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

ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

CURRICULUM 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

PROGRAM CURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATION: 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
A5004	Applied Chemistry	BS	3	0	2	4	30	70	100
A5501	Python Programming	ES	1	0	4	3	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		**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
A5003	Applied Physics	BS	3	0	2	4	30	70	100
A5005	Communicative English	HS	2	0	2	3	30	70	100
A5502	Data Structures	ES	3	0	2	4	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		**12**	**1**	**14**	**20**	**180**	**420**	**600**

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PROGRAM CURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATION: VCE-R19

II YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A5009	Partial Differential Equations and Complex Variables	BS	3	1	0	4	30	70	100
A5202	Network Theory-I	PC	3	0	2	4	30	70	100
A5402	Electronic Devices and Circuit Analysis	PC	3	0	2	4	30	70	100
A5203	Electromagnetic Field Theory	PC	4	0	0	4	30	70	100
A5204	Electrical Machines – I	PC	3	0	2	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	**19**	**01**	**06**	**21**	**180**	**420**	**600**

II YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A5015	Managerial Economics and Financial Analysis	HS	3	0	0	3	30	70	100
A5206	Power Systems – I	PC	4	0	0	4	30	70	100
A5207	Electrical Machines – II	PC	4	0	2	5	30	70	100
A5208	Network Theory-II	PC	3	0	2	4	30	70	100
A5209	Control Systems	PC	3	0	2	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	**20**	**0**	**06**	**21**	**180**	**420**	**600**

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PROGRAM CURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATION: VCE-R19

III YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A5210	Power Systems-II	PC	3	0	2	4	30	70	100
A5211	Power Electronics	PC	3	1	2	5	30	70	100
A5212	Electrical Measurements and Instrumentation	PC	3	0	2	4	30	70	100
A5416	Switching Theory and Logic Design	PC	3	0	0	3	30	70	100
	Professional Elective – I	PE	3	0	0	3	30	70	100
A5016	Engineering Design Thinking	ES	0	0	2	1	30	70	100
A5213	Internship – I	PW	0	0	4	2	100	0	100
A5018	Essence of Indian Traditional Knowledge	MC	2	0	0	0	-	100*	100*
		TOTAL	**17**	**01**	**12**	**22**	**280**	**420**	**700**

III YEAR II SEMESTER

Code	Course Title	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A5417	Integrated Electronic Circuits	ES	3	0	2	4	30	70	100
A5418	Micro Processors and Micro Controllers	PC	2	1	2	4	30	70	100
A5214	Power system Analysis and Protection	PC	3	1	2	5	30	70	100
	Professional Elective – II	PE	3	0	0	3	30	70	100
	Open Elective – I	OE	3	0	0	3	30	70	100
A5017	Product Realization	ES	0	0	2	1	30	70	100
A5215	Mini Project	PW	0	0	4	2	100	0	100
A5019	Indian Constitution	MC	2	0	0	0	-	100*	100*
		TOTAL	**16**	**02**	**12**	**22**	**280**	**420**	**700**

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

PROGRAM CURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS 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
A5216	Power Semiconductor Drives	PC	3	0	2	4	30	70	100
A5217	Power System operation and Control	PC	3	0	0	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
A5219	Internship – II	PW	0	0	4	2	100	-	100
A5218	Project Work Phase – I	PW	0	0	8	4	100	-	100
TOTAL			**12**	**0**	**14**	**19**	**320**	**280**	**600**

IV YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		Internal	External	Total
A5020	Management Science	HS	3	0	0	3	30	70	100
	Professional Elective – IV	PE	3	0	0	3	30	70	100
	Open Elective – III	OE	3	0	0	3	30	70	100
A5220	Project Work Phase – II	PW	0	0	16	8	100	100	200
TOTAL			**9**	**0**	**16**	**17**	**190**	**310**	**500**

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B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

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Professional Elective – I		Professional Elective - II	
A5251	Renewable Energy Sources	A5255	Power System Dynamics and Stability
A5252	Special Electrical Machines	A5256	Power Switching Converters
A5253	Advanced Control Systems	A5257	Neural Networks and Fuzzy Logics
A5254	Machine Modelling Analysis	A5258	Electric Vehicles
Professional Elective – III		**Professional Elective - IV**	
A5259	High Voltage Engineering	A5263	Utilization of Electrical Energy
A5260	Power Quality	A5264	Extra High Voltage AC Transmission
A5261	High Voltage DC Transmission & FACTS	A5265	Digital Control Systems
A5262	Distributed Generation and Micro-grids	A5266	Smart Grid

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

I B.TECH I SEM

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 $Q(x) = e^{ax}$, $\sin(ax+b)$ 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH I SEM

COURSE STRUCTURE

A5004 - APPLIED CHEMISTRY

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. Stereo isomers: 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. 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH I SEM

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:

1. 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)

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH I SEM

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

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:

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, 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: Self and mutual inductances, 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: Introduction to three phase supply, 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:

1. Verification of Ohm's Law.
2. Verification of Thevenin's and Norton's theorems.
3. Verification of superposition theorem.
4. Determination of Z and Y parameters.
5. Determination of h parameters.
6. Verification of KVL and KCL.
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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH I SEM

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
0	0	4	0	0	56	2	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

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:

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 household 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. Theodolite, 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. NI Multisim Software

5. Books and Materials

Text Books:

1. B.C.Punmia,AshokKJain,ArunKJain,SurveyingVol.I,LaxmiPublications,2016.
2. B. L. Juneja, "*Workshop Practice*", 1st Edition, Cengage Learning India Private Limited, NewDelhi,2015.
3. P. Kannaiah and K.L. Narayana, *Workshop Manual*, 2nd Edition 2009, SCITECH Publications Pvt Ltd.
4. PaulScherzandSimonMonk,*"PracticalElectronicsforInventors"*,McGrawHill,4thEdition.

Reference Books:

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

I B.TECH I SEM

COURSE STRUCTURE

A5007-ENGINEERING EXPLORATION

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

This course has no prerequisite or corequisite

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 successful 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

Practice:

- 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 face to face 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 plat form-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. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, Exploring Engineering : An Introduction to Engineering and Design, Academic Press, 3rd edition, 2012.
2. Byron Francis, Arduino : The Complete Beginner's Guide, 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-Hill Education, 2016.
3. W. Richard Bowen, *Engineering Ethics – Outline of an aspirational approach*, Springer London.

SYLLABI FOR I YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH II SEM

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/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:

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. Books and Materials

Text Book(s)

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

Reference Book(s)

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

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH II SEM

COURSE STRUCTURE

A5003-APPLIED PHYSICS

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/co requisites

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 Book:

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH II SEM

COURSE STRUCTURE

A5005-COMMUNICATIVE ENGLISH

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

5. 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/corequisites

This course has no specific prerequisite and co requisite.

6. Course Outcomes (COs)

A5005.1. Build competence in grammar and vocabulary

A5005.2. Develop competence in vocabulary to enable effective written and spoken and listening comprehension.

A5005.3. Develop effective academic reading skills

A5005.4. Identify learner problems in written communication to build the language 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 - 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.

	PRACTICE
S. No	**Title of the Experiment**
1	**CALL:** Introduction to Phonetics - Speech Sounds – Vowels and Consonants **ICS:** Ice-Breaking activity and JAM session.
2	**Module – 2:** **CALL:** Past Tense Marker and Plural Marker – Syllable Structure – Consonant Clusters - Minimal
3	**Module – 3:** **ICS:** Situational Dialogues – Role-Play – Expressions in Various Situations: Greetings: Self-introduction and Introducing others – Apologies – Requests – Complaints– Congratulating – Expressing sympathy/ condolences.
4	**Module – 4:** **CALL:** Basic Rules of Word Accent – Stress Shift – Weak Forms and Strong Forms
5	**Module – 5:** **ICS:** Asking for and Giving Directions – Giving Instructions – Seeking Clarifications – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions
6	**Module – 6:** **CALL:** Neutralization of Mother Tongue Influence-Common Indian Variants in Pronunciation – Differences between British and American pronunciation
7	**Module – 7:** **CALL:** Intonation Patterns-Types of Tones - Sentence Stress

	PRACTICE
S. No	**Title of the Experiment**
8	**Module – 8:** **ICS:** Social and Professional Etiquette - Telephone Etiquette
9	**Module – 9:** **ICS:** Oral Presentation Skills (short presentations) - Making a Presentation-Prepared – Extempore
10	**Module – 10:** **ICS:** Listening-Types of Listening-Steps to effective Listening –Business Listening Comprehension exercises

4. Books and Materials

Text Book(s)

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 Book(s)

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH II SEM

COURSE STRUCTURE

A5502 – DATA STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	2	42	28	0	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/corequisites

A5501- Python Programming

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, data types, operators, type conversion, formatted input/out functions, Control statements.

ARRAYS, FUNCTIONS, STRUCTURES AND POINTERS: 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, TREES AND GRAPHS: Introduction, Singly Linked List: Representation of a Singly Linked List, Operations on a Singly Linked List and 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 TECHNIQUES: linear search, binary search, bubble sort, selection sort, insertion sort, merge sort.

Practice

Week-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 C program for Swapping of two numbers using a third variable.

Week-2: a) Write 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 with string functions.

Week-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.

Week-4: a) Write a C program to Read an array of integers whose size will be specified interactively at rum time
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, rollNo and grade of a student.

Week-5: a) Implement stack operations using arrays.
b) Implementing towers of Hanoi.

Week-6: a) Converting infix expression to postfix expression
b) Evaluate the postfix expression

Week-7: a) Implement Queue using arrays

b) Implement Circular Queue using arrays

Week-8: Implement single linked list.

Week-9: Implement double linked list.

Week-10: Implement Traversals on Binary Tree using linked list.

Week-11: a)Implement Linear Search
b) Implement Binary search

Week-12: a) Implement Bubble sort
b) Implement Selection sort
c) Implement Insertion sort

4. Laboratory Equipment/Software/Tools Required

1. A Computer System with Linux/Ubuntu Operating System.
2. C- Compiler

5. Books and Materials

Text Book:

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

Reference Books:

1. Samanta Debasis (2012), Classic Data Structures, 2nd Edition, Prentice Hall of India.
2. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), Fundamentals of Data Structure in C,2nd Edition, University Press, India.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH II SEM

COURSE STRUCTURE

A5301 – ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

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 and their relationships based on certain basic principles and standard conventions. It can be regarded as a powerful tool to convey 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 is common for all disciplines where they don't undergo these courses except CE and ME 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:

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 Views to Orthographic Views and Vice-versa.

