that provides a base for future professional growth is highlighted and enhanced by launching a ”learning laboratory”, or “research laboratory”, with state-of-the-art rapid prototyping and experimental stress analysis devices 4.

Course Pre/co requisites

- Social Innovation (A5006)
- Engineering Exploration (A5007)
- Engineering Design Thinking(A5016)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5017.1. Interpret the specifications of product and solve it for Practical realization

A5017.2. Analyze the Costumers mindset and accordingly designing of the product.

A5017.3. Applying Gantt Charts to define timeline for Product Realization.

A5017.4. Conceptualize the terms called Product, Purchase, Production and Monitoring of products.

A5017.5. Communicate the process of converting an idea to physical Product

3. Course Syllabus

Practice

Introduction to Product Realization:

Introduction to Product Realization, Need for Product Realization, Product realization process, Case Study of Product Realization for Global Opportunities

Planning of Product Realization:

Plan and develop the processes needed for product realization, Defining Quality objectives and requirements, establish processes documents. Needs - verification, validation, monitoring inspection and test activities (inspection nodes) and criteria for product acceptance and record needed. Case study on timeline of Product realization planning (Gnatt Chart)

Customer-Related Processes:

Product information Enquiries, contracts or order handling Customer feedback including customer complaints, A field survey

Design and Development:

Review verification and validation of each design and development stages, Functional and performance requirements, Information for purchasing, production and service provisions, review and validation, Develop a Design model of the product.

Purchasing, Production and Service Provision:

Purchasing information, Vendors evaluation and approval process, Verification of purchased product. Control of production, service provision, validation of processes for production and service provision, Identification and tractability, Customer property and Preservation of product.

Control of Monitoring and Measuring Equipment:

Monitoring and measurements - Calibrated or verified, Adjusted or re-adjusted, identified to determine the calibration status, Safeguarded from adjustment and Protection from change and deterioration

4. Laboratory Equipment/Software/Tools Required

1. Introducing oneself to the steps of Product realization
2. Case Study to define the necessity
3. Group Formation Activity
4. Brainstorming Session on Product Realization in teams
5. Watching a videos on Planning of product realization in real time scenario from R Labs
6. Verification of the Product specifications which satisfies all the needs
7. Discussion with Customers about the product and the specifications
8. Discussion about the finished product and taking feedback.
9. Feedback Analysis and redesign if required.
10. Verification of redesigned product and market study.
11. Discussion on different Purchasing and Services for the product development.
12. Data from the customer for market and feedback of market is acquired.
13. Activity on Observation skills to know how to use one's observation skills in understanding the parameters
14. BrainstormingDeliberations on the initial observations and measuring of the product
15. Familiarization of the respective templates with the help of sample case study

5. Books and Materials

Text Books:

1. Mileta M Tomovic, Sowping Wang, Product Realization – A Comprehensive Approach, Spinger.
2. Stark, John, Product Life Cycle Management, 21st century Paradigm for Product Realisation 2011, Springer

Reference Books:

1. Verna J. Bowen, Lucy V. Fusco, The Competitive Edge Research Priorities for U.S. Manufacturing, National Academy of Sciences.
2. Renuka Thota, Suren Dwivedi, Implementation of product realization concepts in design and manufacturing courses, University of Louisiana-Lafayette

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III B.TECH II SEMESTER

COURSE STRUCTURE

A5019-INDIAN CONSTITUTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	0	28	0	0	0	100	100

1. Course Description

Course Overview

This course enables the students to understand the constitution of India as the Supreme law of India. The student will also gain knowledge about the parliament of India and how it functions. This course will survey the basic structure and operative dimensions of the Indian constitution. It will explore various aspects of the Indian political and legal system from a historical perspective highlighting the various events that led to the making of the Indian constitution.

Course Pre/corequisites

This course has no Pre requisiteand corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5019.1. Identify the important components of Indian Constitution.
A5019.2. Apply the fundamental rights in right way and become a more responsible citizen.
A5019.3. Illustrate the evolution of Indian Constitution.
A5019.4. Explain the basic structure of Indian Constitution.
A5019.5. Define the basic concepts democracy, liberty, equality, secular and justice.

3. Course Syllabus

Evolution of Indian constitution: Indian independence act 1947, formation of constituent assembly of India, committees of the constituent assembly, constitution of India drafting committee, brief study about Dr. *B. R. Ambedkar, time line of formation of the constitution of India.*

Structure of the constitution of India: Parts, schedules, appendices, constitution and government, constitution and judiciary.

Preamble to the constitution of India: Brief study about sovereignty, socialist, secularism, democracy, republic, justice (political justice, social justice, economic justice), liberty, equality, fraternity, unity & integrity.

Acts: Right to education act, right to information act, anti-defection law, Jan Lokpal bill.

Fundamental rights: Right to equality, right to freedom (freedom of speech and expression, right to practice any profession etc.), right against exploitation, right to freedom of religion, cultural & education rights, right to property, right to constitutional remedies.

4. Books and Materials

Text Books:

1. Dr. Durga das basu. Introduction to the constitution of India. 21st edition, Lexis Nexis books publication Ltd, 2013.

Reference Books:

1. Subhash C. Kashyap, Our Constitution, National Book Trust, New Delhi, 2011.
2. Arun K Thiruvengadam. The constitution of India. 1st edition, Hart publishing India, 2017.

SYLLABI FOR IV YEAR I SEMESTER

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IV B.TECH I SEMESTER

COURSE STRUCTURE

A5419 - INTERNET OF THINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	0	28	4	30	70	100

1. Course Description

Course Overview

The course introduces you to advance concepts and design methodologies to design IoT systems and developing IoT applications programming languages and tools optimized for IoT domain. It also exposes participants to communication technologies and legacy protocols as well as newly developed IoT specific application and physical layer protocols. The course covers python languages in great detail with set of packages which makes it obvious choice as a leading IoT language.

Course Pre/co requisites

- Python Programming (A5501)
- Basics of Internet

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5419.1. Identify the basic building blocks of IoT and its characteristics

A5419.2. Determine the most appropriate IoT Devices and Sensors based on Application

A5419.3. Utilize Python standard libraries for implementing various IoT Applications

A5419.4. Analyze the appropriate protocol for communication between Devices

3. Course Syllabus

Theory

Internet of Things: Introduction, IoT Growth, Application Areas, Characteristics, Things in IoT, IoT Stack, Enabling Technologies, IoT Challenges, IoT Levels, Is Cyber Physical System same as IoT; WSN same as IoT;

Introduction to Python: Language features of Python, Data types& data structures, Control of flow, Functions, Modules, Packages, File Handling, Data/Time operations, Classes

Sensors and Their Interfacing: Interfacing of Gas Sensor Interfacing with Node MCU, Obstacle Sensor, Heartbeat Sensor, Ultrasonic Sound Sensor, Gyro Sensor, LDR Sensor, GPS, Colour Sensor, pH Sensor

Protocols for IoT-Messaging and Transport

Messaging protocols: MQTT, CoAP, Transport Protocols: Bluetooth Low Energy (BLE), Light Fidelity (Li-Fi)

Protocols for IoT- Addressing and Identification

Addressing: IPv4, IPv6

Identification: Uniform Resource Identifier (URI)

Cloud for IoT: IoT with Cloud-Challenges, Selection of Cloud Service Provider for IoT Applications, Fog Computing, Cloud Computing: Security Aspects, Case Study: How to use Adafruit Cloud?

Practice:

1. Compile a Python program which accepts the radius of a circle from the user and compute the area.
2. Compile a Python program that asks the user for seven numbers. Then print the total, the number of positive entries, the number entries equal to zero, and the number of negative entries.
3. Compile a program that asks the user for a temperature in Fahrenheit, and then prints the temperature in Celsius. Search the internet for the correct calculation
4. Compile a program that will ask the user for the information needed to find the area of a trapezoid, and then print the area
5. Compile a single program in Python that will print the following:
   10
   11 12
   13 14 15
   16 17 18 19
   20 21 22 23 24
   25 26 27 28 29 30
   31 32 33 34 35 36 37
   38 39 40 41 42 43 44 45
   46 47 48 49 50 51 52 53 54
6. Compile a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers.
7. Compile a Python program to calculate number of days between two dates
8. Compile a Python code to swap the values
9. Interfacing of Gas Sensor
10. Interfacing of Obstacle Sensor
11. Interfacing of Ultrasonic Sensor
12. Interfacing of LDR Sensor
13. Interfacing of GPS
14. Interfacing of pH Sensor

4. Laboratory Equipment/Software/Tools Required

1. Python Software
2. Various Sensors
3. Microcontroller Boards
4. Cloud

5. Books and Materials

Text Books:

1. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram: Internet of Things, Wiley Publishers,2019.
2. ArshdeepBahga and Vijay Madisetti: Internet of Things, A Hands-on Approach; University Press,2016.

Reference Books:

1. Getting Started with Raspberry Pi:Matt Richardson & Shawn Wallace,O'Reilly (SPD),2014

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IV B.TECH I SEMESTER

COURSE STRUCTURE

A5420 - CELLULAR AND MOBILE COMMUNICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	2	28	0	28	3	30	70	100

1. Course Description

Course Overview

This course is intended to stress the fundamentals of mobile communications engineering that are important to any mobile communication system. It introduces cellular mobile radio systems, performance criteria, design, operations and various generations of cellular systems. It covers various types of interferences in mobile radio environment. This course describes cell coverage for signal and traffic, signal reflections in various terrains, various cell sites and mobile antennas and their analysis. This course explains different frequency management and channel assignment techniques. This course also deals with handoff, dropped calls and cell splitting. It gives an overview of digital cellular networks like GSM, CDMA and next generation cellular technologies.

Course Pre/co requisites

1. Digital Communications (A5410)
3. Computer Networks

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5420.1. Apply the concepts of cellular and mobile communications to increase the system capacity

A5420.2. Compare different methods for reducing the interference in a cellular communication system.

A5420.3. Analyze various mobile radio propagation models and antennas for cell site and mobile unit.

A5420.4. Categorize different channel assignment strategies and handoffs to achieve efficient spectrum utilization.

A5420.5. Examine the technical features of emerging cellular communication systems.

3. Course Syllabus

Theory

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, Why Cellular Mobile Telephone Systems, History Of 800MHz Spectrum Allocation, Trunking Efficiency, A Basic Cellular System, Performance Criteria, Uniqueness of Mobile Radio Environment, Operation of Cellular System.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN: General Description of The Problem, Concept of Frequency Channels, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni-directional Antenna System, Handoff Mechanism, Cell Splitting, Consideration of the Components of Cellular System.

INTERFERENCE: Co-Channel Interference, Exploring Co-Channel Interference areas in a system, Real Time Co-Channel Interference Measurement at mobile radio transceivers, Design of an Omni Directional Antenna System in the worst case, Design of a Directional Antenna System, Lowering the Antenna height, Umbrella Pattern Effect, Use of Parasitic Elements, Power Control, Diversity Receiver

NON CO-CHANNEL INTERFERENCE: Adjacent-channel interference, near-end-far-end interference, effect on near-end mobile units, cross talk, effects on coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects of cell-site components, Interference between systems, UHF-TV Interference, long-distance interference.

CELL COVERAGE FOR SIGNAL AND TRAFFIC: General Introduction, Obtaining the Mobile Point-to-Point Model (Lee Model), Propagation over Water or Flat Open Area, Foliage Loss, Propagation in Near-in Distance, Long –Distance Propagation, Form of a Point-to-Point model, Merits of the point-to-point model.

CELL SITE AND MOBILE ANTENNAS: Antennas at Cell Site, Omni-directional Antennas, Directional Antennas for Interference Reduction, Unique Situations of Cell-Site Antennas, Mobile Antennas.

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Frequency Management, Frequency – Spectrum Utilization, Set-up Channels, Channel Assignments to Cell Sites and Mobile Units, Fixed Channel Assignment, Adjacent Channel Assignment, Channel Sharing and Borrowing, Sectorization, Underlay-Overlay arrangement, Non fixed Channel Assignment Algorithms.

HANDOFF: Value of Implementing Handoffs, Why handoffs, Types of Handoff, Initiation of a Handoff, Delaying a Handoff, Forced Handoffs, Queuing of Handoffs, Power-Difference Handoffs, Mobile Assisted Handoff(MAHO) and Soft Handoff, Cell-Site Handoff, Intersystem Handoff.

DIGITAL CELLULAR NETWORKS: GSM- Architecture, Channels, Multiple-access scheme, Radio resource management, Mobility management, Communication management, Network management, North American TDMA-History, Architecture, CDMA.

NEXT GENERATION CELLULAR TECHNOLOGY: Introduction, 4G evolution, objectives of the projected 4G, Advantages of 4G network technology over 3G, Applications of 4G, 4G technologies, Smart antenna techniques, 4G software, Limitations of 4G, New technologies in cellular data networks.

Practice:

1. Understand the Basic circuit of Mobile phone
2. Understand the concept of cellular frequency reuse, sectoring and handoff mechanism.
3. Analysis of relation between bit rate, symbol rate and chip rate.