Practice:

1. Introduction to engineering drawing: Introduction to engineering drawing: Introduction - Principles of Engineering Graphics and their significance- Usage of Drawing instruments.
2. Lettering, dimensions- Geometrical Constructions (Construction of different Polygons):Lettering and dimensions- Geometrical Constructions (Construction of different Polygons).
3. Conic section: Construction of Ellipse – definition -General Method- Construction of Parabola – definition -General Method- Construction of Hyperbola –definition -General Methods.
4. Projection of points: Principles of Orthographic Projections – Introduction- Conventions – First and Third Angle projections- Projection of Points.
5. Projection of Lines: Parallel, Perpendicular to one of the reference plane inclined to one plane and inclined to both the planes.
6. Projection of planes: Projection of Regular Planes - Plane parallel, perpendicular to one of the reference plane- Projection of Regular Planes - inclined to one reference plane.
7. Projection of planes: Projection of Regular Planes - inclined to both reference planes.
8. Projections of regular Solids: Projections of regular Solids: Introduction -parallel to one of the plane.
9. Projections of regular Solids: Regular solids inclined to one plane and parallel to other plane.
10. Development of surfaces: Development of surfaces of right regular solids –Introduction - Development of Prisms- Development of cylinder.
11. Development of surfaces: Development of Pyramids - Development of Cones.
12. Isometric Projections: Principles of Isometric Projections –Introduction - Isometric Scale – Isometric Views conventions- Isometric Views of Lines and Planes- Isometric Projection of Simple Solids.
13. Isometric Projections: Conversion of Isometric Views to Orthographic Views-simple objects.
14. Isometric Projections: Conversion of orthographic views to isometric views – simple objects.

4. Laboratory Equipment/Software/Tools Required

1. PC installed with operating system (Windows)
2. Auto cad software**.**

5. Books and Materials

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., Engineering Drawing, Charotar Publishing House, 2014.
2. Basant Agrawal B. & Agrawal C. M., Engineering Graphics, TMH Publication, 2016.

Reference Books:

1. Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2016.
2. K. Balaveera Reddy et al, Computer Aided Engineering Drawing, CBS Publications, 2017.
3. Shah, M.B. & Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B.TECH II SEM

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 an open 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

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:

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.

4. Books and Materials

Text Books:

1. Robin Murray, Julie Caulier-Grice, Geoff Mulgan, "The open book of social innovation: Ways to Design, Develop and Grow Social Innovation", The Young Foundation,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–7th Framework Programme, Brussels: European Commission, DG Research.

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 II YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH I SEM

COURSE STRUCTURE

A5009 – PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLES

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 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

A4001 - Linear Algebra and Ordinary Differential Equations

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 form) 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.

5. Books and Materials

Text Books:

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

Reference Books:

1. B.V. Ramana, Higher Engineering Mathematics, 29thReprint, McGraw Hill Education (India) Private Limited, Chennai, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH I SEM

COURSE STRUCTURE

A5202 – NETWORK THEORY-I

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

1. Course Description

Course Overview

Network Theory-I is an integrated course intended to enhance the knowledge of students in electric circuits and develop analytical skills. This course provides basics of network theorems and its application to solve DC and AC circuits. This course also introduces the basic concepts of complex frequency and state space analysis. Students will learn the concepts of series & parallel resonance to examine the behavior of circuits.

Course Pre/co requisites

A4201-Basic Electrical Engineering

2. Course Outcomes (COs)

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

A5202.1. Illustrate nodal analysis, mesh analysis and network topology for electrical circuits.
A5202.2. Apply network theorems to simplify complex electrical circuits with using simulation tool.
A5202.3. Apply the concept of resonance to electrical networks to determine bandwidth and Q-Factor.
A5202.4. Develop transfer function of a given electrical network using Laplace transforms.
A5202.5. Analyze state space representations of a given electrical network.

3. Course Syllabus

Theory

ANALYSIS OF ELECTRICAL CIRCUITS: Mesh analysis, super-mesh analysis, nodal analysis, super-node analysis with AC excitation.
NETWORK TOPOLOGY: Graph, tree, incidence matrix, tie set and cut set matrices, duality and dual circuits.

NETWORK THEOREMS: Superposition, Thevenin's and Norton's theorems with AC excitation, Maximum power transfer theorem, Millman's theorem, Reciprocity theorem, Tellegen's theorem and Compensation theorem with DC and AC excitation.

RESONANCE: Series Resonance, Resonant frequency, concept of band width and Q factor, parallel resonance circuits, Tank circuit.

COMPLEX FREQUENCY AND LAPLACE TRANSFORMS: Laplace transforms for simple time functions, basic theorems for laplace transforms, initial value and final value theorems, nodal and mesh analysis in s-domain, polezeros and transfer functions, complex frequency plane, stability based on pole-zero locations, necessary conditions for transfer functions.

STATE VARIABLE ANALYSIS: state variables, state model, state variable representations of transfer functions & electrical networks, determination of transfer function from state modal, state transition matrix, solution of state and output equations, diagonalization.

Practice (Any 12 Experiments)

1. Verification of Nodal and Mesh analysis.
2. Verification of Thevenin's and Norton's theorems for AC Circuits.
3. Verification of Maximum power transfer theorem.
4. Verification of superposition and reciprocity theorems for AC Circuits.
5. Verification of Millman's and compensation theorems.
6. Determination of resonant frequency, bandwidth, Q factor of series RLC circuit.
7. Verification of Thevenin and Norton theorems using multisim.
8. Verification of Maximum power transfer theorem using multisim.
9. Verification of superposition and reciprocity theorems using multisim.
10. Verification of Millman's and compensation theorems using multisim.
11. Pole –zero plot of a given network using MATLAB.
12. State space model for classical transfer function using MATLAB.
13. Verification of Nodal and Mesh analysis using My-DAQ.
14. Verification of Thevenin and Norton theorems using My-DAQ.

4. Laboratory Equipment/Software/Tools Required

1. Circuit theorems boards
2. Bread boards
3. Resistances of different ranges
4. Multisim software
5. MATLAB software

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. Joseph A. Edminister (2002), *Schaum's outline of Electrical Circuits*, 4th edition, Tata McGraw Hill Publications, New Delhi, India

Reference Books:

1. C. L. Wadhwa (2008), *Electric Circuits Analysis,* 2nd edition, New Age International Publications, New Delhi.
2. A. Chakrabarthy (2010), *Electrical Circuits, 5*rd edition, Dhanpat Rai & Sons Publications, New Delhi.
3. Van Valkenburg, M. E. (1974), *Network Analysis*, 3rd Edition, Prentice Hall of India, New Delhi.
4. A. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*,2ndEdition,Tata Mc Graw Hill, New Delhi.

II B.TECH I SEM

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	28	0	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

"The course has no specific prerequisite and co requisite"

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); BJT as a switch.

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, Static CMOS logic circuits (Simple Logic Gates)
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. Study the forward and reverse bias characteristics of PN junction diode and compute its cut-in voltage, dynamic forward and reverse resistances.
2. Analyze rectifiers and compute its characteristics.
3. Analyze how the diode clipper circuits change the shape of the input signal under different case studies.
4. Analyze how diode clamping circuits are used as voltage doublers or voltage multipliers.
5. Study input and output characteristics of BJT.
6. Bias a given BJT to work in a desired Quiescent operating point by employing different biasing techniques.
7. Study transfer and drain characteristics of JFET and analyze how JFET acts as voltage variable resistor.
8. Design an RC-coupled CE amplifier using bipolar junction transistor and plot its frequency response. Analyze how gain and bandwidth vary with multi-stage amplifiers (CE-CE).
9. Compute the efficiency of power amplifiers under various classes of operation (class A, B and C)
10. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains.
11. Study RC oscillators (RC Phase shift and Wein bridge) and observe the effect of variation in R & C on oscillator frequency.
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.

5. Books and Materials

Text Books:

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH I SEM

COURSE STRUCTURE

A5203 – ELECTROMAGNETIC FIELD THEORY

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

1. Course Description

Course Overview

This course enables the fundamentals of Electrostatics, Magneto-statics and Electromagnetic Fields. It defines capacitors, Inductors and resistors in terms of primary electric and magnetic quantities. It also emphasizes the physical understanding and practical applications of Electromagnetics in Electrical Engineering.

Course Pre/co requisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

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

A5203.1. Understand the physical laws related to Electric and Magnetic fields.

A5203.2. Apply orthogonal coordinate systems to determine Electric and magnetic field components.

A5203.3. Analyze Electric and Magnetic fields in Static and Time Varying fields.

A5203.4. Examine Maxwell's equations for static and Time Varying fields.

A5203.5. Evaluate the capacitance, Inductance and Magnetic force for geometrical conductors in Electromagnetic fields.

3. Course Syllabus.

Theory

STATIC ELECTRIC FIELDS: co-ordinate systems –coulomb's law- electrostatic fields –EFI due to a line and a surface charge – work done in moving a point charge in an electrostatic field-electric potential – potential due to an infinite uniformly charged line – electric dipole – dipole moment -potential due to electrical dipole- potential gradient. Gauss's law – applications of gauss's law – maxwell's first equation.

STATIC MAGNETIC FIELDS: biot-savart's law in vector form – magnetic field intensity(mfi) due to a finite and infinite wire carrying a current i- mfi due to circular ring conductor carrying a current i – maxwell's second equation.

AMPERE'S LAW AND ITS APPLICATIONS: ampere's circuital law and its applications viz. Mfi due to an infinite sheet of current, a long current carrying filament and co-axial cable-point form of ampere's circuital law.

ELECTRIC AND MAGNETIC FIELDS IN MATERIALS: Laplace's and poison's equations – solution of Laplace's equation in one variable. Capacitance - capacitance of parallel plate, spherical and co-axial capacitors with composite dielectrics – energy stored and energy density in electric field- boundary conditions for electric fields- electric current-current density – ohm's law in point form – equation of continuity.
INDUCTANCE: self and mutual inductance – neumann's formulae – determination of self-inductance of a solenoid, toroid and co-axial cable– energy stored and density in a magnetic field.

FORCE IN MAGNETIC FIELDS: magnetic force - moving charges in a magnetic field - lorentz force equation – force on a current element in a magnetic field, straight and a long current carrying conductor in a magnetic field – force between two straight long and parallel current carrying conductors – magnetic dipole and dipole moment – torque on a current loop placed in a magnetic field-scalar magnetic potential and its limitations- vector magnetic potential.

TIME VARYING FIELDS: faraday's laws of electromagnetic induction – its integral and point forms – statically and dynamically induced emfs – simple problems -modification of maxwell's equations for time varying fields – displacement current – poynting theorem and poynting vector.

4. Books and Materials

Text Books:

1. William H.Hayt, John. A. Buck (2006), Engineering Electromagnetics, 7th Edition, Tata McGraw Hill Companies, New Delhi.
2. Sadiku (2005), Electro Magnetic Fields, 4thedition, Oxford Publications India, New Delhi.

Reference Books:

1. David J. Griffiths (2007), Introduction to Electro Dynamics, 3rdedition, Prentice Hall of India, New Delhi.
2. John. D. Kraus, D.A. Fleish (1997), Electromagnetics with Applications, 5thedition,Tata McGraw Hill Inc., New Delhi, India.

II B.TECH I SEM

COURSE STRUCTURE

A5204 – ELECTRICAL MACHINES -I

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, electrical machines-I, is offered as an integrated course having theory & practice that gives hands-on training adequately supported by required hardware. It deals with D.C. Machines and Induction Motors where students will learn construction, operation and design of windings. The types & characteristics, speed control and testing methods will be also discussed. The performance of these electrical machines will be verified by conducting various experiments in the laboratory.

Course Pre/co requisites

- A4201-Basic Electrical Engineering

2. Course Outcomes (COs)

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

A5204.1. Demonstrate the construction and operation of DC machines & Induction motors.
A5204.2. Apply speed control techniques and starting methods for DC motors and induction motors.
A5204.3. Select suitable test to determine the performance parameters of electrical machines.
A5204.4. Analyze the characteristics of DC machines and induction motors.
A5204.5. Design winding diagram for DC machines and induction motors at a given specification.

3. Course Syllabus

Theory

D.C. GENERATORS, CONSTRUCTION & OPERATION: principle, constructional features and operation, e.m.f. Equation, armature reaction - cross magnetizing and demagnetizing at/pole, compensating winding - commutation, reactance voltage, methods of improving commutation.

TYPES OF D.C. GENERATORS: methods of excitation, build-up of e.m.f, critical field resistance and critical speed, failure of self-excitation.

LOAD CHARACTERISTICS OF D.C GENERATORS: shunt, series and compound generators characteristics and their applications, parallel operation of d.c generators.

D.C. MOTORS & SPEED CONTROL OF D.C. MOTORS: principle of operation - characteristics and applications of shunt, series and compound motors. 3-point and 4 - point starters, speed control methods.

TESTING OF D.C. MACHINES: testing of d.c. Machines-constant & variable losses, calculation of efficiency, types of testing- swinburne's test, brake test, hopkinson's test, field's test, retardation test.

3-Phase INDUCTION MOTORS: power stages, equivalent circuit, losses and efficiency, double cage induction motor, characteristics and applications, crawling and cogging.

CIRCLE DIAGRAM: Circle diagram-no load and blocked rotor tests-predetermination of performance

STARTING AND SPEED CONTROL METHODS OF INDUCTION MOTORS: methods of starting - starting current and torque calculations, speed control-change of frequency, poles, cascade connection and injection of an emf into rotor circuit.

Practice (Any 12 Experiments)

1. Magnetization characteristics of DC shunt generator.
2. Load characteristics of DC shunt generator.
3. Load Test on DC series generator.
4. Load test on DC compound generator.
5. Field's test on DC series machine.
6. Speed control of DC shunt motor.
7. Performance characteristics of DC series motor.
8. Predetermination of efficiency of a DC Shunt machine (Swinburne's test)
9. Hopkinson's test on DC shunt machines.
10. Retardation Test on DC Shunt Motor.
11. Speed control of slip ring Induction Motor by Variable rotor resistance method.
12. No-load & Blocked rotor tests on a three phase Induction motor.
13. Modelling of DC shunt motor using MATLAB/Simulink.
14. Modelling of Squirrel cage induction motor using MATLAB/Simulink.

4. Laboratory Equipment/Software/Tools Required

1. DC Motor Generator sets.
2. DC Shunt Generators.
3. DC Series Generators.
4. DC Compound Generators.

5. DC Voltmeters
6. DC Ammeters.
7. Rheostats.
8. Tachometer.
9. 3-Phase Induction Motors.
10. DC Shunt Motors.
11. DC Series Motors.
12. Wattmeters.
13. 3-Phase Variac.
14. AC Voltmeters.
15. AC Ammeters.

5. Books and Materials

Text Books:

1. J. B. Gupta (2006), Theory and Performance of Electrical Machines, 14th edition, S. K. Kataria& Sons, New Delhi.
2. P. S .Bimbra (2000), Electrical Machinery, 7th edition, Khanna Publishers, New Delhi.

Reference Books:

1. E. Fritzgerald, C. Kingsley, S. Umans (2002), Electric Machinery, 5th edition, Tata McGraw Hill Companies, New Delhi.
2. L. Theraja, A. K. Theraja (2002), A text book of Electrical Technology, 2nd edition, S. Chand Publishers, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH I SEM

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 co requisite"

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. Simbo Nuga, *English Grammar and Verbal Reasoning – The Toolkit for Success*, Trafford Publishing, 2013.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH I SEM

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 co requisite

2. Course Outcomes (COs)

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

A5011.1. Interpreting gender sensitization and problems of other genders.
A5011.2. Identifying the reasons for the female feticide.
A5011.3. Interpreting the role of women in domestic, political and economic spheres.
A5011.4. Developing sensitivity towards sexual and domestic violence.
A5011.5. Understanding the women's place in Telengana History.

3. Course Syllabus

1. Gender Sensitization: Why should we study it?

2. Socialization: Making Women, Making Men

Introduction
Preparing for womanhood
Growing up male
First lessons in caste
Different masculinities

3. 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

4. Missing Women: Sex Selection and Its Consequences

Declining Sex Ratio
Demographic Consequences

5. Gender Spectrum: Beyond the Binary

Two or Many?
Struggles with Discrimination

6. Additional Reading: Our Bodies, Our Health

7. Housework: The Invisible Labour

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

8. Women's Work: Its Politics and Economics

Fact and fiction
Unrecognized and unaccounted work
Further Reading: wages and conditions of work.

9. Sexual Harassment: Say No!

Sexual harassment, not eve-teasing
Coping with everyday harassment
Further Reading: "Chupulu"

10. Domestic Violence:

Speaking Out
Is home a safe place?
When women unite (Film)
Rebuilding lives
Further Reading: New Forums for justice.

11. Thinking about Sexual Violence

Blaming the Victim- " I Fought for my life..."
Further Reading: The caste face of violence.

12. Knowledge: Through the Lens of Gender
Point of view
Gender and the structure of knowledge
Further Reading: Unacknowledged women artists of Telangana

13. 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 Books:

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

Reference Books:

1. www.worldofequals.org.in

SYLLABI FOR II YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH II SEM

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 Financial Analysis. It covers the fundamentals of Managerial Economics and its various aspects. Apart from Capital budgeting and its techniques, financial analysis gives clear idea about concepts and conventions of accounting, accounting procedures like journal, ledger, trial balance, final accounts and interpretation of financial statements through ratios.

Course Pre/co requisites

"The course has no specific prerequisite and co requisite"

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 Financial 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 Analyze financial statements to assess financial health of business.
A5015.5 Apply capital budgeting techniques to select best investment opportunity.

3. Course Syllabus

INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND: 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 & BREAK EVEN 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 and Monopolistic Competition, 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.

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.

FINANCIAL ANALYSIS THROUGH RATIOS: Ratio – Meaning, importance - Types: Liquidity Ratios, Solvency Ratios, Turnover Ratios and Profitability ratios. (Simple problems).

CAPITAL BUDGETING: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting - Payback Method, Accounting Rate of Return (ARR), Net Present Value Method, Profitability Index, Internal rate of return (simple problems).

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH II SEM

COURSE STRUCTURE

A5206 – POWER SYSTEMS-I

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

1. Course Description

Course Overview

Electrical Energy plays a significant role in day-to-day life of entire mankind. This course deals with the generation of power along with its economic aspects. It deals with the basic theory of various conventional power stations and the different components present in them. The course also helps the students to familiarize with different types of substations and its advantages and disadvantages. It also deals with the economic aspects of power system, power factor correction techniques and suitable pricing methods.

Course Pre/co requisites

"The course has no specific prerequisite and co requisite"

2. Course Outcomes (COs)

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

A5206.1 Understand the different components of an electric power system.

A5206.2 Analyze the different conventional methods of generating electrical power to meet the required load demand.

A5206.3 Develop a layout and single line diagram for any given substation.

A5206.4 Model a power system to reduce economic losses.

3. Course Syllabus

BASIC FUNDAMENTALS OF POWER SYSTEM: overview, single line diagram of electrical power system, important terms & factors. Base load and peak load. Interconnected grid system, different types of energy sources and efficiency.

THERMAL POWER STATION: schematic diagram of thermal power plant – economizers, boilers, super heaters, turbines, condensers, air preheaters, chimney and cooling towers, choice of site selection.

HYDROELECTRIC POWER STATION: elements of hydro-electric power station-types-concept of pumped storage plants, mass curve and estimation of power developed from a given catchment area, heads and efficiencies.

NUCLEAR POWER STATIONS: nuclear fission and chain reaction. Nuclear fuels, principle of operation of nuclear reactor and its types. Reactor components- radiation hazards - shielding and safety precautions.
GAS POWER STATIONS: principle of operation and components.

SUBSTATIONS: classification - air insulated substations, indoor & outdoor substations, bus bar arrangements in the sub-stations, gas insulated substations (GIS)- features and single line diagram, comparison of air insulated substations and gas insulated substations.

ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF METHODS: load curve, load duration and integrated load duration curves, demand, diversity, capacity, utilization and plant use factors, tariff methods-flat rate, block-rate, two-part, three-part, and power factor tariff methods.
POWER FACTOR IMPROVEMENT: causes of low power factor, methods of improving power factor, phase advancing and generation of reactive KVAR using static capacitors, most economical power factor for constant KW load and constant KVA type loads.

4. Books and Materials

Text Books:

1. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakrabarti (2010), "A Text Book on Power System Engineering", 2nd Edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.
2. C. L. Wadhwa (2010), "Generation, Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International (P) Limited, New Delhi.