4. Study of DSSS technique for CDMA, observe effect of variation of types of PN codes, chip rate, spreading factor, processing gain on performance.
5. Bit Error Rate Measurement of DSSS CDMA
6. Analyze the 3G Communication System
7. Analyze the AT commands of 4G LTE Smart Phone
8. Study and analyze the Buzzer in 4G LTE Smart Phone
9. Study and analyze the Vibrator in 4G LTE Smart Phone

4. Laboratory Equipment/Software/Tools Required

1. MATLAB/SIMULINK,
2. Scientek 2139 Kit,
3. Scientek 2131B kit

5. Books and Materials

Text Books:

1. William C. Y. Lee (2006), *Mobile Cellular Telecommunications*, 2nd Edition, Tata McgrawHill, India.
2. GottapuSasibhushana Rao (2012), *Mobile Cellular Communications*, Pearson education, India.

Reference Books:

1. Theodore S. Rappaport (2002), *Wireless Communications*, 2nd edition, Pearson education, India.
2. T.L.Singal (2010), *WirelessCommunication*, Springer International, McGraw Hill, New Delhi. India.
3. Erik Dahlman, Stefan Parkvall, and Johan Sköld (2011), *4G: LTE/LTE-Advanced for Mobile Broadband*, Elsevier.

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IV B.TECH I SEMESTER

COURSE STRUCTURE

A5459 - MIXED SIGNAL VLSI DESIGN

(PROFESSIONAL ELECTIVE – III)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course deals with the analysis and design of analog CMOS integrated circuits. It emphasizes on fundamentals of analog design that students need at industry level. The course deals with the operation of various amplifiers and mixed signal circuits.

Course Pre/co requisites

1. Low Power VLSI Design

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5459.1. Apply the small signal models of MOSFET based circuits to design CMOS amplifiers for a given specifications.

A5459.2. Analyze the operation of various CMOS amplifiers, OP-AMP, Current mirrors

A5459.3. Evaluate the performance metrics of various amplifiers.

A5459.4. Analyze the working of mixed mode circuits such as ADCs, DACs, PLL.

3. Course Syllabus

CMOS Amplifiers: Common source stage with diode connected load and current source load, CS stage with source degeneration, CG stage and Source Follower (Only Voltage Gain and Output impedance of circuits), Folded Cascode stage.

Current Mirrors: Basic circuit, PMOS and NMOS current mirrors, Cascode and Active current mirror circuits.

Differential Amplifiers: Basic Differential Pair, Common Mode Response, Differential Pair with MOS Loads.

Frequency Response of Amplifiers: Miller Effect, Association of poles with Nodes, Common source stage, Cascode stage, Differential Pair.

CMOS OP-AMPS: Single stage Op-Amps, Two- stage Op-Amps, Performance Parameters - Gain Boosting, Input Range Limitations, Slew Rate, PSRR, Noise.

Stability and Frequency Compensation: Multipole Systems, Phase Margin, Frequency Compensation, Compensation of Two-stage Op Amps.

Switched-Capacitor Circuits: Sampling Switches, Switched-Capacitor Amplifiers, Switched-Capacitor Integrator.
Phase-Locked Loops: Simple PLL, Charge-Pump PLLs, Nonideal Effects in PLLs, Applications.

Data Converter Fundamentals: Sample and Hold Circuits, Digital-to-Analog Converter Specifications, Analog -to-Digital Converter Specifications.
Data Converter Architectures: DAC Architectures- Resistor String, Charge Scaling and Pipeline types, ADC Architectures- Flash, Pipeline ADC, Successive Approximation ADC.

4. Books and Materials

Text Books:

1. Razavi B., Design of Analog CMOS Integrated Circuits, Mc Graw Hill, 2001.
2. Baker, Li, Boyce, CMOS: Circuits Design, Layout and Simulation, Prentice Hall India, 2000.

Reference Books:

1. Razavi B., Fundamentals of Microelectronics, Wiley student Edition2014.
2. Phillip E. Allen, Douglas R. Holbery, CMOS Analog Circuit Design, Oxford, 2004.

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IV B.TECH I SEMESTER

COURSE STRUCTURE

A5460 - HARDWARE SOFTWARE CO-DESIGN

(PROFESSIONAL ELECTIVE – III)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

An introduction to the design of mixed hardware-software systems, focusing on common underlying modeling concepts, the design of hardware-software interfaces, and the trade-offs between hardware and software components. Students will use simulation tools to conduct experiments with mixed hardware-software systems in the area of embedded systems. In classic embedded system design, hardware and software components are developed independently by separate design teams. This leads to a slow and inefficient design process. There is general agreement in the design community that a combined consideration of hardware and software design issues will lead to more efficient systems and a more efficient design process. This course, targeted at computer engineers, addresses these issues. The course provides an introduction in hardware-software co-design. It outlines the basic strengths of hardware and software implementations and shows how to combine those into a successful system design. The focus is on the commonalities in the design process of hardware and software, as well as on the design of hardware-software interfaces.

Course Pre/co requisites

- Digital Design and Implementation using Verilog

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5460.1. Apply knowledge on firmware development process and tools that are used in it
A5460.2. Analyze interrelationship between Hardware and software in a embedded system
A5460.3. Make use of his knowledge in system specification and modeling.
A5460.4. Take Part in formulating the design specification and module creation.

3. Course Syllabus

CO DESIGN ISSUES: Co- design models-SM's, Data Flow Graph, FSM with Datapath, HCFSM's, Architectures-Controller, Datapath, FSMD, CISC, RISC, VLIW, Languages-Concurrency, State Transition, Hierarchy, A Generic Co-design Methodology.

PROTOTYPING AND EMULATION: Prototyping and emulation techniques, prototyping and emulation Environments-Weaver Prototyping Environment, Quickturn Emulation Systems, Mentor Sim Express, Zycad Paradigm RP and XP, Aptix Prototyping System, future developments in emulation and prototyping

TARGET ARCHITECTURES: Architecture specialization techniques-Component Specialization, System Specialization and Techniques, Memory Architectures, system communication infrastructure, target architecture and application system classes architecture for control dominated systems- high performance control, architecture for data dominated systems -ADSP21060 Sharc, TMS320C80 MVP, mixed systems and Less Specialized Systems

COMPILATION TECHNIQUES AND TOOLS FOR EMBEDDED PROCESSOR ARCHITECTURES: Modern embedded architectures-Architectures in Multimedia, Wireless and Telecommunications-TCECMMDSP for MPEG audio applications, SGS Thomson Integrated Videophone, embedded software development needs, compilation technologies-Are Traditional Compilation Techniques Enough; The Re-targetable compiler concept, practical consideration in a compiler development environment-Compiler Validation, Source Level Debugging, Architecture and Algorithm Exploration

LANGUAGES FOR SYSTEM LEVEL SPECIFICATION AND DESIGN: System – level specification, design representation for system level synthesis, system level specification languages, Heterogeneous specifications and multi language co-simulation

COSYMA SYSTEM: Design Flow, Architecture and Input Languages, Hardware/Software Partitioning and Synthesis.

LYCOS SYSTEM: Partitioning and Design Space Exploration, Overview, Trajectory for Hardware/Software Partitioning session for LYCOS

4. Books and Materials

Text Book:

1. Jorgen Staunstrup, Wayne Hendrix Wolf (2002), *Hardware / software co- design Principles and Practice*, kluwer academic publishers, USA.

Reference Books:

1. Patrick R. Schaumont (2010), *A Practical Introduction to Hardware/Software Do-design*,Springer, USA.
2. Giovanni De Micheli, Mariagiovanna Sami (1996), *Hardware/Software Co-design*, Kluwer Academic, USA.

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IV B.TECH I SEMESTER

COURSE STRUCTURE

A5461 - ARTIFICIAL NEURAL NETWORKS

(PROFESSIONAL ELECTIVE – III)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course will introduce the basic principles of artificial neural networks. It will cover simple representation schemes, problem-solving paradigms, constraint propagation, and search strategies and also covers the basic neural network architectures and learning as well as reasoning algorithms

Course Pre/co requisites

- Linear Algebra and Ordinary Differential Equations (A5001)
- Advanced Calculus (A5002)
- Image Processing and Pattern Recognition (A5457)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5461.1. Understand the basic model of artificial neuron and compare the functions of both artificial neuron and biological Neuron.

A5461.2. Analyze the problem of linearly separable using Perceptron model and relate to the concept of Madaline networks.

A5461.3. Formulate the associative learning of the neural network, the architecture of Hopfield network and the error performance of Hopfield network.

A5461.4. Develop different architectures of Artificial Neural Networks and apply learning laws and the learning rules associated with the neural networks

3. Course Syllabus

INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS: Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods.

FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS: Introduction, McCulloch: Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta

Learning Rule (Widrow-Hoff Rule or Least mean Square (LMS) rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

FEED FORWARD NETWORKS: Introduction, Single Layer Perceptron Architecture, Algorithm, Application Procedure, Perception Algorithm for Several Output Classes, Perceptron Convergence Theorem.

MULTILAYER PERCEPTRON: Brief Introduction to Multilayer Perceptron networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

ADALINE AND MADALINE NETWORKS: Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm.

COUNTER PROPAGATION NETWORKS: Winner Take: all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

4. Books and Materials

Text Books:

1. S. N. Sivanandam, S. Sumathi, S. N. Deepa (2006), Introduction to Neural Networks using MATLAB 6.0, Tata McGraw-Hill, New Delhi.
2. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

Reference Books:

1. B. Yegnanarayana (2007), Artificial Neural Networks, Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous Institute Affiliated to JNTUH

IV B.TECH I SEMESTER

COURSE STRUCTURE

A5462 - ADVANCED COMMUNICATIONS

(PROFESSIONAL ELECTIVE – III)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course introduces to the students to know the basic fundamentals of optical, microwave, satellite and radar Communications and its real time applications in the present and forthcoming days. The concepts of cellular telephone systems and satellite launching mechanism deals with transfer of information globally with the help of satellites and using GSM, LTE configurations. The radar range equation in its many forms is developed and applied to different situations. Radar transmitters, antennas, and receivers are covered. The fundamentals of radar target detection in presence of a noise background are discussed.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5462.1. Analyze the three types of optical fiber configurations: single-mode step index, multimode step index, and multimode graded index

A5462.2. Contrast frequency modulation with amplitude modulation microwave

A5462.3. Analyze the location of satellite using orbital mechanics and launching procedures. Classify different satellite subsystems and identify the impact of subsystems on communication services

A5462.4. Classify pulsed and continuous types of radars Doppler Effect and the concepts of continuous wave radars

A5462.5. Examine the various methods of MTI and tracking radar and how it is applicable to radar systems

3. Course Syllabus

Optical Fiber Transmission Media

Introduction, History of Optical Fiber Communications, Optical Fibers versus Metallic Cable Facilities, Electromagnetic Spectrum, Block Diagram of an Optical Fiber Communications System ,OpticalFiber

Types, Light Propagation , Optical Fiber Configurations, Optical Fiber Classifications, Losses in Optical Fiber Cables, Light Sources, Optical Sources, Light Detectors, Lasers, Optical Fiber System Link Budget

Microwave Radio Communications and System Gain

Introduction, Advantages and Disadvantages of Microwave Radio, Analog versus Digital Microwave, Frequency versus Amplitude Modulation, Frequency-Modulated Microwave Radio System, FM Microwave Radio Repeater, Diversity, Protection Switching Arrangements, FM Microwave Radio Stations, Microwave Repeater Station, Path Characteristics, Microwave Radio System Gain.

Cellular Telephone Systems

Introduction, First-Generation Analog Cellular Telephone, Personal Communications System, Second-Generation Cellular Telephone Systems, N-AMPS , Digital Cellular Telephone, Interim Standard 95 (IS-95), North American Cellular and PCS Summary, Global System for Mobile Communications, Personal Satellite Communications System, Overview of 4G, 5G Mobile networks.

Satellite Communications

Introduction, History of Satellites, Kepler's Laws, Satellite Orbits, Geosynchronous Satellites, Antenna Look Angles, Satellite Classifications, Spacing, and Frequency Allocation, Satellite Antenna Radiation Patterns: Footprints, Satellite System Link Models, Satellite System Parameters, Satellite System Link Equations, Link Budget, Applications of Satellite communications like GPS, VSAT Networks.

RADAR Systems: The Nature of Radar, Maximum unambiguous range, Radar waveforms, Simple form of Radar equation, Radar block diagram & Operation, Radar frequencies and applications, Related Problems.RADAR EQUATION: Prediction of Range performance, Minimum detectable signal, Receiver Noise & SNR, Integration of Radar pulses, PRF & Range Ambiguities, System losses, Related ProblemsMTI AND PULSE DOPPLER RADAR: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter.

4. Books and Materials

Text Books:

1. Wayne Tomasi(2014), Advanced Electronic Communications Systems, Sixth Edition, Pearson new International edition.
2. Merill I. Skolnik (2007), Introduction to Radar Systems, 2nd edition, Tata McGraw- Hill,India.