Reference Books:

1. Leonard L. Grigsby (2012), "Electric Power Generation Transmission and Distribution", 3rd Edition, CRC press.
2. J. B. Gupta (2010), "*A Course in Power Systems",* 10th edition, S. K. Kataria & Sons, New Delhi.

II B.TECH II SEM

COURSE STRUCTURE

A5207 – ELECTRICAL MACHINES - II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
4	0	2	56	0	28	5	30	70	100

1. Course Description

Course Overview

This Course Electrical Machines-II, is offered as an integrated course having theory & practice that gives hands-on training adequately supported by required hardware. It deals with Synchronous Machines, single phase motors and Transformers, where students will learn about their construction, operation and testing. The types & characteristics, testing methods will also be discussed. The performance of these electrical machines will be verified by conducting various experiments in the laboratory.

Course Pre/co requisites

A5204-Electrical Machines-I

2. Course Outcomes (COs)

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

A5207.1 Demonstrate the construction and operation of Synchronous machines & Single Phase motors.

A5207.2 Analyze the characteristics and performance of Synchronous machines, Transformers and single phase motors.

A5207.3 Apply appropriate speed control technique and starting method for Synchronous and single phase motors for any industrial or house hold applications.

A5207.4 Identify suitable test to determine the performance parameters of Synchronous machines and transformers.

A5207.5 Compare various methods for finding voltage regulation of Alternators.

3. Course Syllabus

Theory

SINGLE PHASE TRANSFORMERS: Review of transformers–regulation and testing, sumpner's test, separation of no load losses by experimental method, all-day efficiency, parallel operation, auto transformers.

THREE PHASE TRANSFORMERS: type of connections, relation between line and phase voltages and currents, use of tertiary winding, scott connection of transformers for phase conversion.
TAP CHANGING TRANSFORMERS: concept of tap changing, on-load and off-load tap changers, phase shift transformers.

SYNCHRONOUS GENERATORS: Armature windings, integral slot and fractional slot windings, distributed and concentrated windings, pitch and winding factors, e.m.f equation, characteristics, generation and suppression of harmonics, armature reaction, leakage reactance, synchronous reactance and impedance, phasor diagram, load characteristics.
REGULATION OF SYNCHRONOUS GENERATOR: regulation by e.m.f., m.m.f., z.p.f. And a.s.a. Methods. Salient pole alternators, two reaction analysis, determination of xd and xq (slip test)-phasor diagrams, regulation of salient pole alternators.

PARALLEL OPERATION OF SYNCHRONOUS GENERATOR: Synchronizing alternators with infinite bus bars, synchronizing power, torque, parallel operation and load sharing. Effect of change of excitation and mechanical power input.
SYNCHRONOUS MOTORS: Theory of operation, phasor diagram, variation of current and power factor With excitation, synchronous condenser, mathematical analysis for power developed.

SINGLE PHASE INDUCTION MOTORS: Double revolving field theory and cross field theory, split phase starting, shaded pole motor, speed-torque characteristics, Equivalent circuit, phasor diagrams, applications.

Practice (Any 12 Experiments)

1. Three Phase Transformer: Verification of Relationship between Voltages and Currents.

   (Star Delta, Delta-Delta, Delta-star, Star-Star)

2. Scott connection of transformers.
3. Separation of core losses of a single phase transformer.
4. Sumpner's test on a pair of single phase transformers
5. Regulation of a three phase alternator by synchronous impedance method.
6. V and Inverted V curves of a three phase synchronous motor.
7. Equivalent Circuit of a single phase Induction motor.
8. Determination of Xd and Xq of a salient pole synchronous machine.
9. Synchronization of alternators.
10. Determination of sequence impedances of an alternator.
11. Brake test on a single phase Induction motor.

12. Efficiency of Three phase alternator.
13. Modelling of Single phase Transformer using MATLAB/Simulink.
14. Modelling of Three phase Synchronous motor using MATLAB/Simulink.

4. Laboratory Equipment/Software/Tools Required

1. Single phase transformers.
2. 3 phase Alternators.
3. Scott connection transformer set.
4. AC Voltmeters.
5. AC Ammeters.
6. Excitation unit.
7. Synchronous motor.
8. 1-Phase Induction Motors.
9. Wattmeters.
10. 1-Phase Variacs.

5. Books and Materials

Text Books:

1. J. B. Gupta (2006), Theory and Performance of Electrical Machines, 14th edition, S. K. Kataria& Sons, New Delhi.
2. P. S .Bimbra (2000), Electrical Machinery, 7th edition, Khanna Publishers, New Delhi.

Reference Books:

1. E. Fritzgerald, C. Kingsley, S. Umans (2002), Electric Machinery, 5th edition, Tata McGraw Hill Companies, New Delhi.
2. L. Theraja, A. K. Theraja (2002), A text book of Electrical Technology, 2nd edition, S. Chand Publishers, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH II SEM

COURSE STRUCTURE

A5208 – NETWORK THEORY-II

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 the extension of Network Theory-I course. It is an integrated course intended to enhance the knowledge of students in electric circuits and develop analytical skills. This course introduces self & mutual inductances and series & parallel magnetic circuits. Students will learn the concepts of two-port networks and network functions. Students can classify R-L-C passive filters based on the frequency response.

Course Pre/co requisites

A5202-Network Theory-I

2. Course Outcomes (COs)

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

A5208.1 Understand the basic concepts of magnetic circuits.
A5208.2 Analyze DC and AC transients for given electrical circuit.
A5208.3 Determine various parameters of a given two-port networks using simulation tools.
A5208.4 Develop driving point function and transfer function of a given two port network.
A5208.5 Compare and contrast responses of different types of R-L-C passive filter.

3. Course Syllabus

Theory

MAGNETIC CIRCUITS: Faraday's laws of electromagnetic induction, concept of self and mutual inductance, dot convention, coefficient of coupling, composite magnetic circuit, analysis of series and parallel magnetic circuits.

DC AND AC TRANSIENT ANALYSIS: transient response of R-L, R-C, R-L-C circuits (series and parallel combinations), initial conditions, solution using differential equation and Laplace Transform method.

TWO-PORT NETWORKS: two-port network parameters: impedance and admittance parameters, hybrid parameters (ac excitation) – inverse hybrid parameters, transmission and inverse transmission

parameters, inter-relationships between various parameters, connections of two-port networks, reciprocity and symmetry conditions and necessary conditions for driving point functions.

PASSIVE RLC FILTERS: classification of RLC filters, first order low-pass & high-pass filter circuits, second order band-pass, band-stop filter circuits and their frequency responses.

THREE PHASE CIRCUITS: Advantages of three phase systems, phase sequence, analysis of three phase circuits with balanced and unbalanced loads, measurement of active and reactive power.

Practice (Any 12 Experiments)

1. Determination of self, Mutual inductance and coefficient of coupling.
2. Transient response of series RL and RC circuits.
3. Verification of Z and Y parameters of AC circuits.
4. Verification of Hybrid and Transmission parameters of AC Circuits.
5. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
6. Design of High pass and Low pass filters using NI- My DAQ.
7. Transient analysis of series RL& RC circuits using NI-My DAQ.
8. Verification of Z and Y parameters using MULTISIM.
9. Verification of Hybrid and Transmission parameters using MULTISIM.
10. Transient analysis of series RLC circuit using MULTISIM.
11. Analysis of 3-phase circuit with unbalanced load using MULTISIM.
12. Transient analysis of series RLC circuit using MATLAB.
13. Determination of self, Mutual inductance and coefficient of coupling using MATLAB.
14. Verification of Z and Y parameters using NI-MyDAQ

4. Laboratory Equipment/Software/Tools Required

1. Circuit theorems boards
2. Bread boards.
3. Resistances of different ranges.
4. My-DAQ.
5. Single Phase Transformer.
6. Single phase Variac.
7. Multisim software.
8. MATLAB software.

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. Joseph A. Edminister (2002), *Schaum's outline of Electrical Circuits*, 4th edition, Tata McGraw Hill Publications, New Delhi, India

Reference Books:

1. C. L. Wadhwa (2008), *Electric Circuits Analysis,* 2nd edition, New Age International Publications, New Delhi.
2. A. Chakrabarthy (2010), *Electrical Circuits, 5*rd edition, Dhanpat Rai & Sons Publications, New Delhi.
3. Van Valkenburg, M. E. (1974), *Network Analysis*, 3rd Edition, Prentice Hall of India, New Delhi.
4. A. Sudhakar, Shyammohan S. Palli (2003), *Electrical Circuits*,2ndEdition,Tata Mc Graw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH II SEM

COURSE STRUCTURE

A5209 – CONTROL 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

This course offered as an integrated course having theory & practice that gives hands-on training on MATLAB / Simulink and adequately supported by required hardware. From this course students can understand the principles and applications of control systems in daily life. This course deals with basic concepts of block diagram reduction, time domain analysis, and stability analysis of the system in frequency domain, time domain and state equations. This course also emphasizes the understanding and practical applications of PID controllers in the field of power electronics and power systems.

Course Pre/co requisites

"The course has no specific prerequisite and co requisite"

2. Course Outcomes (COs)

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

A5209.1 Develop the transfer function and state space models of dynamic systems.

A5209.2 Analyze performance indices of linear and nonlinear control systems.

A5209.3 Apply Routh's and Nyquist stability criterion to analyze and design of feedback control systems.

A5209.4 Examine the performance of feedback control system by using graphical techniques.

A5209.5 Design the various compensators and controllers for time invariant systems.

3. Course Syllabus

Theory

BASICS OF CONTROL SYSTEMS: introduction, open loop and closed loop control systems, differences and effects of feedback.

MATHEMATICAL MODELLING OF CONTROL SYSTEMS: differential equations, transfer function of electrical systems, electrical and mechanical analogues systems, block diagram reduction techniques, state variable representation of block diagrams, signal flow graph representation, reduction using mason's gain formula, state variable representation of signal flow graph.

CONTROL SYSTEM COMPONENTS: Transfer function of dc servo motor, ac servo motor, synchro transmitter and receiver, state model representation of dc servo motor.
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.

ROUTH'S STABILITY AND ROOT LOCUS: 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.

FREQUENCY RESPONSE ANALYSIS: introduction, frequency domain specifications-polar plots, bode diagrams determination of transfer function from the bode diagram-phase margin and gain margin-stability analysis from bode plots and polar plots.

NYQUIST STABILITY ANALYSIS: principle of argument, nyquist plots, nyquist stability analysis.
COMPENSATORS AND CONTROLLERS: Lag, Lead, Lead-Lag compensation techniques, PID controllers, controllability, observability, stability.

Practice (Any 12 Experiments)

1. Time response of second order system.
2. Characteristics of Synchros.
3. Frequency response of lead and lag compensator circuits.
4. Temperature control using PID controller.
5. Characteristics of AC servo motor.
6. DC Position control system.
7. Determination of gain margin and phase margin of Linear Time Invariant system using polar and Nyquist plots using MATLAB/SCILAB.
8. Evaluation of Effect of time delay on gain margin and phase margin of Linear Time Invariant system using Bode plot using MATLAB/SCILAB.
9. Effect of P, PI, PD and PID controller on speed control of DC motor system using MATLABSimulink/SCILAB.
10. Testing of controllability and observability of dynamical systems using MATLAB/SCILAB.
11. Effect of open loop poles and zeroes on Root Locus contour using MATLAB/SCILAB
12. Design of a passive RC lead and lag compensating network for the given specifications and get its

frequency response using MATLAB/SCILAB.

13. Step response of a typical second order system using MATLAB/SCILAB.
14. Evaluation of the effect of loop gain, addition of poles and zeros on time response, steady state errors and stability of system using MATLAB/SCILAB.

4. Laboratory Equipment/Software/Tools Required

1. Time response kit.
2. Synchro transmitter-receiver pair and PLC study module.
3. DC motor.
4. PID module.
5. Magnetic Amplifier kit.
6. Rheostat and CRO.
7. AC servo motor kit.
8. Multimeters.
9. MATLAB Software
10. Simulink Software.

5. Books and Materials

Text Books:

1. I.J.Nagrath, M .Gopal (2011), Control Systems Engineering, 5th edition, New Age International (P) Limited, New Delhi, India.
2. Benjamin C. Kuo (2003), Automatic Control Systems, 8th edition, John Wiley and Son's, USA.

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

II B.TECH II SEM

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 co requisite"

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 Books:

1. R.S. Aggarwal , *Quantitative Aptitude for competitive examinations*, 2017 edition, S. Chand.

Reference Books:

1. Abhijit Guha, *Quantitative Aptitude for competitive examinations*, 6th Edition, McGraw Hill Education.
2. Dinesh Khattar, *The Pearson guide to Quantitative Aptitudefor Competitive Examinations*, 3rd Edition, Pearson Education.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B.TECH II SEM

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 co requisite"

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 best possible solutions.

A5012.3 Make use of environmental laws for the protection of forest and wild life.

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. Classification of ecosystems. 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: Effects of modern agriculture practices on environment. Problems with Chemical fertilizers and pesticides. Bio fertilizers (organic farming) and their importance. Energy resources: Renewable energy resources: solar energy, wind energy, geothermal energy. Biofuels: Definition, Gobar gas production and Biodiesel production by trancesterification.

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. Threats to biodiversity: Habitat loss, Poaching of wildlife, 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, Marine pollution, Soil pollution, Noise pollution, Thermal pollution, Global warming, Acid rains and Ozone layer depletion.
SOLID WASTE MANAGEMENT: Causes, effects and methods of solid waste disposal. E-waste management. 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. Green building concept. Water conservation, Rainwater harvesting, watershed management. A brief study about: Mission Kakatiya, water man of India Dr. Rajendrasingh, Anna hazare watershed management development programme, Bishnoi tribe environmental conservation and environmental ethics. Environmental Policies and Legislations: Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

4. Books and Materials

Text Books:

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

Reference Books:

1. Erach Bharucha. 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

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5210 – POWER SYSTEMS-II

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 deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators. The main objective of the course is to introduce students to Transmission system concepts. In particular, concepts like Transmission line parameters, Cables, Performance of Transmission lines, Transients, Sag & tension calculations & Underground cables concepts are emphasized.

Course Pre/co requisites

A5206-Power Systems-I

2. Course Outcomes (COs)

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

A5210.1 Apply the knowledge of electromagnetic fields to calculate the transmission line parameters.

A5210.2 Analyze the Voltage regulation and efficiency for different Power transmission lines.

A5210.3 Analyze power loss due to corona with various factors and physical strength of transmission line by Sag calculations

A5210.4 Identify the importance of various types of insulators , their string efficiency , grading of cables in power system transmission.

3. Course Syllabus

Theory

TRANSMISSION LINE PARAMETERS: Estimation of Electric Stress, Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines.

PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES: Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks. Mathematical Solutions to estimate regulation and efficiency of all types of lines. Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants .

VARIOUS FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINE: Skin and Proximity effects-Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

SAG AND TENSION CALCULATIONS: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor.

OVERHEAD LINE INSULATORS & UNDERGROUND CABLES: Types of Insulators, String efficiency and Methods for improvement - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation. Capacitance of Single and 3-Core belted cables.

Practice

1. Measurement of low Resistances (Milli Volt Drop Test).
2. Simulation of Mid-Point compensation using PSCAD.
3. End point compensation under light load using PSCAD.
4. Line compensation under lagging PF Conditions using PSCAD.
5. Simulation of load compensation using PSCAD.
6. Verification of Ferranti effect in a long transmission line.
7. Determination of ABCD parameters for a long transmission line.
8. Plotting of e-fields using electrolytic bath.
9. Over head Transmission line modelling using PSCAD.
10. Break down Characteristics of Sphere – Sphere Geometry.
11. Break down Characteristics of Sphere – Point Geometry.
12. Determination of Break down strength of oil for distance electrodes.

4. Laboratory Equipment/Software/Tools Required

1. Milli Volt Drop Test kit.
2. PSCAD Software
3. Long Transmission line simulator kit.
4. High voltage testing kit.
5. Electrolytic bath
6. Oil Testing Kit.

5. Books and Materials

Text Books:

1. C. L. Wadhwa (2011), *Electrical Power Systems*, 6th edition, New Age International (P) Limited, New Delhi.
2. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakrabarti (2011), *A Text Book on Electrical Engineering*, 2nd edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.

Reference Books:

1. B. R. Gupta (2008), *Power System Analysis and Design*, Revised Edition, S. Chand & Company Limited, New Delhi.
2. Hadi Saadat (2010), *Power System Analysis*, 3rd Edition, Public Affairs Information Service, New Delhi.
3. I. J. Nagarat, D. P .Kothari(2006), *Modern Power System Analysis,* 3rd Edition, Tata McGraw Hill Higher Education, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5211 – POWER ELECTRONICS

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 is a core subject for electrical and electronics engineering students of third Year. The objective is to make them familiar with various power electronic switches and converter circuits. This course deals with operation of various power electronic devices like SCR, IGBT, MOSFET, etc. Also, this course mainly emphasizes on basic power electronic converter circuits such as Phase controlled rectifiers, Choppers, AC voltage controllers, Cyclo-converters and Inverters.

Course Pre/co requisites

A5402- Electronic Devices And Circuit Analysis

2. Course Outcomes (COs)

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

A5211.1 Apply the knowledge of thyristor, IGBT and MOSFET in different PE converters.

A5211.2 Analyze AC-DC, DC-DC, DC-AC, AC-AC converters and commutation circuits.

A5211.3 Apply the knowledge of converters to select suitable converter for a given application.

A5211.4 Calculate different parameters of Converters for the given requirements to investigate the performance of a converters.

A5211.5 Apply the knowledge of PWM techniques to improve the performance of DC-DC and DC-AC converters.

3. Course Syllabus

Theory

POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS: Thyristors - Silicon Controlled Rectifiers (SCR's), BJT, power MOSFET, power IGBT and their characteristics, other thyristors. Basic operation of SCR, Static characteristics, turn on and turn off methods, Dynamic characteristics of SCR, two transistor analogy, series and parallel connections of SCR's, snubber circuit details, ratings of SCR's, line commutation and forced commutation circuits.

SINGLE PHASE CONTROLLED CONVERTERS: Phase control technique, single phase line commutated converters, midpoint and bridge connections, half controlled converters and fully controlled

converters -with R, RL loads and RLE load, without and with freewheeling diode. Derivation of average load voltage and current, line commutated inverter, performance parameters, effect of source inductance.

THREE PHASE LINE COMMUTATED CONVERTERS: Three pulse and six pulse conversion, midpoint and bridge connections average load voltage with R and RL loads, effect of source inductance, dual converters (both single phase and three phase), waveforms.
AC VOLTAGE CONTROLLERS: AC voltage controllers, single phase two SCR's in anti parallel with R and RL loads, Triac with R and RL loads, derivation of RMS load voltage, current and input power factor.

CYCLO CONVERTERS: Single phase midpoint cycloconverters with resistive and inductive load (principle of operation only), bridge configuration of single phase cycloconverter (principle of operation only), waveforms.
CHOPPERS: Time ratio control and current limit control strategies, step down chopper and step up chopper, derivation of load voltage expression. Morgan's chopper and Jone's chopper.

INVERTERS: Basic series inverter, basic parallel inverter, single phase bridge inverter, waveforms, Three phase inverters (120^0 and 180^0 operation), voltage control techniques for inverters-pulse width modulation techniques.

Practice

1. Study of SCR, MOSFET & IGBT Characteristics.
2. Study of DC Jone's Chopper.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Analysis of Single Phase bridge converter with R and RL loads.
5. Single Phase Cyclo-converter characteristics with R and RL loads.
6. Single Phase Series inverter with R and RL loads.
7. Analysis of Single Phase half controlled converter with R & RL loads.
8. DC chopper characteristics with R & RL Loads.
9. Analysis of three phase Half Controlled Bridge converter.
10. Simulation of Three phase Inverter using MATLAB.
11. Simulation of three phase full converter with RL load using MATLAB.
12. Simulation of Single Phase PWM inverter using MATLAB.

4. Laboratory Equipment/Software/Tools Required

1. MATLAB/ SIMULINK and DESKTOP.
2. SCR. MOSFET and IGBT kit.
3. Regulated Power Supply and loads.
4. Jones chopper kit, Regulated Power Supply and loads.
5. AC voltage controller kit, AC supply and loads.
6. Bridge converter kit, AC supply and loads.

7. Cyclo converter kit, AC supply and loads.
8. Series inverter kit, Regulated Power Supply and loads.
9. Half converter kit, Regulated Power Supply and loads.

5. Books and Materials

Text Books:

1. M. D. Singh, K. B. Kanchandhani (2008), Power Electronics, 3rd edition, Tata Mc graw hill publishing company, New Delhi.
2. M. H. Rashid (1998), Power Electronics: Circuits, Devices and Applications, 3rd Edition, Prentice Hall of India, New Delhi.