Reference Books:

1. Timothy Pratt (2003), Satellite Communications, 2nd edition, Wiley Publications, India.
2. M. Richharia (2003), Satellite Communications: Design Principles, 2nd edition, BS publications, India.
3. Dennis Roddy (2006), Satellite Communications, 2nd edition, Tata McGraw-Hill, India. John. D. Kraus (2007), Electromagnetics, 6th edition, McGraw Hill, New Delhi.

SYLLABI FOR IV YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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IV B.TECH II SEMESTER

COURSE STRUNCTURE

A5020 - MANAGEMENT SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

In this course, students will learn the fundamental concepts and contributions of Management. It also explains Inventory control techniques, Human Resource Practices, Quality control techniques and Project Management which plays a vital role in the organization.

Course Pre/co requisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5020.1. Explain and infer the concepts and aspects of management

A5020.2. Analyze the different organizational structures, plant layouts, work study tools for enhancement of productivity in an organization

A5020.3. Apply statistical quality control techniques to know quality of product with in control limits.

A5020.4. Use Human resource management techniques for better people management.

A5020.5. Apply the project management techniques to decide the optimum time and cost for completion of a project.

3. Course Syllabus

INTRODUCTION: Management - Definition, Nature, Importance of management, Functions of Management - Taylor's scientific management theory, Fayol's principles of management, Contribution of Elton mayo, Maslow, Herzberg, Douglas MC Gregor. Basic concepts of Organisation Authority, Responsibility, Delegation of Authority, Span of control, Departmentation and Decentralization - Organisation structures (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

OPERATIONS MANAGEMENT: Plant location, Factors influencing location, Principles and types of plant layouts - Methods of production (job, batch and mass production), Work study - Basic procedure involved in method study and Work measurement.

QUALITY CONTROL AND MATERIALS MANAGEMENT: Statistical quality control – Meaning- Variables and attributes - X chart, R Chart, C Chart, P Chart, (simple Problems) Acceptance sampling, Sampling plans, Deming's contribution to quality. Materials management – objectives, Need for inventory control, Purchase procedure, Store records, EOQ, ABC analysis, Stock levels.

HUMAN RESOURCE MANAGEMENT (HRM): Concepts of HRM, Basic functions of HR manager: Man power planning, Recruitment, Selection, Training and development, Placement, Wage and salary administration, Promotion, Transfers, Separation, performance appraisal, Job evaluation and Merit rating.

PROJECT MANAGEMENT: Early techniques in project management - Network analysis: Programme evaluation and review technique (PERT), Critical path method (CPM), Identifying critical path, Probability of completing project within given time, Project cost analysis, project crashing (simple problems).

4. Books and Materials

Text Books:

1. Koontz &weihrich – Essentials of management, TMH, 8th edition, 2010.
2. O.P. Khana, Industrial engineering and Management, Dhanpat rai publication.

Reference Books:

1. Dr.A.R.Aryasri, Management Science, TMH, 4th edition, 2009.
2. Stoner,Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004.
3. L.S.Srinath, PERT & CPM, 3rd edition East-West press pvt. ltd.-New Delhi.

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IV B.TECH II SEMESTER

COURSE STRUNCTURE

A5463 - DESIGN FOR TESTABILITY

(PROFESSIONAL ELECTIVE – IV)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course will enable in comprehending the fault models and the need for testing algorithms at the various levels of the VLSI Design process.

Course Pre/co requisites

- Digital Logic Design (A5401)
- CMOS VLSI Design (A5413)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5463.1. Identify the significance of testing in digital circuits

A5463.2. Design and simulate the fault models for combinational and sequential circuits at different levels of abstraction.

A5463.3. Design for the prevention and forecasting of faults using testing algorithms.

A5463.4. Analysis of various testing methods in memory based digital systems

A5463.5. Evaluate the test pattern generations in the design of Combinational and Sequential circuits

3. Course Syllabus

Introduction To Testing: Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

Logic and Fault Simulation: Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation, ATPG

Testability Measures: SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

Built-In Self Test: The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-PerScan BIST Systems, Circular Self Test Path System, Memory BIST, Delay Fault BIST.

Boundary Scan Standard: Motivation, System Configuration with Boundary Scan: TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions

4. Books and Materials

Text Books:

1. M.L. Bushnell, Vishwani. D. Agarwal (2004), Essentials of Electronic Testing, Springer Science, USA
2. MironAbramovici, Melvin A. Breuer, Arthur. D Friedman: *Digital Systems Testing and Testable Design*; IEEE Press, USA, 1994.

Reference Books:

1. Robrt. J. Feugate, J. Steven M. Mclntyre, Englehood Cliffs (1988), Introduction to VLSI Testing, Prentice Hall of India, New Delhi.
2. Stroud, “A Designer’s Guide to Built-in Self-Test”, Kluwer Academic Publishers, 2002
3. T.Kropf, "Introduction to Formal Hardware Verification", Springer Verlag, 2000.
4. P. Rashinkar, Paterson and L. Singh, "System-on-a-Chip Verification-Methodology and Techniques", Kluwer Academic Publishers, 2001

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IV B.TECH II SEMESTER

COURSE STRUCTURE

A5464 - EMBEDDED LINUX

(PROFESSIONAL ELECTIVE – IV)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course covers the basic concepts of Embedded Linux system,booting Linux, Debugging,Interrupts,Parallel port Interfacing,System Integration. This course will help the students to learn how Linux is used as an OS for Embedded Application.

Course Pre/co requisites

- Computer Organization and Operating Systems (A5407)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5464.1. Identify various types of Hosts and Boot configurations.

A5464.2. Describe about Linux boot Process and the root file system

A5464.3. Examine the various types of Debugging and measuring interrupt latency

A5464.4. Interface various peripherals to Standard Parallel port

A5464.5. Analyze the system integration process.

3. Course Syllabus

BASIC CONCEPTS: What Is an Embedded System? What Does Real-Time Mean? Implications of Open Source, Real Life and Embedded Linux Systems, Design and Implementation Methodology. Types of Hosts, Generic Architecture of an Embedded Linux System, System Startup, Types of Boot Configurations,System Memory Layout.

BOOTING LINUX: Target BPR's, Linux Boot Process, The Linux Root File System, Creating the Root File System, Installing the TFTP Server, Installing Minicom, Booting the Embedded Planet, Booting the Bright star Engineering Media Engine target, Boot comparison.

DEBUGGING: Introducing GDB, Local Debugging, Remote Debugging, Network Mounting the Root System.

INTERRUPTS: Linux Timing Sources, Measuring Interrupt Latency, Implementing the Race Timer.

PARALLEL PORT INTERFACING: Control Using the Parallel Port, Standard Parallel Port Control with Port I/O, Standard Parallel Port Control Using PPDEV, Developing a Custom Device driver.

SYSTEM INTEGRATION: Integration Overview, Installing the System Integration Applications, Creating and Testing the Project Trailblazer Database, Developing the Target and CGI Integration Scripts, GUI Development, Real time Capabilities, Project Trailblazer Hardware.

4. Books and Materials

Text Books:

1. Dr.CraigHollabaugh (2004), Embedded Linux: Hardware, Software and Interfacing, 5th edition, Pearson Education, New Delhi, India.
2. Karim Yaghmour (2008), Building Embedded Linux Systems, 2nd edition, O'Reilly Media, New Delhi, India.

Reference Books:

1. J. Corbet, Rubini, Greg K. Hartman(2005), Linux Device Drivers, 3rd edition, O' Reilly Media, New Delhi, India.
2. P. Raghavan, Amol Lad, Sriram Neelakandan (2005), Embedded Linux System Design and Development, Auerbach Publications, CRC Press, USA.

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IV B.TECH II SEMESTER

COURSE STRUCTURE

A5465 - DSP PROCESSORS AND ARCHITECTURES

(PROFESSIONAL ELECTIVE – IV)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

It gives the knowledge about the processing of digital signal and their application in the present communication world. It also gives knowledge about different transforms used to represent the signal in frequency domain for analysis and Design tools for DSP systems using MATLAB. It helps us to learn the process to implement DSP systems with accuracy and understand Architectures for programmable devices. Allow the students to study the detailed architecture of TMS 320C54XX, Implementation of BASIC DSP algorithms, FFT algorithms and interfacing memory and I/O peripherals to programmable DSP devices.

Course Pre/co requisites

- Digital Signal Processing (A5415)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5465.1. Analyze the effects of quantization and aliasing in a real-time DSP system.

A5465.2. Apply the fundamentals of controllers to investigate existing TMS processors design.

A5465.3. Develop basic DSP algorithms using DSP processors

A5465.4. Integrate basic peripherals to DSP Processors.

3. Course Syllabus

INTORODUCTION TO DIGITAL SIGNAL PROCESING: Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors.

ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address

Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

IMPLEMENTATIONS OF BASIC DSP ALGORITHMS: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.
IMPLEMENTATION OF FFT ALGORITHMS: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

4. Books and Materials

Text Books:

1. Avtar Singh and S. Srinivasan (2006), Digital Signal Processing, Thomson Publication, India.
2. Phil Lapsley Jeff Bier, Amit Shoham, Edward A.Lee (2010),DSP Processor Fundamentals, Architectures & Features, John Wiley & Sons, India.

Reference Books:

1. B. Venkata Ramani and M. Bhaskar,(2004),Digital Signal Processors, Architecture, Programming and Applications, Tata McGraw-Hill, New Delhi.
2. JonathamStein(2005),Digital Signal Processing, John Wiley, India.
3. Emmaneul C Ifeachor, Barrie W Jrevis, Digital Signal Processing, Pearson Education.

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IV B.TECH II SEMESTER

COURSE STRUCTURE

A5466 - WIRELESS COMMUNICATIONS AND NETWORKS

(PROFESSIONAL ELECTIVE – IV)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Wireless communications and networks have become ubiquitous technologies in the past couple of decades. The objective of this course is to give an introduction to the fundamentals of the wireless communications systems, the wireless network architectures, protocols, and applications. This course covers the basic principles of wireless communications and wireless network architectures. Topics of study include an overview of wireless communication systems, spread-spectrum modulation for wireless systems, Wireless Application Protocol, 4G and 5G technologies, multiple access techniques, and wireless networking standards (e.g., 2.5G, 3G, 4G, 5G, IEEE 802.11, 802.15 and IEEE 802.16).

Course Pre/co requisites

- Digital Communications (A5410)
- Cellular and Mobile Communications (A5420)

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5466.1. Apply the knowledge of various systems, techniques and technologies for effective wireless communication.

A5466.2. Analyze the different types of protocols and standards for the enhancement (development) of wireless networking.

A5466.3. Make use of various design considerations to utilize the spectrum effectively.

A5466.4. Identify the ways for data transfer to achieve higher data rates in wireless networks.

3. Course Syllabus

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS: Evolution of mobile radio communications, examples of wireless communication systems-paging systems, cordless telephone systems, cellular telephone systems, comparison of common wireless communication systems.

MODERN WIRELESS COMMUNICATION SYSTEMS: Historical Trend of Wireless Communications, Evolution of LTE Technology to Beyond 4G,5G Roadmap,10 Pillars of 5G.

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction, FDMA, TDMA, spread spectrum multiple access, FH-CDMA, DS-CDMA, SDMA, packet radio, packet radio protocols, CSMA protocols, reservation protocols, capacity of cellular systems.

RADIO PROPAGATION AND PROPAGATION PATH-LOSS MODELS: Introduction, Free-Space Attenuation, Attenuation over Reflecting Surface, Effect of Earth's Curvature, Radio Wave Propagation, Characteristics of a Wireless Channel: Multipath Delay Spread, Coherence Bandwidth, and Coherence Time, Signal Fading Statistics: Rician Distribution, Rayleigh Distribution, Lognormal Distribution, Propagation Path-Loss Models: Okumura/Hata Model, Indoor Path-Loss Models, Fade Margin, Link Margin.

WIRELESS COMMUNICATION SYSTEMS AND TECHNOLOGIES: Introduction, Features and challenges, applications, 4G technologies: Multicarrier modulation, smart antenna techniques, OFDM – MIMO systems, Adaptive modulation and coding with time slot scheduler, BLAST system, SDR and cognitive radio.
Wireless Application Protocol: Introduction, WAP Programming Model, WAP Architecture, WAP Advantages and Disadvantages, Applications of WAP.

WIRELESS NETWORKS: Introduction to wireless networks, advantages and disadvantages of wireless local area networks, WLAN topologies, WLAN standard IEEE 802.11, IEEE 802.11 medium access control, comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, wireless PANs, Hipper LAN 2, WLL.

4. Books and Materials

Text Books:

1. Theodore S. Rappaport (2002), Wireless Communications - Principles Practice, 2nd edition, Prentice Hall of India, New Delhi.
2. Vijay K Garg (2010), Wireless Communication and Networking, Morgan Kaufmann Publishers.
3. Jonathan Rodriguez (2015), Fundamentals of 5G Mobile Networks, John Wiley & Sons, Ltd

Reference Books:

1. William Stallings (2009), Wireless Communications and Networks, 2nd edition, Pearson Education, India.
2. Andrea Goldsmith (2005), Wireless Communications, Cambridge University Press.
3. Andreas F. Molisch (2006), Wireless Communications, Wiley – India, New Delhi
4. Erik Dahlman, Stefan Parkvall, and Johan Sköld (2011)4G: LTE/LTE-Advanced for Mobile Broadband, Elsevier.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5131 - PROJECT PLANNING AND MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course will provide a general introduction to project management. This course covers key components of project management including project integration, project scope management, project time and cost management, quality management, human resource considerations, communications, and procurement management. Understand network techniques for Project planning, scheduling and Execution Control with limited resources.