Reference Books:

1. Vedam Subramanyam (1997), Power Electronics, New Age International (P) Limited, New Delhi.
2. R. Murthy (2005), Power Electronics, 1st edition, Oxford University Press, New Delhi.
3. P. C. Sen(2001), Power Electronics, 30th edition, Tata Mc Graw Hill Publishing, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5212 – ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

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

It is a core course for all UG Electrical Engineering students. The content of this course is also aligned to the syllabus for the GATE EE exam. This course deals with Working principle and Dynamics of different electro-mechanical instruments, ammeter, voltmeter, ohmmeter, wattmeter, energy meter, measurement of resistance and impedances, bridges and potentiometers, Instrument transformers. This course also deals with the different types of instrument devices like transducers.

Course Pre/co requisites

A5202-Network Theory-I

2. Course Outcomes (COs)

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

A5212.1 Able to analyze the working of various indicating instruments and their suitable applications.

A5212.2 Apply the knowledge in measurement of power, energy and frequency in real time applications.

A5212.3 Able to use the wave analyzers in harmonic measurements and communication also use potentiometer for calibration of ammeter and voltmeter.

A5212.4 To develop the suitable bridge for measurement of resistance, inductance and capacitance.

A5212.5 Select suitable transducers for measuring non electrical parameters.

3. Course Syllabus

Theory

MEASURING INSTRUMENTS: Classification - deflecting, control and damping torques- Ammeters and Voltmeters-PMMC, moving iron type instruments- expression for the deflecting torque and control torque-Errors and compensations, extension of range using shunts and series resistance**.**

INSTRUMENT TRANSFORMERS: Current Transformer and Potential Transformer, Ratio and phase angle errors.

POWER FACTOR METERS: Type of Power Factor Meters, dynamometer and moving iron type, 1-ph and 3-ph.

MEASUREMENT OF POWER: Single phase dynamo meter wattmeter, LPF and UPF, expression for deflecting and control torques-Extension of range of wattmeter using instrument transformers-Three voltmeter and three ammeter methods, Iron loss in a Bar specimen.
MEASUREMENT OF ENERGY: Single phase induction type energy meter-driving and braking torques-errors and compensations-testing by phantom loading using R.S.S. meter.

D.C POTENTIOMETERS: Principle and operation of D.C Crompton's potentiometer, standardization. Measurement of unknown resistance, current, voltage, Q-meter.

A.C.BRIDGE: Measurement of inductance - Quality Factor, Maxwell's bridge, Hay's bridge, Anderson bridge. Measurement of capacitance and loss angle - Desauty Bridge and Schering Bridge.
RESISTANCE MEASUREMENTS: Method of measuring low, medium and high resistance. Wheatstone's bridge, Kelvin's double bridge, loss of charge method.

TRANSDUCERS: Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle of operation of LVDT and LVDT Applications, Strain gauge and its principle of operation, gauge factor, Piezoelectric transducers.

Practice

1. Calibration and Testing of Single Phase Energy Meter.
2. Calibration of Dynamometer Power Factor Meter.
3. Calibration of PMMC ammeter and PMMC voltmeter using Crompton D.C. Potentiometer.
4. Measurement of Resistance using Kelvin's double bridge.
5. Measurement of unknown Inductance using Anderson Bridge.
6. Calibration of UPF wattmeter by Phantom testing.
7. Measurement of Iron loss in a bar specimen using a wattmeter.
8. LVDT characteristics and Calibration.
9. Resistance strain Gauge-strain measurements and Calibration.
10. Measurement of Parameters of a choke coil using 3 Voltmeter and 3 Ammeter method.
11. Measurement of unknown Capacitance by Schering Bridge.
12. Measurement of 3-phase power with single wattmeter and two current transformers.

4. Laboratory Equipment/Software/Tools Required

1. Single phase energy meter.
2. Stop watch.
3. Power factor meter.
4. Ammeters.
5. Voltmeters.
6. Crompton potentiometer kit.
7. Kelvin's double bridge kit, standard resistances.

8. Anderson bridge kit, head phones.
9. UPF wattmeter, phantom load.
10. Iron bar, wattmeter, voltmeter and ammeter.
11. LVDT trainer kit.
12. Strain measuring unit.
13. Chock coil, Ammeters and voltmeters.
14. Schering bridge kit, head phones.
15. Wattmeter, current transformers, voltmeter and ammeters.

5. Books and Materials

Text Books:

1. A. K. Sawhney (2011), A Course in Electrical &Electronic Measurement & Instruments, 19th Edition, Dhanpat Rai & Co. Publications, New Delhi.
2. W. Golding, F.C. Widdis (2010), Electrical Measurements and Measuring Instruments, 5th Edition, Wheeler Publishing, New Delhi.

Reference Books:

1. J. B. Gupta (2010), Electronics and Electrical Measurements and Instrumentation, 10th Edition, S.K. Kataria sons, New Delhi.
2. Reissland, Martin.U (2010), Electrical Measurements: Fundamentals, Concepts, Applications, New Age International (P) Limited, New Delhi.
3. H. S. Kalsi (2010), Electronic Instrumentation, 3rdEdition, Tata McGraw Hill Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5416 – SWITCHING THEORY AND LOGIC DESIGN

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 the knowledge required to comprehend the switching principles and its importance in digital design. This course will start with the Boolean algebraic concept and the reduction of Boolean functions and its impact in the realization of digital design, followed by the design of combinational and sequential circuits in implementing with real time applications. The representation of digital circuits in flowchart plays a pivotal role in the understanding of the design flow of the digital circuits. Later the analyze with respect to timing performance will be performed by the developed digital systems. The development of complex real application justifies the structure of the switching theory and logic design course. This course is the basis for advanced courses like Microprocessors and Interfacing, Embedded Systems and VLSI Design.

Course Pre/co requisites

A5202-Network Theory-I

2. Course Outcomes (COs)

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

A5416.1 Demonstrate the importance of Boolean algebra and its reduction in digital circuit design.

A5416.2 Apply the knowledge of circuit minization in the design of combinational and sequential circuits

A5416.3 Construct the design flow with the timing diagram of the complex digital circuits.

A5416.4 Implement the digital systems based on combinational and sequential circuit design.

A5416.5 Analyze the performance of the developed digital applications.

3. Course Syllabus

Boolean Algebra And Switching Functions: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Universal Gates, Binary Codes.

Minimization of Digital Circuits: Minimization with theorem, The Karnaugh Map Method-Three to Five Variable Maps, Don't Care Map Entries, Realization of SOP and POS using K-Maps, Prime and Essential Implications, Tabular Method.

Design of Combinational Circuits: Combinational Design- Adders and Subtractors Circuits, Comparator, Multiplexers, Demultiplexer, Encoder and Decoder, Implementation of Boolean Functions using Multiplexer, Code Converters.

Sequential Machines Fundamentals: Distinctions between Combinational and Sequential circuits, Flip Flops-SR-FF, D-FF, T-FF and JK-FF, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration.

Sequential Circuit Design: Design of Synchronous Counters, Non-Sequential Counters, Design of Asynchronous Counters, Ripple Counters, Shift Registers, Ring Counter, Finite state machine, Mealy and Moore models.

Sequential Circuits: Minimization of completely specified and incompletely specified sequential machines, Partition techniques, Merger chart methods, Concept of minimal cover table

Algorithmic State Machines: Salient features of the ASM chart, System design using data path, System design using control subsystems, Control Implementations, Design of Weighing machine, Design of Binary multiplier

4. Books and Materials

Text Books:

1. M. Morris Mano, Michael D. Ciletti: *Digital Design*; 4th Edition, Pearson Education/ PHI, India, 2008.
2. Charles H. Roth, Cengage Learning: *Fundamentals of Logic Design*; 5th Edition, 2004.

Reference Books:

1. Fredriac J. Hill, Gerald R. Peterson: Introduction to Switching Theory and Logic Design; 3rd Edition, John Wiley & Sons Inc.
2. Thomas L. Floyd: Digital Fundamentals – A Systems Approach; Pearson, 2013.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5251 – RENEWABLE ENERGY SOURCES

(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 offered as a non-integrated course having introduction to renewable energy technologies and potentials. From this course students can understand the principles and applications of renewable energy sources. This course deals with principles of solar radiations, solar energy conversion, wind energy, biomass, geothermal, wave energy and tidal energy. This course also emphasizes the understanding and practical applications of renewable energy sources in real time scenario. Further each lecture contains several examples from real world applications and in-progress industrial developments.

Course Pre/co requisites

A5206-Power Systems-I

2. Course Outcomes (COs)

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

A5251.1 Apply the principles of renewable energy sources for the construction of Power generating station.

A5251.2 Analyze various harvesting techniques of Renewable energy for different applications.

A5251.3 Apply energy storage methods in renewable energy systems.

A5251.4 Analyze Renewable energy systems for various environmental conditions.

A5251.5 Categorize various energy conversion systems and their limitations.

3. Course Syllabus

PRINCIPLES OF SOLAR RADIATION: Role and potential of renewable source, Environmental impact of solar power, instruments for measuring solar radiation and sun shine, solar radiation data.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors and their classifications.

WIND ENERGY: Horizontal and vertical axis windmills, performance characteristics and Betz criteria.

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.
OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.
TIDAL AND WAVE ENERGY: Potential, Conversion techniques and mini-hydel power plants.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating /cooling technique, solar distillation and drying, photovoltaic energy conversion.

DIRECT ENERGY CONVERSION: Need for DEC, limitations, principles of DEC and different types of Energy conversions, Introduction to Fuel cells and Electric Vehicles.

4. Books and Materials

Text Books:

1. Renewable energy resources, Tiwari and Ghosal/ Narosa, second edition (2008), Mc Graw Hill Company, New Delhi.
2. Non-Conventional Energy Sources, G.D.Rai, fourth edition (2009), Khanna Publishers, New Delhi.

Reference Books:

1. Renewable Energy Sources, Twidell& Weir, fourth Edition (2009), Tata McGraw Hill Education Private Limited, New Delhi.
2. Solar Energy, S.P. Sukhatme, Third Edition (2010), Tata McGraw Hill Education Private Limited, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5252 – SPECIAL ELECTRICAL MACHINES

(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 is a non-integrated course for engineering students of third Year. The objective is to make them familiar with different type of special electrical machines. The course addresses the construction, operation and applications of all types of special electrical machines such Switched reluctance motor, stepper motors, Permanent magnet DC motor, Permanent magnet brushless DC motor and linear induction and linear synchronous motor applications of stepping motors and switched reluctance motor and its application are also discussed.