Course Pre/co-requisites

This course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5131.1 Identify project characteristics and various phases of a project.
A5131.2 Explain project organization, staffing and feasibility of projects.
A5131.3 Apply the techniques of Project planning, scheduling and Execution Control.
A5131.4 Analyse the role of stakeholders.
A5131.5 Evaluate Resources, Budget, Claims and Disputes.

3. Course Syllabus

Project Management: Overview of Project Management, Concepts and Definitions. Project manager and his responsibilities. Types of projects, Various stages of projects, Organizational structures used in project management. Management Functions and staffing.

Project Planning: Time planning, Contents of Project plan, planning process, Work breakdown structure, process mapping. Project Budgeting: Financial Projections, time value of money, cost of capital, capital investment decisions.

Scheduling Techniques: Bar Charts, CPM & PERT: Time estimate- Optimistic time estimate, Most likely time estimate, Pessimistic time estimate & Expected time. Project Scheduling, Network Analysis, Cost-Time Analysis in Network Planning, Float - Total float, free float.

Monitoring and Controlling: Plan monitor control cycle, data collection and reporting, Project control. Working with stakeholders.

Conflict Management: claims and Disputes- Source of claim, Claim Management, Dispute resolution, Arbitration and its advantages, Project closure.

4. Books And Materials

Text Books:

1. Punmia B.C., Khandelwal K.K., Project *planning and control with PERT and CPM*, Fourth Edition, Laxmi Publications, New Delhi, 2016.

Reference Books:

1. Stephen A. Robbins, David A. Decenzo& Mary Coulter,*Fundamentals of Management* 7th Edition, Pearson Education, 2011.

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OPEN ELECTIVE

COURSE STRUCTURE

A5132 – AIR POLLUTION AND CONTROL

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course provides an introduction to major aspects of air pollution and its control technologies, with an emphasis on outdoor rather than indoor air pollution. In this course, students will learn effects of air pollutants on human beings, materials and environment; sources of air pollution and behavior of pollutants in the atmosphere; a presentation of the models that are used to predict dispersion and air pollutant concentrations; and finally a review of the strategies and key technologies for controlling emissions of gaseous pollutants and particulate matter.

Course Pre/ co-requisites

- A5012-Environmental Science

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5132.1. Select sampling technique and appropriate methods to control air pollution.

A5132.2. Develop a broad overview of the strategies to manage air pollution.

A5132.3. Examine various particulate and gaseous pollutant removal mechanisms to reduce emissions.

A5132.4. Explain how atmospheric and chemical composition drives changes in the environment

A5132.5. Predict the ground level concentration of air pollutants using mathematical formulation.

3. Course Syllabus

Air pollution & Global issues: Definitions, scope, significance and episodes, air pollutants – classifications - Effects of air pollutants on man, material and vegetation - Global effects of air pollution - Green House Effect, Heat Islands, Acid Rains, Photochemical Smog, and Ozone Depletion.

Properties of Atmosphere: Meteorological Aspects of Air Pollution Dispersions, Temperature Lapse Rates and Stability, Wind Velocity and Turbulence, Plume Behavior, Dispersion of Air Pollutants, Solutions to the Atmospheric Dispersion Equation, the Gaussian Plume Model.

Air pollution Sampling and Measurement: Types of Pollutant Sampling and Measurement, Ambient Air Sampling, Collection of Gaseous Air Pollutants, Collection of Particulate Pollutants, Stock

Sampling, Analysis of Air Pollutants, Sulphur Dioxide, Nitrogen Dioxide, Carbon Monoxide, Oxidants and Ozone, Hydrocarbons, Particulate Matter.

Air Pollution Control Methods: Sources, Correction Methods, Cleaning of Gaseous Effluents, Particulate Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection a Particulate Collector, Control of Gaseous Emissions, Adsorption by Solids, Absorption by Liquids, Combustion - Behavior and Fate of Air Pollutants.

Air Quality Management: Monitoring of SPM, SO; NO and CO Emission Standards. Air pollution laws and standards.

4. Books and Materials

Text Books:

1. Prof. Y. Anjaneyulu, "Air Pollution and Control Technologies", Allied publishers, 2002.
2. M. N. Rao, H. V. N. Rao, “Air pollution”, Tata McGraw Hill Education, New Delhi, India, 2017.

Reference Books:

1. R. K. Trivedy, P. K. Goel, “Introduction to Air pollution”, ABD Publications, New Delhi, India, 2003.
2. Wark, Warner, “Air pollution its origin and control”, Addison-Wesley, New York, 1998.
3. K.V.S.G. Murali Krishna, “Air Pollution and Control”, USP, India, 2017.

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OPEN ELECTIVE

COURSE STRUCTURE

A5133 – DISASTER MANAGMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

The course has been framed with an intention to provide a general concepts in the dimensions of disasters caused by nature beyond human control as well as the disasters and environmental hazards induced by human activities with emphasis on Natural disaster, Man-made disaster, vulnerability and risks of disasters, Disaster Management Mechanism, Capacity Building and disaster coping Strategies and Disaster management planning.

Course Pre/co-requisites

A5012- Environmental science

2.Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5133.1. Identify concepts, hazards and vulnerabilities of different types of disasters.
A5133.2. Examine the components of disaster management mechanism.
A5133.3. Select suitable capacity building frame work for disaster management
A5133.4 Interpret various disaster coping strategies
A5133.5. Develop Strategies for disaster management planning

3. Course Syllabus

CONCEPT- HAZARDS - VULNERABILITIES OF DISASTERS: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional) Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards.

DISASTER MANAGEMENT MECHANISM: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief.

CAPACITY BUILDING: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels.

COPING WITH DISASTER: Coping Strategies; alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management.

DISASTER MANAGEMENT PLANNING: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

4. Books and Materials:

Text Books:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2017

Reference Books:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

Autonomous Institute Affiliated to JNTUH

OPEN ELECTIVE

COURSE STRUCTURE

A5231 – TRANSDUCERS AND MEASUREMENTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

2. Course Description

Course Overview

This course provides an overall understanding of the elements and processes, including sources of errors, and digitally acquiring these measurements. Along with an overview of instrumentation principles, the physical principles and electrical characteristics for several common instrument transducers are studied. The electronic signal conditioning circuits required converting the electrical changes in the transducers to signal which can be interpreted accurately by a microprocessor or an embedded controller are analyzed and designed effectively. This course also gives an integration of hardware and software in designing computer controlled processes and/or systems with the aid of sensors, transducers data acquisition board, and instrument control.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites

3. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5231.1. Aware the basic concepts of measurement parameters as well as instrument standards, characteristics and errors.

A5231.2. Construct and design various measuring devices like voltmeters, Ammeters, Ohmmeters, analog, digital multi-meters and analyze different types of cathode ray oscilloscopes.

A5231.3. Design different bridge networks and analyze balanced condition for finding out values of resistance, capacitance and inductance.

A5231.4.Analyze different physical parameters like pressure, force, velocity, acceleration, sound, torque, strain and stress etc. using non-electrical transducers.

A5231.5. Apply the principles and practice for instrument design and develop for real world problems.

3. Course Syllabus

CHARACTERSTICS OF INSTRUMENTS: Block schematic of measuring system, Performance characteristics of instruments-static and dynamic characteristics, Errors in measurement.

MEASURING INSTRUMENTS: DC voltmeters- multi-range, range extension, DC Ammeter- multi range, range extension, ohm-meters-series type and shunt type, AC Voltmeter.

DIGITAL VOLTMETERS: Dual slope and Successive Approximation type DVM.

TRANSDUCERS-I: Introduction, classification, strain gauges, LVDT, Piezo electric transducers, OP-AMP applications in measurement and transducer circuits, instrumentation amplifier, thermometers, thermocouples, thermistors, sensistors.

TRANSDUCERS-II: Measurement of non electrical quantities- displacement, pressure, torque, vibration, pH, sound, velocity, humidity, speed, analog and digital data acquisition systems, programmable logic controllers and their industrial applications.

DC and AC BRIDGES: Measurement of resistance Wheat's stone bridge, Kelvin's double bridge, measurement of Inductance using Maxwell's inductance bridge, Anderson's bridge, Hay's bridge, measurement of capacitance using Schering bridge.

CATHODE RAY OSCILLOSCOPE (CRO): Introduction to CRT, vertical amplifiers, horizontal deflection system, simple CRO, measurement of phase and frequency (lissajous patterns).

4. Books and Materials

Text Books:

1. A. K. Sawhney (2007), Electrical and Electronic Measurements and Instrumentation, 18th Edition, Dhanpat Rai & Co, New Delhi.
2. H.S.Kalsi, Electronic Instrumentation, 3rd edition, Tata McGraw-Hill Education.

Reference Books:

1. D. Helfrick, W.D. Cooper (2002), Modern Electronic Instrumentation and Measurement Techniques, 5th edition, Prentice Hall of India, New Delhi.
2. David A. Bell (2003), Electronic Instrumentation & Measurements, 2nd edition, Prentice Hall of India, New Delhi.

OPEN ELECTIVE

COURSE STRUCTURE
A5232 – SOLAR ENERGY AND APPLICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. COURSE DESCRIPTION

Course Overview

This is an engineering introduction to Solar energy technologies and potentials. The course aims to introduce a general engineering/science audience to the basic concepts of solar energy. The concepts of Photo Voltaic cells and their properties will be explained. Applications of solar cells will be explained in detail also the environmental issues of solar systems will be explained.

Course Pre/co-requisites

"The course has no specific prerequisite and co-requisites"

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5232.1 Compare the present and future available electrical power from solar energy in the world based on the knowledge of global solar horizontal irradiation.

A5232.2 Assimilate and acquire the skills for design and engineering of solar thermal and solar photovoltaic technology and systems.

A5232.3 Identify simple to complex problems involved in solar thermal energy conversion technique used in the liquid based solar heating and cooling systems for buildings/societal needs.

A5232.4 Examine a solar PV(Photo Voltaic) system components and their function by utilizing the previous literature knowledge on different Photovoltaic solar cells like crystalline, Multi-Crystalline, Amorphous and thin film.

A5232.5 Analyze the techno economics interaction of developments in the solar energy systems

3. Course Syllabus

PRINCPLES OF SOLAR RADIATION: Role and potential of solar energy, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and Sun shine, solar radiation data.

SOLAR ENERGY COLLECTORS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

STORAGE AND APPLICATIONS: Different methods of solar energy storage, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating /cooling technique, solar distillation and drying.

PHOTO VOLTAICS (PV): Fundamentals of solar cells, types of solar cells, absorption of photons, excitations and photo emission of electrons.

PV CELL PROPERTIES: Solar cell properties and design, p-n junction photodiodes, depletion region, electrostatic field across the depletion layer, electron and holes transports, device physics, charge carrier generation, recombination and other losses, I-V characteristics, output power.

SOLAR CELL APPLICATIONS: PV cell interconnection, module structure and module fabrication, Equivalent circuits, load matching, efficiency, fill factor and optimization for maximum power, Design of stand-alone PV systems, system sizing, device structures, device construction, DC to AC conversion, inverters.

COST ANALYSIS AND ENVIRONMENTAL ISSUES: Cost analysis and pay back calculations for different types of solar panels and collectors, installation and operating costs, Environmental and safety issues, protection systems, performance monitoring.

4. Books and Materials

Text Books:

1. G. D. Rai (2009), Non-Conventional Energy Sources, 4th Edition, Khanna Publishers, New Delhi.
2. Martin A. Green (2008), Solar Cells: Operating Principles, Technology and system Applications, 1st Edition, Prentice Hall, New Delhi.

Reference Books:

1. B. H. Khan (2016)- Non Conventional Energy Resources-3rd Edition, McGraw Hill Education (India) Private Limited.
2. Sukatme (2008), Solar Energy, 3rd Edition, McGraw Hill Companies, New Delhi.
3. D. Yogi gosuami, Frank Kreith, Jan F. Kreider (2000), Principles of Solar Engineering, 3rd Edition, Taylor & Francis, USA.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5233 – ENERGY MANAGEMENT AND AUDIT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Energy management can help industry control its operating costs. Energy management is also important for reducing local, regional and global emissions and can help mitigate the problem of global warming. This course will help industry professionals acquire the skills and techniques required to implement energy management. This course will also benefit researchers and students who are interested in working on energy management. In the context of the Energy Conservation Act 2001, the Bureau of Energy Efficiency has emphasised the importance of Energy Managers and Certified Energy Auditors. This course is designed to provide the background required for engineers to meet this role.

Course Pre/co-requisites

"The course has no specific prerequisite and co-requisites"

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5233.1 Analyze the influence of energy availability on the development of Industries and various other organizations.

A5233.2 Discuss the concepts and technologies used for energy conservation.