Course Pre/co requisites

A5204-Electrical Machines-I
A5207-Electrical Machines-II

2. Course Outcomes (COs)

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

A5252.1 Analyze the design of stator, rotor of SR Motors and different types of power converter and its control types of electrical machines.

A5252.2 Evaluate the performance characteristics of stepper motor and servo motor by position Control.

A5252.3 Analyze the torque equation and equivalent circuit of PMDC motor.

A5252.4 Understand the construction and operation control the BLDC motor with and without sensor.

A5252.5 Apply the linear induction and linear synchronous motor for different purpose.

3. Course Syllabus

SWITCHED RELUCTANCE MOTOR: Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

STEPPER MOTORS: Construction – Principle of operation – Theory of torque production – Hybrid stepping motor – Variable reluctance stepping motor – Open loop and closed loop control.

PERMANENT MAGNET DC MOTORS: Construction – Principle of working – Torque equation and equivalent circuits – Performance characteristics – Moving coil motors.

PERMANENT MAGNET BRUSHLESS DC MOTOR: Construction – Principle of operation – Theory of brushless DC motor as variable speed synchronous motor – Sensor less and sensor based control of BLDC motors.

LINEAR MOTORS: Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

4. Books and Materials

Text Books:

1. Special electrical Machines, K. Venkata Ratnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet and reluctance motor drives, Clarenden press, T.J.E. Miller, 1989, Oxford.

Reference Books:

1. Special electrical machines, E.G. Janardhanan, PHI learning private limited, 2014.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5253 – ADVANCED CONTROL SYSTEMS

(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

Modern day control engineering is a relatively new field of study that gained significant attention during the 20th century with the advancement of technology. It can be broadly defined or classified as practical application of control theory. It seeks to understand physical systems, using mathematical modeling, in terms of inputs, outputs and various components with different behaviors, use control systems design tools to develop controllers for those systems and implement controllers in physical systems employing available technology. A system can be mechanical, electrical, fluid, chemical, financial and even biological, and the mathematical modeling, analysis and controller design uses control theory in one or many of the time, frequency and complex-s domains, depending on the nature of the design problem.

Course Pre/co requisites

A5209-Control Systems

2. Course Outcomes (COs)

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

A5253.1 Develop the mathematical modeling of linear/non-linear systems in state space.

A5253.2 Investigate the controllability/observability of a given system.

A5253.3 Analyze stability of linear / Non-linear systems using various methods.

A5253.4 Design state feedback controller and optimal controller for a given system.

3. Course Syllabus

STATE SPACE ANALYSIS: State Space Representation, Solution of State Equation, State Transition Matrix.

CONTROLLABILITY AND OBSERVABILITY: Tests for controllability and observability for continuous time systems, Time varying case, minimum energy control, time invariant case. Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms. Canonical Forms: Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

DESCRIBING FUNCTION ANALYSIS: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.
PHASE-PLANE ANALYSIS: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

STABILITY ANALYSIS: Stability in the sense of Lyapunov: Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

MODEL CONTROL: Effect of state feedback on controllability and observability, Design of State Feedback Controller through Pole placement. Full order observer and reduced order observer.

STATE FEEDBACK CONTROLLERS AND OBSERVERS: Design of state feedback controller through pole placement, Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

4. Books and Materials

Text Books:

1. K. Ogata (2008), *Modern Control Engineering*, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi.
2. M. Gopal (2009), *Digital Control and State Variable Method*, 3rd edition, Tata McGraw-Hill Companies, New Delhi.

Reference Books:

1. I. J. Nagrath, M. Gopal (2011), *Control Systems Engineering*, 5th Edition, New Age International (P) Ltd, New Delhi.
2. M. Gopal (2005), *Modern Control System Theory*, 2nd edition, New Age International Publishers, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

COURSE STRUCTURE

A5254 – MACHINE MODELLING ANALYSIS

(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 is designed to introduce you to the principles and practice of smart electrical energy conversion. The fundamental power electronic converter topologies are introduced, and you will learn about modulation processes (i.e. switching) and control techniques for these systems.

Course Pre/co requisites

A5202 – Network Theory-I

2. Course Outcomes (COs)

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

A5254.1 Construct the two pole machine diagram for any given machine modelling.

A5254.2 Analyze the response both in transient and steady state for any DC machine.

A5254.3 Apply the knowledge of Machines to transform one set of variables into any other set of variables as required.

A5254.4 Develop the model of an induction machine and synchronous machine.

3. Course Syllabus

BASIC TWO POLE MACHINE: Basic Two-pole DC machine, primitive 2-axis machine, Voltage and Current relationship, Torque equation.

MODELLING AND ANALYSIS OF DC MACHINES: Mathematical model of separately excited DC motor and DC Series motor in state variable form. Transfer function of the motor. Mathematical model of D.C. shunt motor and D.C. Compound motor in state variable form. Transfer function of the motor.

TRANSFORMATIONS: Linear transformation, Phase transformation (a, b, c to α,β,γ), Active transformation.

MODELLING OF THREE PHASE INDUCTION MACHINES: Circuit model of a 3 - phase Induction motor, linear transformation, Phase Transformation, Transformation to a Reference frame, Two axis models for Induction motor.

REFERENCE FRAME THEORY: Voltage and current Equations in stator reference frame, Equation in Rotor reference frame, Equations in a synchronously rotating frame. Torque Equation, Equations in state space form.

MODELLING OF SYNCHRONOUS MACHINE: Circuit model of a 3 phase Synchronous motor, Two axis representation of Synchronous Motor. Voltage and current Equations in state - space variable form, Torque equation.

4. Books and Materials

Text Books:

1. P. S. Bimbhra (2002), Generalized Theory of Electrical Machines, 5 th edition, Khanna Publishers, New Delhi.
2. Vedam Subramanyam (2008), Thyristor control of Electric Drives, 1st Edition, Tata McGraw Hill Education, New Delhi.

Reference Books:

1. Paul C. Krause, Oleg wasynezuk, Scott D. Sudhoff (2002), Analysis of Electric Machinery and Drive Systems, 2nd Edition, Wiley Publishers, New Delhi.

III B.TECH I SEM

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

To focus on building basic necessary skills, problem solving, design processes and enhancing the engineering design robustness

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 engineering and 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

Module 1 - Introduction

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

Module 2 - Case Studies

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

Module 3 - Human Centered Design
Introduction to HCD (Human Centered Design), HCD as a Mindset, personas and scenarios, best practice working with communities.

Module 4 - Specification Development
Definition of specification, three examples of ways to generate specifications, how to manage specifications, functional decomposition.

Module 5 - Prototyping
Three kinds of prototypes, how prototypes can be used in the design process, how to use prototypes can be used to elicit input from users.

Module 6 - Ideation, Innovation & Creativity
Concept Selection, Interpretation of Creativity and Innovation, Brain storming Expanding the Design Space, case study using decision matrix.

Module 7 - 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.

Module 8 - 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 2ndEditon.
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, Emad Abouel Nasr, "Engineering design and Rapid Prototyping", Springer.
2. Ken Hurst," Engineering design principles", Elsevier, 2nd Edition.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH I SEM

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/co requisites

"The course has no specific prerequisite and co requisite"

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:

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

SYLLABI FOR III YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

COURSE STRUCTURE

A5417 – INTEGRATED ELECTRONIC CIRCUITS

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

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

A5402-Electronic Devices and Circuit Analysis

2. Course Outcomes (COs)

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

A5417.1 Understand the working and analysis of electronic circuits.

A5417.2 Apply the knowledge of Kirchhoff's voltage and Current laws to observe the response of various Electronic circuits.

A5417.3 Analyze the functioning of various Electronic Circuitry, including wave shaping circuits, signal generation, filtering, timing and control circuits.

A5417.4 Design Signal Processing and Generation circuits for the given specifications.

A5417.5 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 and step input.

SIGNAL GENERATORS: Design and analysis of fixed bias and self-biased Bistable multivibrator, design and analysis of collector coupled Monostable and Astable multivibrator.

OPERATIONAL AMPLIFIER AND ITS APPLICATIONS: Basic information of Op-Amp IC741, Differential Amplifier, 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 and its applications.
ACTIVE FILTERS: Low pass, high pass (1^{st} and 2^{nd} order), band pass, band stop.

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) – Single slope, dual slope, successive approximation, Flash type.

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 Bistable Multivibrator as a Memory element.
5. Design of Monostable Multivibrator as a Pulse Width generator.
6. Design of Astable Multivibrator 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. Digital Storage Oscilloscope.
2. Function Generator.
3. Desktop Computers.
4. Multisim Software.
5. Component Development System (CDS) Boards.
6. Digital Multimeters.

7. Active and Passive Components.
8. Regulated Power Supply.

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.

Reference Books:

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

III B.TECH II SEM

COURSE STRUCTURE

A5418 – MICRO PROCESSORS AND MICRO CONTROLLERS

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) and their architectures with an emphasis on its interfacing with external devices. Focus is on 8086 microprocessor family 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 8051 microcontroller, 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.

Course Pre/co requisites

A5420- Switching Theory and Logic Design

2. Course Outcomes (COs)

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

A5418.1 Explain the fundamentals of microprocessor & controller to investigate existing designs.

A5418.2 Utilize the assembly language programming proficiency to assemble and run on host machine.

A5418.3 Identify the required driver circuitry to microprocessor and controller I/O ports to interface external devices.

A5418.4 Build and integrate the required hardware & software modules for a functional model.

A5418.5 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, Minimum mode system operation, Timing diagrams.

8086 ASSEMBLY LANGUAGE PROGRAMMING: 8086 Assembly Language Programming Process, Assembly language instructions involving evaluation of arithmetic expressions, branch, call instructions, sorting, string manipulation, assembler directives, procedures and macros, Simple programs.

8086 MEMORY INTERFACING: Interfacing RAM, ROM, EPROM to 8086, Direct Memory Access (DMA-8257) Data Transfer.

INTERRUPTS AND PROGRAMMABLE INTERRUPT CONTROLLERS: 8086 Interrupts and Interrupt Responses, 8259A Priority Interrupt Controller.

SERIAL DATA TRANSFER SCHEMES: Asynchronous and synchronous data transfer schemes, RS - 232C Serial data standard, USART, sample program of serial data transfer (Transmit & Receive)

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

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.