A5233.3 Develop methods for evaluating worth of project.

A5233.4 Investigate the schemes for demand side management.

A5233.5 Evaluate the VAR requirements for effective voltage control.

3. Course Syllabus

ELECTRICAL ENERGY AND SAFETY AUDIT: Overview of Electricity Act – Energy conservation act – Electrical energy audit – Types – Tools – Tariff – Load factor improvement – Power factor correction – Power demand control and shifting – Electrical safety Auditing.

ENERGY CONSERVATION IN ELECTRIC MOTORS: Motors efficiency – Motor selection – Factors affecting motor performance – Efficiency at low load – Rewound motors – Variable speed drives – Load reduction – High efficiency motors – Energy savings in transformers – Case studies.

ELECTRICAL ENERGY CONSERVATION IN DRIVEN EQUIPMENTS: Input electrical energy requirements in pumps, fans and compressors – Load factor estimation in the equipment – Energy conservation potential.

ENERGY CONSERVATION IN INDUSTRIAL LIGHTING: Concept of lighting systems – Choice of lighting – Different lighting technologies – Energy saving – Control of lighting – Lighting standards and requirements – Light meter audit – Methods to reduce costs.

ENERGY MANAGEMENT: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting – Energy manager, Qualities and functions.

4. Books and Materials

Text Books:

1. W. R. Murphy, G. McKay (2008), *Energy Management,* 1st Edition*,* B.S. Publications, New Delhi.
2. Tripathy S. C., "Electric Energy Utilization and conservation", Tata McGraw Hill.
3. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982.

Reference Books:

1. B. Smith (2007), *Energy Management Principles*, 1st Edition, Pergamon Press, Inc., England.
2. Energy Management Handbook, Edited by W.C.Turner, Wiley, New York, 1982.
3. IEEE Bronze Book, 'Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities, IEEE Press.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE
A5331 - BASIC MECHANICAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview:

This course is designed to lay emphasis on the fundamental principles of Thermodynamics, Fluid Mechanics, Hydraulic Machines and heat transfer and to equip the students with the knowledge and skills to solve mechanical engineering problems efficiently.

Course Pre/co-requisites

- Engineering Physics (A5008)
- Linear Algebra and Ordinary Differential Equations (A5001)

2. COURSE OUTCOMES (COS)

After the completion of the course, the student will be able to:

A5331.1. Develop the general energy equations for thermal systems by laws of thermodynamics.

A5331.2. Compare types of fluids, fluid flows, pressure and flow measuring devices, losses in pipes, laminar and turbulent boundary layer concepts.

A5331.3. Evaluate design parameters of hydraulic turbines at given efficiency and discharge

A5331.4. Analyze an expression for force, workdone and efficiency of vane, turbines and pumps.

A5331.5. Apply the principles of conduction, convection and radiation heat transfer to analyze natural phenomena.

3. Course Syllabus

BASIC THERMODYNAMIC CONCEPTS: System, surroundings, universe, Intensive and Extensive Properties, Macroscopic and Microscopic Approach, Force, Pressure, Energy, Work, Power, Heat, Temperature, Specific Heat Capacity, Change of State, Path, Process, Cycle, Internal Energy, Enthalpy, Statements of Zeroth and First Laws of Thermodynamics**.**

FUELS AND COMBUSTION: Types of Fuels and their Characteristics, Combustion and Combustion Products of Fossil Fuels, Environmental Effects of Fossil Fuel Combustion, Bio-fuels, Comparison of Bio-fuels with Petroleum Fuels in Terms of Calorific Value and Emission.

ENERGY RESOURCE UTILIZATION:

Classification of Energy Resources, Non-Renewable Energy - Principles of Generating Electricity by Steam, Gas and Nuclear Power Plants; Renewable Energy - Utilization of Hydro, Solar, Wind, Geothermal and Biomass Energies.

ENGINEERING MATERIALS AND MACHINING PROCESSES:

Classification of Materials, Types and Applications of Ferrous & Non-Ferrous Metals, Alloys and Composites; Principles of Metal Joining Processes -Riveting, Bolting, Soldering, Brazing, and Welding, Principles of Metal Cutting Processes - Turning, Drilling, Milling, Boring, Shaping, Slotting Broaching and Sawing

POWER TRANSMISSION DRIVES:

Types of Power Transmission, Belt Drives - Open and Crossed Belt, Flat and V-Belt, Stepped Pulley; Gear Drives – Spur, Helical and Bevel Gears, Rack and Pinion, Worm Gear; Gear Trains – Simple and Compound; Chain Drives, Rope Drives, Advantages and Disadvantages of Chain Drive Over Belt or Rope Drive.

4. BOOKS AND MATERIALS

Text Books:

1. M.P. Poonia, S.C. Sharma (2018), “Basic Mechanical Engineering”, 1st Edition, Khanna Book Publishing.
2. S.Trymbaka Murthy, (2011), “A Text Book of Elements of Mechanical Engineering”, 3rd New edition, I K International Publishing House Pvt. Ltd.

Reference Books:

1. K.P. Roy, S.K. Hajra Choudhury, NirjharRoy(2012), “Elements of Mechanical Engineering”, 7th Edition, Media Promoters & Publishers Pvt Ltd,Mumbai.
2. Pravin Kumar 2013,“Basic Mechanical Engineering”, Edition, Pearson, India.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5332 - INTRODUCTION TO 3D PRINTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

3D printing is an additive manufacturing process whereby objects are built up from plastic filament, liquid resin, layers of powder, or even bio-compatible and edible materials. Desktop 3D printing is today's printing press, putting rapid prototyping, customizable products, and individualized medical appliances in reach of the general public. Literacy in basic 3D modeling and manufacturing is an essential skill for future STEM success in this country. In this course students will learn how to be "makers" by using various types of 3D modeling software and imaging equipment, printing actual physical objects that they have designed and modeled themselves, and participating in educational outreach in the institute and the community

Course Pre/co-requisites

- AutoCAD and Manufacturing Process

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5332.1. Understand the fundamental concepts of Additive Manufacturing (i.e. Rapid Prototyping) and 3-D printing, its advantages and limitations.

A5332.2. Apply engineering knowledge, techniques, skills and modern tools to analyze problems in 3D PRINTING.

A5332.3. Appraise additive manufacturing through 3d printing.

A5332.4. Solve Complex manufacturing problems for significant technological and societal development

A5332.5. Analyze, design and evaluate engineering products using the knowledge of mathematics, science, engineering and IT tools.

3. Course Syllabus

INTRODUCTION TO 3D PRINTING: Fundamental of 3D printing, Need for 3D printing Generic 3d printing process, Distinction between 3D printing and CNC, Classification of 3D printing Processes, Steps in 3D printing process, Advantages of 3D printing, standards for 3D printing, Major Applications.

VAT PHOTO POLYMERIZATION 3D PRINTING PROCESSES: Stereo lithography (SL), Materials, SL resin curing process, Process Benefits and Drawbacks, Applications of Photo polymerization Processes

MATERIAL JETTING 3D PRINTING PROCESSES:- Binder Jetting 3D PRINTING Processes: Evolution of Printing as a 3D printing Process, Materials, Process Benefits and Drawbacks, Applications of Material Jetting Processes.

BINDER JETTING 3D PRINTING PROCESSES: Materials, Process Benefits and Drawbacks, Research achievements in printing deposition, Technical challenges in printing, Applications of Binder Jetting Processes

EXTRUSION-BASED 3D PRINTING PROCESSES: Fused Deposition Modeling (FDM), Principles, Materials, Plotting and path control, Bio-Extrusion, Process Benefits and Drawbacks, Applications of Extrusion-Based Processes.

POWDER BED FUSION 3D PRINTING PROCESSES: Selective laser Sintering (SLS), Materials, Powder fusion mechanism, SLS Metal and ceramic part creation, Electron Beam melting (EBM), Process Benefits and Drawbacks, Applications of Powder Bed Fusion Processes.

DIRECTED ENERGY DEPOSITION 3D PRINTING PROCESSES: Process Description, Laser Engineered Net Shaping (LENS), Direct Metal Deposition (DMD), Electron Beam Based Metal Deposition, Benefits and drawbacks, Applications of Directed Energy Deposition Processes.

Wire arc based additive manufacturing methods, Advantages and disadvantages, comparison with conventional 3D printing and WAAM.

POST PROCESSING OF 3D PRINTING PARTS: Support Material Removal, Surface Texture Improvement, Accuracy Improvement, Aesthetic Improvement, Preparation for use as a Pattern, Property Enhancements using Non-thermal and Thermal Techniques.

Inspection of 3D printing parts: Different destructive and non-Destructive testing of 3D printing parts, acceptance standards for 3D printing parts

3D PRINTING APPLICATIONS: Functional models, Pattern for investment and vacuum casting, Medical models, art models, Engineering analysis models, Rapid tooling, new materials development, Bi-metallic parts, Re-manufacturing. Application examples for Aerospace, defense, automobile, Bio-medical and general engineering industries

Software Package: FUSION 360 and CATIA

4. Books and Materials

Text Books:

1. Ian Gibson, David W Rosen, Brent Stucker (2015) “Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing”, 2nd Edition, Springer.
2. Ali K. Kamrani, EmandAbouel Nasr (2006) “Rapid Prototyping: Theory & Practice”, Springer

Reference Books:

1. D.T. Pham, S.S. Dimov (2001) “Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling”, Springer.
2. Rafiq Noorani (2006) “Rapid Prototyping: Principles and Applications in Manufacturing”, John Wiley & Sons.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE
A5333 - FUNDAMENTALS OF ROBOTICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course introduces students to the basics, types and elements of robots. The course exposes students to the theoretical concepts of robot kinematics. Path planning and trajectory planning concepts gives the perception on control of robotics. The concepts on actuators and sensors gives clear understanding and design ability for mobility systems. It gives an overview on application of robotics in manufacturing industry.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to

A5333.1. Understand the basic concepts and components of a robotic system.

A5333.2. Identify theuse of actuators and sensors for designing robot mobility system.

A5333.3. Solve transformation problems to describe the robot position and orientation of robot.

A5333.4. Apply the concepts of robot work cell design and control.

A5333.5. Select appropriate robots for various applications suitable to modern manufacturing systems.

3. Course Syllabus

Introduction to Robotics: Classification of Robots, Advantages and Disadvantages of Robots, Degree of freedom, joints, Robot coordinates, Robot workspace, Robot characteristics, Robot Components, types of robot arms, end effectors, grippers.

Actuators: Characteristics of Actuating Systems, Comparison of Actuating Systems, Hydraulic and Pneumatic Devices, Electric Motors in Robotics.

Sensors: Sensor Characteristics, Position Sensors, Velocity Sensors, Acceleration Sensors, Touch and Tactile Sensors, Proximity Sensors, Range Finder.

Manipulator Kinematics: Specifications of matrices, Homogeneous Transformation, D-H notation, joint coordinates and world coordinates, Forward and inverse kinematics, Simple problems.

Path Planning:Trajectory planning and avoidance of obstacles, Path planning, introduction to robot programming.

Robot Work Cell Design and Control: Robot Cell Layouts, Multiple Robots and Machine Interface, Some Consideration in Work Cell Design, Interlocks, Error Detection and Recovery, Robot Cycle Time Analysis.

Robotic Applications: Robots in manufacturing and non- manufacturing applications, Health Service, Intelligent Home Applications, Military Applications, Space Application, Entertainment robots, Service robots, Domestic or household robots.

4. Books and Materials

Text Books:

1. Richard D. Klafter (2010), Robotic Engineering, 2nd edition, Prentice Hall of India, New Delhi.
2. M.P. Groover (2010), Industrial Robotics, 3rd edition, Pearson Education, New Delhi.

Reference Books:

1. R.K. Mittal, I.J. Nagrath (2012), Robotics and Control, 1st edition, Tata Mc Graw Hill, New Delhi.
2. P. Coiffet, M. Chaironze (2010), An Introduction to Robot Technology, 3rd edition, Kogam Page Ltd., London.
3. Ganesh S. Hegde (2015), A Textbook of Industrial Robotics, 2nd edition, University Science Press.
4. K.S. Fu (2010), Robotics, 1st edition, Tata Mc Graw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5431 - FUNDAMENTALS OF IoT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

The course introduces you to advance concepts and design methodologies to design IoT systems and developing IoT applications programming languages and tools optimized for IoT domain. It also exposes participants to communication technologies and legacy protocols as well as newly developed IoT specific application and physical layer protocols. The course covers python languages in great detail with set of packages which makes it obvious choice as a leading IoT language.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5431.1. Identify the basic building blocks of IoT and its characteristics

A5431.2. Choose the application-layer protocols and web services architectures for a seamless integration of various components within an IoT ecosystem

A5431.3. Utilize Python standard libraries for implementing various IoT Applications

A5431.4. Examine the communication between a machine or a device with a remote system

A5431.5. Analyze cloud infrastructure, services, APIs and architectures of commercial and industrial cloud platforms

3. Course Syllabus

INTRODUCTION TO INTERNET OF THINGS: Introduction, Physical Design of IoT, Logical Design of IoT, IoT enabled Technologies, IoT Levels and Templates, IoT Platforms Design Methodology.

INTRODUCTION TO PYTHON: Language features of Python, Data types& data structures, Control of flow, Functions, Modules, Packages, File Handling, Data/Time operations, Classes, Python packages of interest for IoT(JSON,XML)

IoT AND M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, **IoT System Management with NETCONF- YANG**-Need for IoT Systems Management, SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG

IoT PHYSICAL DEVICES AND ENDPOINTS: Introduction to IoT Device, Exemplary Device: Raspberry Pi, Components of Raspberry Pi Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming – Raspberry Pi with Python

I0T PHYSICAL SERVERS AND CLOUD OFFERINGS: Introduction to Cloud Storage models and communication APIs,WAMP – AutoBahn for IoT, Xively Cloud for IoT, Python web application framework-Django, Designing a RESTful web API

4. Books And Materials

Text Book:

1. ArshdeepBahga and Vijay Madisetti: *Internet of Things,A Hands-on Approach*; University Press, 2016.

Reference Book:

1. Getting Started with Raspberry Pi:Matt Richardson & Shawn Wallace,O'Reilly (SPD),2014.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5432 - PRINCIPLES OF ANALOG AND DIGITAL COMMUNICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course is useful to understand the basics of Signals, Systems, Random Variables and Communication. The course presents and integrates the basic concepts for both continuous-time and discrete signals and systems. This course provides a foundation in the theory and applications of random variables stochastic processes and an understanding of the mathematical techniques elating to random processes in the areas of signal processing, detection & estimation theory and communications. it gives the basics of Analog and Digital Communication and also gives the background required for advanced study on the course. This is accomplished by providing overviews of the necessary background in signal, system, probability, and random process theory required for the analog and digital communications. It gives more emphasis on stressing fundamental concepts. The topics in the course, more than enough to students needs.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5432.1. Analyze linear and non - linear modulators and demodulators in time as well as frequency domain.

A5432.2. Design a linear and non linear modulators and demodulators for the analog signals

A5432.3. Outline the basic concepts of digital communications with an insight into practical applications and Differentiate between PCM and DM and identify the applications of these modulation schemes in base band transmission

A5432.4. Estimate a overall digital communication system for the improvement of the system performance.

A5432.5. Analyze the performance of a digital communication system by introducing various spread spectrum modulation techniques.

3. Course Syllabus

UNIT-I: Introduction to communication system, need for modulation, Types of modulation techniques: AM, FM, PM, Generation and detection. Radio Transmitters,Radio Receivers AM,FM Comparison of Radio transmitters and receivers.

UNIT-II: Sources of Noise, Resistor Noise, Shot Noise, Calculation of Noise in a Linear System, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Figure of Merit,Threshold Improvement in Discriminators.

UNIT-III: Analog-to-Digital Conversion: Pulse modulation Techniques, Sampling Process, PAM,PWM and PPM. Time Division Multiplexing, Digital Modulation Techniques: Pulse Code Modulation, Companding, Differential Pulse Code Modulation, Delta Modulation, Noise in Pulse-Code Modulation Systems.

UNIT-IV: Binary Amplitude Shift-Keying, Frequency Shift-Keying, Phase-Shift Keying, Differential Phase-Shift Keying, Quadrature Phase-Shift Keying (QPSK), Comparison of BASK, BFSK and BPSK, Minimum Shift Keying (MSK), Duo binary Encoding.

UNIT- V: Spread Spectrum Modulation: Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division Multiple Access (CDMA), Ranging using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation and Characteristics of PN Sequences, Acquisition (Coarse Synchronization) of a FH Signal, Tracking (Fine Synchronization) of a FH Signal, Acquisition (Coarse Synchronization) of a DS Signal, Tracking of a DS Signal.

4. Books and Materials

Text Book:

1. Principles of Communications By Taub and Schilling

Reference Books:

1. Communication Systems, Simon Haykins (2nd Edition).
2. Analog and Digital Communication Systems by Martin S. Roden, 3rd edition, Prentice Hall, 1994.

OPEN ELECTIVE

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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COURSE STRUCTURE

A5433 - INTRODUCTION TO SIGNAL PROCESSING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Signal Processing is an introductory course essentially attempts to cover classification, representation of signals and analysis in time domain and frequency domain of systems. It is a foundation course to advanced courses like Communication Systems, Image and Speech Processing in their undergraduate program. This course provides coherent and comprehensive coverage of signal processing.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5433.1. Understand mathematical description of signals and representation of systems
A5433.2. Identify the spectrum of continuous-time periodic and non-periodic signals
A5433.3. Apply various transforms to analyze continuous and discrete-time systems
A5433.4. Analyze digital systems using various transform techniques
A5433.5. Design and implement FIR and IIR filters for given specifications

3. Course Syllabus

CLASSIFICATION OF SIGNALS: Continuous time (CT) and Discrete time (DT) signals, elementary signals-Unit, Step, Impulse, ramp signals, singularity functions and operations on signals.
SIGNAL TRANSMISSION THROUGH LTI SYSTEMS: Classification of systems, discrete time LTI systems and continuous time LTI systems, properties of LTI system, Convolution

FOURIER TRANSFORM (FT): Fourier series, convergence of Fourier series, Fourier transform (FT), Fourier transform of standard signals, Hilbert transform and its properties
LAPLACE TRANSFORM (LT): The Laplace transform (LT), The Region of convergence (ROC) for Laplace transforms, Properties of Laplace transforms, some Laplace transform pairs, Inverse Laplace transforms

SAMPLING: Sampling of continuous time signals, sampling theorem, reconstruction of signal from its samples, the effect of under sampling- aliasing, practical aspects of sampling.

Z - TRANSFORMS: The Z - Transform, The Region of Convergence (ROC) for Z - transform and its properties, properties of Z –transform

DISCRETE FOURIER TRANSFORM: Frequency domain representation of discrete time signals & Systems, Discrete Fourier transforms: Frequency domain sampling, Relationship of DFT to other transforms, Properties of DFT

FIR & IIR FILTERS: Design of linear phase FIR Digital Filters using Windows, IIR filter design (Butter worth) by suitable mapping technique, comparison of IIR & FIR filters

4. Books and Materials

Text Books:

1. Oppenheim A. V, Willisky (2009), Signals and Systems, 2nd edition, Prentice Hall of India, India.
2. John G. Proakis, Dimitris G. Manolakis (2007), Digital Signal Processing, Principles, Algorithms, and Applications, Pearson Education / PHI, India.

Reference Books:

1. Anand Kumar, Signals and Systems, PHI Learning Pvt. Ltd.
2. B. P. Lathi (2001), Signals, Systems & Communications, BS Publications, New Delhi**.**
3. M. H. Hayes (2007), Schaums Outlines of Digital Signal Processing, Tata McGraw Hill, India.
4. Dimitris G. Manolakis, Vinay Ingle (2011), Applied Digital Signal Processing, Cambridge University Press, Newyork.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5531 – FUNDAMENTALS OF JAVA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. COURSE DESCRIPTION

Course Overview

This course provides OOP concepts using Java. The course focuses on different aspect of core Java Environment suitable to write efficient, maintainable, and portable code. It also ignites Object Oriented thinking and explores with the evolution of Java and its basics. It provides strong foundation on Inheritance, Packages, and Interfaces and also illustrates Exception Handling and Multithreaded mechanisms. In depth knowledge to implement Collection frameworks. Emphasis on AWT concepts used for GUI applications is given with event handling. The course plays a vital role in developing front-end interface for Mini and Major Projects.

Course Pre/co-requisites

- Python Programming (A5501)
- Data Structures (A5502)

2. COURSE OUTCOMES (COS)

After the completion of the course, the student will be able to:

A5531.1. Understand the principles of Object Oriented Programming to model real world problem.

A5531.2. Use various constructs / concepts to write programs in OOP paradigm.

A5531.3. Analyze the applications for Handling Exceptions and Multithreading in Java runtime environment.

A5531.4. Implement Collection Frameworks to retrieve and process data efficiently.

A5531.5. Build GUI applications using AWT for Interactive applications.

3. COURSE SYLLABUS

Introduction to OOP: Evolution of Java, OOP principles, Java Buzzwords, Implementing Java program, JVM, Data Types, Variables, Type conversions and Casting, Operators, Control statements, Arrays**.**CLASS, METHODS, OBJECTS AND CONSTRUCTORS- Classes, Objects, Methods, Constructors, this keyword, Overloading Methods and Constructors, Argument passing, Exploring String class.

Inheritance, Interfaces and Packages:INHERITANCE: Inheritance Basics, Using super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract classes, final keyword. PACKAGES AND INTERFACES: Defining a Package, Finding Packages and CLASSPATH, Access Protection, Importing Packages, Defining and Implementing interfaces, Extending interfaces.

Exception Handling and Multithreading: EXCEPTION HANDLING-Exception Handling Fundamentals, Exception Types, Using try catch, throw throws and finally keywords, Built-in Exceptions, Creating own exception subclasses. MULTITHREADING- Life cycle of a thread, creating threads, thread priorities, Synchronizing threads, Interthread Communication.

Collections and Event Handling: COLLECTIONS FRAMEWORK-Collection classes- ArrayList, LinkedList, HashSet, and TreeSet. EVENT HANDLING-Delegation Event Model, Event Sources, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter classes.
AWT: AWT Hierarchy, AWT controls – Label, Button, TextField, TextArea, Checkbox, CheckboxGroup List and Choice. Layout Managers: FlowLayout, BorderLayout, GridLayout, and CardLayout. Limitations of AWT.

4. BOOKS AND MATERIALS

Text Book:

1. Herbert Schildt (2011), Java: The Complete Reference, 8th Edition, Tata McGraw-Hill Education, New Delhi.

Reference Books:

1. Michael Ernest (2013), Java SE 7 Programming Essentials, John Wiley & Sons Inc.
2. Y. Daniel Liang (2014), Introduction to Java Programming, Comprehensive Version, 10thEdition, Pearson Education, India.
3. Kathy Sierra, Bert Bates (2014), OCA/OCP Java SE 7 Programmer I & II Study Guide (Exams 1Z0-803 & 1Z0-804), 1st Edition, McGraw-Hill Education Publisher, USA.
4. T. Budd (2010), An Introduction to Object Oriented Programming, 3rd Edition, Pearson Education, India.

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OPEN ELECTIVE

COURSE STRUCTURE

A5532 – FUNDAMENTALS OF DBMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, including database design theory: E-R modeling, data definition and manipulation languages, database security and administration. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control, Recovery and various types of databases like distributed database, and intelligent database, Client/Server.

Course Pre/co-requisites

- Object oriented Programming (A5531)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5532.1. Understand design and implementation of a database for a given problem domain.

A5532.2. Construct Queries in Relational algebra, relational calculus and SQL.

A5532.3. Apply Normalization techniques to reduce data redundancy in data base.

A5532.4. Analyze various transaction control and recovery methods to keep data base consistent

3. Course Syllabus

INTRODUCTION: History of database systems, introduction to database management systems, database system applications, database systems versus file systems, view of data, data models, database languages- DDL & DML commands and examples of basic SQL queries, database users and administrators, transaction management.

SQL: Overview, the form of a basic SQL query, union, intersect and except operators, nested queries, aggregate operators, null values, complex integrity constraints in SQL, cursors, triggers

SCHEMA REFINEMENT AND NORMAL FORMS: Functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, schema refinement in database design, other kinds of dependencies: 4NF, 5NF.

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions, Anomalies due to interleaved execution of transactions, serializability, recoverability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control - lock based protocols, timestamp based protocols, validation based protocols, deadlock handling.

4. Books and Materials

Text Books:

1. Raghurama Krishnan, Johannes Gehrke (2007), Database Management Systems, 3rd Edition, Tata McGraw-Hill, New Delhi, India.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2010), Database System Concepts, 6th Edition, McGraw- Hill, New Delhi, India.

Reference Books:

1. ElmasriNavate (2014), Fundamentals of Database Systems, Pearson Education, India
2. C. J. Date, A. Kannan and S. Swamynathan(2009),*An Introduction to Database Systems,*3rd Edition,Pearson Education, India.

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OPEN ELECTIVE

COURSE STRUCTURE

A5533 – FUNDAMENTALS OF OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Operating Systems is a graduate-level introductory course that teaches the basic concepts in operating systems like abstractions, mechanisms, and their implementations. This course also deals with Process Management & Synchronization, Inter process communication, Memory Management, Virtual Memory, File & Disk Management and Deadlock handling methods.

Course Pre/co-requisites

- Digital Design and Computer Organization (A5505)

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5533.1. Understand the various services provided by the operating system.

A5533.2. Analyze the concepts of Process management and Synchronization in a multi processing system.

A5533.3. Apply the Memory management techniques for efficient usage.

A5533.4. Use File and Disk management schemes for effective storage management.

A5533.5. Demonstrate Deadlock Handling Methods to allocate resources among processes.

3. Course Syllabus

OPERATING SYSTEMS OVERVIEW: Definition, Operating System Types, Operating System operations, Operating system services, System calls and System Programs, Distributed Systems, Special Purpose Systems.

PROCESS MANAGEMENT: Process concepts- Process, Process State Diagram, PCB and Operations on processes, IPC- Pipes, Message Passing and Shared Memory. Process Scheduling- Scheduling Criteria, Scheduler Types and Scheduling Algorithms. PROCESS SYNCHRONIZATION-Concept of Synchronization, Critical section problem, Peterson's solution, Semaphores, Classic problems of Synchronization-The Bounded Buffer Problem, The Readers –Writers Problem, Dining - Philosophers Problem.

MEMORY MANAGEMENT: Introduction to Memory Management, Swapping, Contiguous Memory Allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, Page-replacement algorithms, allocation of frames, thrashing.

FILE SYSTEM AND MASS STORAGE STRUCTURE: Concept of a file – File Attributes, File Types, Access Methods, Directory Structure, File System structure, File System Implementation, directory implementation, File Allocation methods, and Free-Space management. MASS-STORAGE STRUCTURE: Introduction to Magnetic Disks, Disk Structures, Disk Scheduling, Swap Space Management, RAID Structure- Levels and Purpose.

DEADLOCKS: System Model, Deadlock Characterization, Deadlock Prevention, Avoidance, Detection and recovery from deadlock.

4. Books and Materials

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2009), *Operating System Concepts*, 8th Edition, Wiley India Private Limited, New Delhi.
2. Dhananjay M. Dhamdhere (2009), Operating Systems, A Concept-Based Approach, 3rd Edition, McGraw Hill, New Delhi.

Reference Books:

1. William Stallings (2006), *Operating Systems, Internals and Design Principles*, 5th Edition, Pearson Education, India.
2. Achyuth S Godbole, Atul Kahate (2017),Operating Systems, 3rd Edition, McGraw Hill, New Delhi.

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OPEN ELECTIVE

COURSE STRUCTURE

A5631 - PRINCIPLES OF SOFTWARE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course acts as a foundation in the field of software engineering and is aimed at helping students develop an understanding of how software systems are developed from scratch, by guiding them through the development process, adopting the fundamental principles of system development. The course will orient the students to the different software process models, software requirements engineering process, systems analysis and design as a problem-solving activity, with focus on quality.

Course Pre/co-requisites:

This course has no specific pre/co-requisitess.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5631.1. Understand metrics in the process and project domains.

A5631.2. Identify the right process model to develop the right software system.

A5631.3. Gather requirements and analyze them scientifically in order to develop the right product, besides authoring software requirements documents.

A5631.4. Apply testing strategies for application being developed.

A5631.5. Propose design as per functional and non-functional requirements using design principles.

3. Course Syllabus

INTRODUCTION TO SOFTWARE ENGINEERING: The Evolving nature of software engineering, Changing nature of software engineering, Software engineering Layers, The Software Processes, Software Myths.

PROCESS MODELS:A Generic Process Model, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Spiral Model, the Unified Process, Personal and Team Process Models, the Capability Maturity Model Integration (CMMI).

REQUIREMENTS ENGINEERING: Functional and Non-Functional Requirements, The Software requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management.

SYSTEM MODELING: Context Models, Interaction Models, Structural Models, Behavioural Model, Model-Driven Engineering.

DESIGN CONCEPTS: The Design Process, Design Concepts, The Design Models, Architectural Design: Software Architecture, Architectural Genres, Architectural Styles.

DESIGN AND IMPLEMENTATION: TheObjectOriented Design with UML, Design Patterns, Implementation Issues, Open Source Development.

USER INTERFACE DESIGN: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

SOFTWARE TESTING STRATEGIES: A Strategic approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing.

PRODUCT METRICS:A Framework for Product Metrics, Metrics for the Requirements Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing.

PROCESS AND PROJECT METRICS: Metrics in the Process and Project Domains, Software Measurements, Metrics for Software Quality.

RISK MANAGEMENT: Risk versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinements, Risk Mitigation Monitoring and Management (RMMM), The RMMM Plan.

QUALITY MANAGEMENT: Quality Concepts, Software Quality, Software Quality Dilemma, Achieving Software Quality. Review Techniques, Reviews: A Formal spectrum, Informal Reviews, Formal Technical Reviews.

SOFTWARE QUALITY ASSURANCE: Background Issues, Elements of Software Quality Assurance, Tasks, Goals and Metrics, Software Reliability, the ISO 9000 Quality Standards.

4. Books and Materials

Text Books:

1. Roger S. Pressman (2011), Software Engineering, A Practitioner's approach, 7th edition, McGraw Hill International Edition, New Delhi.
2. Sommerville (2001), Software Engineering, 9th edition, Pearson education, India.

Reference Books:

1. K. K. Agarval, Yogesh Singh (2007), Software Engineering, 3rd edition, New Age International Publishers, India.
2. Lames F. Peters, WitoldPedrycz(2000), Software Engineering an Engineering approach, John Wiely& Sons, New Delhi, India.
3. Shely Cashman Rosenblatt (2006), Systems Analysis and Design, 6th edition, Thomson Publications, India.

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OPEN ELECTIVE

COURSE STRUCTURE

A5632 - E-COMMERCE TRENDS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

The tremendous growth of the Internet and World Wide Web is having great impact on businesses, governments and individuals throughout the world. In this course, we will attempt to understand the phenomena, technological, economic and social, behind these rapid changes, and how organizations successfully conduct Internet-based activities. We will also study some of the technology of the Internet. This course provides an overview of e-commerce from both technological and managerial perspectives. It introduces e-commerce frameworks, and technological foundations; and examines basic concepts such as strategic formulation for e-commerce enterprises, management of their capital structures and public policy. It is particularly important that the student place a great deal of emphasis in understanding the different E-Commerce system design principles.

Course Pre/co-requisites:

This course has no specific pre/co-requisitess.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5632.1. Illustrate the components and roles of the E-Commerce environment.

A5632.2. Understand legal and ethical issues related to E-Commerce and web marketing approaches.

A5632.3. Identify how to sell products and services on the web as well as to meet the needs of web site Visitors.

A5632.4. Analyze e-commerce payment systems.

3. Course Syllabus

INTRODUCTION TO E-BUSINESS AND E-COMMERCE: What is the difference between e-commerce and e-business, Anatomy of E-Commerce applications, E-Business risks and barriers to business adoption, Management responses to E-Commerce and E-Business, Electronic Commerce-Frame work.

E-COMMERCE FUNDAMENTALS- Location of trading in the marketplace, Business models for ecommerce, Focus on auction business models, Focus on Internet start-up companies.

E-BUSINESS INFRASTRUCTURE- Introduction, Internet technology, Web technology, Internet-access software applications, Managing e-business infrastructure, Focus on web services, SaaS and service oriented Architecture (SOA), Focus on mobile commerce.
E-ENVIRONMENT- Social and legal factors, Environmental and green issues related to Internet Usage, Focus on e-commerce and globalization, Political factors.

E-BUSINESS STRATEGY- What is e-business strategy, Strategic analysis, Strategic objectives, Strategy definition, Strategy implementation, Focus on information systems strategy and e-business strategy.
E-SECURITY - Securing the Business on Internet- Security Policy, Procedures and Practices, Transaction Security, Cryptology, Digital Signatures, Security Protocols for Web Commerce.
SUPPLY CHAIN MANAGEMENT- What is supply chain management? Focus on the value chain, Using e- business to restructure the supply chain, Supply chain management implementation

E-PROCUREMENT- What is e-procurement, Drivers of e-procurement, Focus on estimating eprocurement cost, implementing e-procurement.
E-MARKETING- What is e-marketing? E-marketing planning, Situation analysis, Objective setting, Strategy, Tactics, Focus on online branding.

CUSTOMER RELATIONSHIP MANAGEMENT- What is e-CRM and its applications, online buying process, focus on marketing communications for customer Acquisition, Customer retention management and Technology solutions for CRM.

4. Books and Materials

Text Book:

1. E-Business and E-Commerce Management, strategy, Implementation and practice, Dave Chaffey, Fourth Edition, Prentice Hall

Reference Books:

1. Frontiers of electronic commerce – Kalakata, Whinston,Pearson.
2. Bharat Bhaskar: Electronic Commerce,Tata Mc-Graw-Hill, New Delhi, 2003
3. E-Commerce — Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.
4. Electronic Commerce Gary P.Schneider — Thomson
5. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth - 215 - Chang, JohnWiley.
6. E-Commerce, S.Jaiswal –Galgotia.
7. E-Commerce, Efrain Turbon, Jae Lee, David King, H.MichaelChang.

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OPEN ELECTIVE

COURSE STRUCTURE

A5633 - FUNDAMENTAL OF CYBER SECURITY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course drawing upon a wealth of experience from academia, industry, and government service, Cyber Security details and dissects, in current organizational cyber security policy issues on a global scale—taking great care to educate students on the history and current approaches to the security of cyberspace. It includes thorough descriptions—as well as the pros and cons—of an excess of issues, and document policy alternatives for the sake of clarity with respect to policy alone. It also delves into organizational implementation issues and equips students with descriptions of the positive and negative impact of specific policy choices.

Course Pre/co-requisites

This course has no specific pre/co-requisitess.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5633.1. Understand how to protect them self and ultimately society from cyber-attacks by studying various case studies.

A5633.2. Summarize different government cyber laws and cyber-forensics techniques.

A5633.3. Apply different techniques to classify different types of cybercrimes

A5633.4. Analyze cyber-attacks on different online web applications

A5633.5. Apply various investigating methods on the new cases using previous case studies

3. Course Syllabus

INTRODUCTION: Cyber Security, Cyber Security policy, Domain of Cyber Security Policy, Laws and Regulations, Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus Policy,

CYBER SECURITY EVOLUTION: Productivity, Internet, E-commerce, Counter Measures and Challenges.

CYBER SECURITY OBJECTIVES AND GUIDANCE: Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices, Security Policy Objectives.

GUIDANCE FOR DECISION MAKERS: Tone at the Top, Policy as a Project, Cyber Security Management, Arriving at Goals, Cyber Security Documentation.

THE CATALOG APPROACH: Catalog Format, Cyber Security Policy Taxonomy.

CYBER SECURITY POLICY CATALOG: Cyber Governance Issues, Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging, Cyber User Issues, Malvertising, Impersonation, Appropriate Use, Cyber Crime, Geolocation, Privacy, Cyber Conflict Issues, Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

CYBER MANGEMENT ISSUES: Fiduciary Responsibility, Risk Management, Professional Certification, Supply Chain, Security Principles, Research and Development, Cyber Infrastructure Issue, Banking and finance, Health care, Industrial Control systems.

CASE STUDY: A Government's Approach to Cyber Security Policy

4. Books and Materials

Text Book:

1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss "Cyber Security Policy Guidebook" John Wiley & Sons 2012.

Reference Books:

1. Richard A. Clarke, Robert Knake"Cyberwar: The Next Threat to National Security & What to Do About It" Ecco 2010.
2. Dan Shoemaker Cyber security The Essential Body of Knowledge, 1st ed. Cengage Learning 2011
3. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
4. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and SunitBelpure, Publication Wiley.
5. Rick Howard "Cyber Security Essentials" Auerbach Publications 2011

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OPEN ELECTIVE

COURSE STRUCTURE

A5031 - NUMERICAL TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Solution of Algebraic, Transcendental Equations and System of Linear Equations, Interpolation, Numerical Differentiation and Integration, Curve fitting, Numerical solutions of Ordinary and Partial differential equations. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A5021.1. Apply appropriate Numerical method to find a root of an equation.

A5021.2. Make use of interpolation to find approximate values of the function at intermediate points.

A5021.3. Evaluate definite integral using appropriate Numerical methods.

A5021.4. Construct curve of best fit for the bivariate data using method of least squares.

A5021.5. Determine approximate solution of ordinary and partial differential equations.

3. Course Syllabus

Solution of Algebraic, Transcendental Equations and System of Linear Equations: Bisection method, Regula-Falsi method, Iteration method, Newton-Raphson method. Iterative methods of solution of system of equations: Jacobi's iteration method, Gauss-Seidel iteration method.

Interpolation: Finite differences: Forward, Backward and Central differences, Other difference operators and relations between them, Differences of a polynomial, Missing terms, Newton's interpolation formulae, Central difference interpolation formulae: Gauss's forward and backward interpolation formulae, Interpolation with unequal intervals: Lagrange's interpolation formula.

Numerical Differentiation, Integration and Curve fitting: Numerical differentiation: Derivatives using Newton's interpolation formulae. Numerical integration: Newton-cotes quadrature formula,

Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule. Curve Fitting: Method of least squares**,** Fitting a straight line, Second degree parabola and Non-linear curves of the form $y = ae^{bx}$, $y = ab^{x}$, $y = ax^{b}$ by the method of least squares.

Numerical Solution of Ordinary Differential Equations of First Order: Taylor's series method, Picard's method, Euler's and modified Euler's Method, Runge-Kutta method of fourth order, Predictor and Corrector methods: Milne's method, Adams-Bashforth-Moulton method.

Numerical Solution of Partial Differential Equations: Finite difference approximations to partial derivatives, Elliptic equations: Solution of Laplace equation by Liebmann's iteration process, Parabolic equations: Solution of one dimensional Heat equation by Schmidt explicit method and Crank-Nicolson implicit method.

4. Books And Materials

Text Book:

1. M.K. Jain, S.R.K Iyengar and R.K.Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Edition, New Age International Publishers, New Delhi, 2007.

Reference Books:

1. B.S.Grewal, *Higher Engineering Mathematics*, 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. B.V. Ramana, *Higher Engineering Mathematics*, 23rd Reprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.

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OPEN ELECTIVE

COURSE STRUCTURE

A5032 - MATHEMATICAL PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

The course deals with more advanced engineering mathematical topics which provide students to impart knowledge about various tools in Mathematical Programming to apply and solve real life problems in Engineering. The topics covered are Linear programming problem, Formulation and Graphical solution of Linear programming problem, Simplex method, Big -M method, Two-phase simplex method, Dual simplex method, Degeneracy in simplex and unbound solutions, Transportation problem, Assignment model, Replacement models and Sequencing models. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Pre/co-requisites

This course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to:

A5022.1. Identify LPP and express in mathematical form to solve by graphical or simplex method.
A5022.2. Apply artificial variable techniques to obtain the optimal solution of an LPP.
A5022.3. Interpret various methods under transportation model to get optimal results.
A5022.4. Solve travelling salesmen problem using Hungarian method.
A5022.5. Develop various replacement and sequencing models to arrive at an optimal decision.

3. Course Syllabus

Introduction to Operations Research: Basic definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation and Graphical solution of Linear Programming Problem. Simplex method.

Artificial Variables Techniques: Big -M method, Two-phase simplex method, Duality in simplex method, Dual simplex method, degeneracy in simplex and unbound solutions.

Transportation problem: Formulation, solution, unbalanced Transportation problem. Finding initial basic feasible solutions, North-West corner rule, lowest cost entry method and Vogel's approximation method. Optimality test- MODI method, degeneracy in transportation, restricted transportation problem, conditional transportation problem.

Assignment Model: Formulation, Hungarian method for optimal solution, solving unbalanced problem, restricted assignment, conditional assignment problems, crew assignment problems, Travelling salesman problem, Transportation problem as assignment problem.

Replacement Models and Sequencing Models: Replacement Models**:** Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value, Replacement of items that fail suddenly, individual replacement policy, group replacement policy.

Sequencing Models:Solution of Sequencing Problem, Processing n Jobs through two machines, Processing n Jobs through three machines, Processing two Jobs through m machines, Processing n Jobs through m Machines.

4. Books and Materials

Text Book:

1. S. D. Sharma, *Operation Research*, Tata McGraw Hill, New Delhi, 2009.

Reference Books:

1. J. K. Sharma, *Operations Research – Theory and Applications*, 5th Edition, Macmillan India Ltd, India, 2007.
2. R. Panneerselvam, *Operations Research*, 2nd Edition, Prentice Hall of India, India, 2008.

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OPEN ELECTIVE

COURSE STRUCTURE

A5033 - SPECIAL FUNCTIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics, required to analyzethe problems in engineering. Topics to be covered in this course include: series solutions to Differential Equations, Bessel functions, Legendre polynomials, Hermite polynomials and Z - transforms. The mathematical skills derived from this course provides necessary base to analytical and design concepts occurring in the program.

Course Pre/co-requisites

This course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

After the completion of the course, the student will be able to

A5033.1. Determine series solutions of ordinary differential equations about ordinary and regular singular points.

A5033.2. Solve problems in cylindrical and spherical coordinate systems using Bessel functions.

A5033.3. Relate algebraic polynomials with Legendre and Hermite polynomials.

A5033.4. Apply Z - Transforms to solve difference equations.

3. Course Syllabus

Series Solutions of Second Order Ordinary Differential Equations: Classification of Singularities, series solutions to Differential Equations around zero, Frobenius Method around zero.

Bessel Functions: Bessel's Differential equation, Recurrence formulae for $J_n(x)$, Generating function for $J_n(x)$, Orthogonality of Bessel functions.

Legendre Functions: Legendre's Differential equation, Rodrigue's formula, Legendre Polynomials, Generating function for $P_n(x)$, Recurrence formulae for $P_n(x)$, Orthogonality of Legendre functions.

Hermite Functions: Hermite's equation, Generating function of Hermite Polynomials, Orthogonal Property, Recurrence formulae for $H_n(x)$.

Z-Transforms: Definition, Some standard Z-transforms, Damping rule, Shifting rule, Multiplication by n, Initial and final value theorems. Inverse Z-transforms using partial fractions, Convolution theorem, Solution of difference equations by Z - transforms.

4. Books and Materials

Text Books:

1. B.S. Grewal, *Higher Engineering Mathematics*, 43rdEdition, Khanna Publishers, New Delhi, 2014.

Reference Books:

1. *M.D.Raisinghania, Ordinary and Partial Differential Equations, 6th Edition,* S.Chand& Co. Ltd. New Delhi,
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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OPEN ELECTIVE

COURSE STRUCTURE

A5034– ENTREPRENEURSHIP DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

This course aims to provide students with an understanding of the nature of enterprise and entrepreneurship and introduces the role of the entrepreneur, will inculcate the knowledge of government supporting programs like financial assistance by public sector banks. Apart from this, students learn about the women entrepreneurs and success stories of women entrepreneurs, gain the knowledge of project management and profitability appraisal, focus on importance of training the new entrepreneurs as well as existing entrepreneurs.

Course Pre/co-requisites

This course has no specific pre/co-requisitess.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A5034.1. Understand the role, characteristics, qualities and functions of entrepreneur and use this knowledge to become future entrepreneurs.

A5034.2. Interpret various Institutional supports for setting up a business enterprise and apply this knowledge while approaching these institutions for financial support.

A5034.3. Illustrate role, importance and functions of women entrepreneur and use this knowledge to become future women entrepreneurs.

A5034.4. Infer the concept of Project Management and steps in Project development and analyze while taking future project assignments.

A5034.5. Indicate training programs and different training institutions to impart training and apply this knowledge to train existing and future entrepreneurs.

3. Course Syllabus

ENTREPRENEURSHIP: Importance and role of entrepreneurship, Qualities of an entrepreneur, Functions of entrepreneur, Theories of entrepreneurship, Stimulants of entrepreneurship and Barriers to entrepreneurship, Ethics and Social Responsibility, Role of entrepreneur in economic development

INSTITUTIONAL SUPPORT: Role of Government: Role of IDBI, SIDBI, SIDO, NIESBUD, DIC, Entrepreneurship Development Institute, T-Hub (Telangana Hub).

WOMEN ENTREPRENEURSHIP: Role & Importance, Functions of women entrepreneur, Profile of Indian Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India and in Foreign Countries.

PROJECT MANAGEMENT: Concept of project and classification of project, Project life cycle identification, Project formulation, Project report , Project evaluation- profitability appraisal, social cost benefit analysis, feasibility analysis, financial analysis and project financing, Project implementation, Project completion.

ENTREPRENEUR TRAINING: Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training, Feedback and Performance of Trainees, NSIC, Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Telangana Academy for Skill and Knowledge (TASK).

4. Books and Materials

Text Book(s)

1. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), Entrepreneurship, Tata Mc Graw Hill, New Delhi

Reference Book(s)

1. Bholanath Datta (2009), Entrepreneurship, Excel publications, India.
2. David H Holt (2010), Entrepreneurship, Prentice hall of India, New Delhi, India

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OPEN ELECTIVE

COURSE STRUCTURE

A5035– HUMAN RESOURCE MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

2. Course Description

Course Overview

The Students are able to understand the nature and significance of human resource management in contemporary world, the challenges that HR managers face in performing the HR functions. The Course provides the various Human Resource Development functions that an organization deals with individual employees for employee and Organizational growth. It also addresses the grievances of the employees and settlement of disputes for Industrial relations.

Course Pre/co-requisites

This course has no specific pre/co-requisitess.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A5035.1. Identify functions of Human Resource Management

A5035.2. Illustrate the process of Recruitment and selection

A5035.3. Analysis the needs and methods for training

A5035.4. Outline the functional relationship of performance and compensation

A5035.5. Illustrates the importance of Industrial relations through collective bargaining, trade unions and industrial settlement machinery.

3. Course Syllabus

INTRODUCTION HUMAN RESOURCE MANAGEMENT: Introduction and significance of HRM, Scope, functions of HRM, changing environment of HRM and Challenges. Human Resource Planning, Objectives, Factors influencing Human Resource planning, HR Planning Process.

JOB ANALYSIS AND RECRUITMENT: Job analysis- Job description, Job specification, Sources of Recruitment; Selection, process of selection and techniques, Retention of Employees.

HUMAN RESOURCES DEVELOPMENT: Training Vs Development, Need, Process of training, Methods of training, Training Evaluation, Career planning, Performance Management System, Methods of Appraisal, Common Errors.

COMPENSATION MANAGEMENT: Concepts and components of wages, Factors influencing wage fixation, Job evaluation, Methods of payment, Incentives and Fringe benefits.

INDUSTRIAL RELATIONS: Components of Industrial Relation, Trade Unions, functions of Trade Union, Employee Participation, Collective Bargaining, Grievance Redressal, Industrial Dispute Settlement machinery.

4. Books and Materials

Text Book(s)

1. Biswajeet Pattnayak (2009), Human Resource Management, Prentice hall of India, New Delhi, India.
2. R. Wayne Mondy and Robert M. Noe (2009), Human Resource Management, Pearson, India.

Reference Book(s)

1. Aswathappa. K. (2007), Human Resources and Personnel Management, Tata MC Graw Hill, New Delhi, India.
2. Monappa. A, Saiyadain. M. (1979), Personnel Management, Tata Mc Graw Hill, New Delhi, India.
3. C. B. Mamoria (2003), Personnel Management, Himalaya Publishing House, India.

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OPEN ELECTIVE

COURSE STRUCTURE

A5036– LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

3. Course Description

Course Overview

This course addresses the concepts and techniques of Logistics and Supply chain management. It covers Customer services, Bench marking process, Sourcing issues. Apart from Network design and Co-ordination in supply chain, it discusses role of Information Technology and Global logistics & Global supply chain issues.

Course Pre/co-requisites

This course has no specific pre/co-requisitess.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A5036.1. Explain the concepts of Logistics & Supply chain management.

A5036.2. Analyze the role of Supply chain drivers & Customer services of supply chain.

A5036.3. Examine the Benchmarking process and role of Sourcing in supply chain.

A5036.4. Analyze Network design in supply chain along with Coordination in supply chain.

A5036.5. Examine the role of IT in supply chain as well as Global logistics & Global supply chain.

3. Course Syllabus

Introduction to Supply Chain Management: Concept, Objectives, Scope and Functions of Supply Chain; Process view of a Supply Chain. Supply Chain Drivers - Facilities, Inventory, Transportation, Information, Sourcing, Pricing; Obstacles to achieve Strategic fit, Role of Aggregate Planning in Supply Chain, Methods and Managing Supply and Demand.

Logistics Management: Introduction, Difference between Logistics and Supply Chain; Inbound, Inter and Outbound Logistics; Integrated Logistics Management; 3PL, 4PL, Intermodal and Reverse Logistics. Supply Chain Customer Service - The Marketing and Logistics interface, Customer Service and Customer Retention, Service-Driven Logistics System, Setting customer Service Priorities and Service Standards.

Bench marking: Objectives, Bench marking Cycle, Process and types, Setting Bench marking Priorities. Sourcing in supply chain: Role of Sourcing in Supply Chain Management, Supplier Scoring and Assessment; Supplier Selection and Controlling; The Procurement process, Sourcing Planning and Analysis; Global Sourcing.

Network design in Supply Chain: The role of distribution in the Supply Chain Management, factors influencing distribution network design; Transportation Fundamentals: The role of Transportation in Supply Chain, Factors influencing Transportation Decisions, Modes of transportation, Transportation documentation. Coordination in Supply Chain: Introduction, Lack of Supply Chain Coordination and the Bullwhip effect, Impact of Lack of Coordination, Obstacles to Coordination in Supply Chain, Managerial levers to achieve Coordination.

IT in Supply Chain: The role of IT in the Supply Chain, The Supply Chain IT framework; CRM, Internal SCM, SRM; The future of IT in Supply Chain, Supply Chain IT in Practice. Global Logistics and Global Supply Chain: Logistics in Global Economy, Change in Global Logistics, Global Supply Chain business process; Global Strategy; Global Purchasing, Global SCM.

4. Books and Materials

Text Book:

1. K.Shridhara bhat, “Logistics and Supply Chain management”, Himalaya Publishers, New Delhi, 2009.

Reference BookS:

1. Sunil Chopra and Peter Meindl, “ Supply Chain Management: Strategy, Planning & Operations”, Pearson Education, New Delhi, 2004.
2. Donald J Bowerfox and David J Closs, “ Logistics Management: The integrated Supply Chain Process”, TMH, 2003.
3. D.K.Agarwal, “Logistics and Supply Chain management”, Mc millan Publishers, 2011.
4. B.Rajasekhar, Acharyulu, “Logistics and Supply Chain management”, Excel Books, New Delhi, 2009.