Practice

Formulate/Compose/Compute an assembly language program under MASM (8086) and Keil (8051)

Cycle - I

1. To list operational codes with pneumonic on the trainer board using serial & stand alone modes.
2. To evaluate all addressing modes (8) using debugger mode.
3. To perform arithmetic operations (ADD, SUB, MUL, DIV, ADC, SBB) of 8, 16 & 32 - bit operands.
4. To move the content (Block of data transfer) from memory location to other memory location in Intra & Inter segments.
5. To find GCD and Factorial of given operand, ASCII operations and also to authenticate the password of length 3 bytes.
6. To find the sum of a series, squares & cubes of 8-bit or 16 bit numbers in a given array of 5 numbers.
7. To perform code conversion i.e. conversion of unpacked to packed BCD and vice versa.
8. To find the largest and smallest number in an array of data & to arrange a given series of numbers in ascending and descending order.
9. To perform string manipulation operations on the string stored in the memory
10. To generate 5ms delay with and without interrupt for timer & Count no of pulses in the external clock using counter in 8051.

Cycle - II

11. 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.

Note: Source code either in Assembly or Embedded C

12. 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

Note: Source code either in Assembly or Embedded C

13. To interface D/A converters to 8086/8051 and observe the following:
    a. Square wave
    b. Ramp signal
    c. Sinusoidal wave

Note: Source code either in Assembly or Embedded C

14. To observe traffic signals by interfacing controller to 8086/8051 & observe the changes in signals like Red, Green, Amber & straight, left, right, pedestrian etc.

4. Laboratory Equipment/Software/Tools Required

1. Computer System (PCs).
2. Assembler (MASM) Software (Open Source / Freeware).
3. 8086 Based Microprocessors Trainer Kit.
4. KEIL Compiler Software (Open Source / Freeware).
5. 8051 based Microcontroller kits.
6. Function Generators (0-1MHz).
7. 16 Channel ADC Interface.
8. Study Card 8255.
9. Study Card 8259.
10. Dual DAC Interface.
11. Elevator Interface.
12. Stepper Motor Interface.
13. Dual Channel Cathode Ray Oscilloscope (0-20MHz).
14. LCD interface.
15. Keyboard interface.
16. Traffic light Interface.

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.

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

COURSE STRUCTURE

A5214 – POWER SYSTEMS ANALYSIS AND PROTECTION

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

Power Systems Analysis and Protection deals with the computer control of power systems and protection. This course basically introduces the study of load flow analysis, per unit system, Y bus matrix, Z bus matrix and graph theory, which are used to analyse the power system behaviour under various circumstances. This course also gives the knowledge of various protection schemes, types of circuit breakers and relays in power systems.

Course Pre/co requisites

A5210-Power Systems-II

2. Course Outcomes (COs)

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

A5214.1 Develop per-unit reactance diagrams, bus incidence, Y bus and Z bus matrices for modeling the actual power system.

A5214.2 Determine steady state power flow analysis of power system using Gauss-Seidel, Newton Raphson and fast decoupled iterative methods

A5214.3 Analyze symmetrical and unsymmetrical power system faults.

A5214.4 Analyze the operational aspects of different types of circuit breakers.

A5214.5 Distinguish various types of relaying schemes such as differential, distance, over current / under voltage, Instantaneous, DMT and IDMT relays.

3. Course Syllabus

Theory

PER-UNIT SYSTEM OF REPRESENTATION: Per-Unit equivalent reactance network of a three phase Power System. Bus Incidence Matrix, Y-bus formation by Direct and Singular Transformation Methods.

POWER FLOW ANALYSIS - I: Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart.

Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers.

POWER FLOW ANALYSIS - II: Newton Raphson and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements.

SHORT CIRCUIT ANALYSIS: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors.

FAULT ANALYSIS: Symmetrical Component Transformation, Positive, Negative and Zero sequence components (Voltages, Currents and Impedances) and networks. LG, LL, LLG faults with and without fault impedance.

CIRCUIT BREAKERS: Fuse, Types of Fuses and its Characteristics, Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages, Restriking Phenomenon, Average and Max. RRRV. Current Chopping and Resistance Switching, CB ratings and Specifications, Types. Auto reclosures description and Operation of following types of circuit breakers, Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

ELECTROMAGNETIC AND STATIC RELAYS: Principle of Operation and Construction of Attracted armature, Balanced Beam, Induction Disc and Induction Cup relays.
RELAYS CLASSIFICATION: Instantaneous, DMT and IDMT types. Application of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. 3-Zone protection, Introduction to digital relays.
UNIVERSAL TORQUE EQUATION, DISTANCE RELAYS: Impedance, Reactance and Mho and Off-Set Mho relays, Buchholtz Relay.

Practice

1. Determination of bus admittance matrix (Y-Bus) using MATLAB.
2. Determination of bus impedance matrix (Z-Bus) using MATLAB.
3. Load flow analysis using Gauss – Seidal Method using MATLAB.
4. Load flow analysis using Newton Raphson Method Using MATLAB.
5. Determination of symmetrical components using MATLAB.
6. Study of LG, LLG, LLL, and LLLG faults using PSCAD.
7. PSCAD Simulation of a circuit breaker operation.
8. IDMT Characteristics of a fuse.
9. IDMT Characteristics of a circuit breaker.
10. LG Fault of a long transmission line.
11. Measurement of earth resistivity.
12. Protection of Transmission Line with distance relays using PSCAD.

4. Laboratory Equipment/Software/Tools Required

1. Earth Resistance test kit.
2. Hammer (3kgs).
3. Miniature Circuit Breaker(MCB) Test Kit (50A).
4. Fuse Testing unit (50A).
5. Transmission line Protection simulation unit.
6. Desktop Computers.
7. PSCAD Software.
8. MATLAB Software.

5. Books and Materials

Text Books:

1. G. W. Stagg, A. H. El-Abiad (2008), Computer Methods in power System Analysis, 2nd Edition, Tata McGraw Hill Publications, New Delhi.
2. M. A. Pai (2008), Computer Techniques in Power System Analysis, 2nd edition, Tata McGraw Hill Publications, New Delhi, India.
3. Badari Ram, D. N. Viswakarma (2007), Power System Protection and Switchgear, 1st Edition, Tata McGraw Hill Publications, New Delhi.

Reference Books:

1. Hadi Saadat (2007), Power System Analysis, 5th edition, Tata McGraw Hill Publications, New Delhi.
2. I. J. Nagrath, D. P. Kothari (2005), Modern Power system Analysis, 3rd edition, Tata McGraw Hill Publications, New Delhi, India.
3. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakraborti (1999), A Text Book on Electrical Engineering, 1st Edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

COURSE STRUCTURE

A5255 – POWER SYSTEM DYNAMICS AND STABILITY

(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 provides an understanding of the electromechanical dynamics of the interconnected electric power grid. This subject is presented from a theoretical viewpoint; however, many practical examples are included. The course begins with a description of the physics of the power system, frequency regulation during "steady-state" operation, dynamic characteristics of modern power systems, a review of feedback control systems, power system frequency regulation, and a review of protective relaying. This is followed by material on synchronous machine theory and modeling. Simulation of power system dynamic response, small signal stability, transient stability analysis using SIMULINK and effects of non-traditional power sources on systems dynamics will also be covered. Power system stabilizers, load modeling and under frequency load shedding are covered in the final lectures.

Course Pre/co requisites

A5210-Power Systems-II

2. Course Outcomes (COs)

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

A5255.1 Analyze the steady state behavior of synchronous machine using Park's transformation.

A5255.2 Analyze the dynamic behavior of synchronous generator under system conditions leading to instability.

A5255.3 Analyze the generator excitation, prime mover controls and recognize their role in power system stability control.

A5255.4 Compare different types of power system stabilities and methods to improve overall system stability.

A5255.5 Evaluate the power system behavior under small signal, transient and voltage instability conditions using PSCAD simulation.

3. Course Syllabus

Introduction: Introduction General basic concept of Power System Stability, States of operation & System Security, System Dynamics Problems, Review of Classical Model, System Model, Analysis of Steady State Stability & Transient Stability.

Modelling of Synchronous Machine: Synchronous Machine, Park's Transformation, Analysis of Steady State Performance, Equivalent Circuit of Synchronous Machine.

Excitation systems & Prime Mover Controllers: Simplified Representation of Excitation Control, Excitation systems, Modelling, Block Diagram, State Equations, Prime Mover Control System, Transmission Line & Load Modelling.

Dynamics of Synchronous Generator: Dynamics of Synchronous Generator Connected to Infinite Bus System Model, Synchronous Machine Model, System Simulation, Consideration of other Machine Models including SVC Model.

Small signal Stability -Single and multi-machine system, Damping and Synchronizing torque Analysis, Power System Stabilizers Transient Stability and Voltage Stability controllers. Voltage Stability: Introduction, affecting factors, analysis, comparison with angle stability.

4. Books and Materials

Text Books:

1. K. R. Padiyar, Power System Dynamics – Stability & Control, BS Publications.
2. I.J. Nagrath and M. Gopal, Control system engineering, Wiley Eastern Ltd, 3rd Edition, 2000.

Reference Books:

1. Benjamin C. Kuo, Automatic Control system, Prentice Hall of India Pvt Ltd.
2. Prabha Kundur, Power System Stability and Control, Tata McGraw Hill.

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III B.TECH II SEM

COURSE STRUCTURE

A5256 – POWER SWITCHING CONVERTERS

(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 Power Switching Converters deals with modeling and design of power electronic converters like buck, boost, fly back, push pull converters, etc. This course also deals with zero voltage switching and zero current switching to minimize the power losses. Analysis of various multi-level inverter circuits also present in this course.

Course Pre/co requisites

A5211 – Power Electronics

2. Course Outcomes (COs)

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

A5256.1 Apply the knowledge of thyristor, IGBT and MOSFET in different Power Electronic converters.

A5256.2 Analyze various power electronic converters.

A5256.3 Apply the knowledge of converters to select suitable converter for a given application.

A5256.4 Calculate different parameters of Converters for the given requirements to investigate the performance of a converters.

3. Course Syllabus

BASIC CONVERTER TOPOLOGIES: Buck converter, steady state converter analysis of Buck converter in continuous and discontinuous mode, Boost converter, steady state converter analysis of Boost converter in continuous and discontinuous mode, Buck-Boost converter, steady state converter analysis of Buck-Boost converter in continuous and discontinuous mode, numerical.

STATE SPACE MODELLING: State space modelling of buck, boost and buck-boost converters in continuous conduction mode, voltage and current control modes, Circuit Averaging Modelling Technique, PWM switch modelling.

ISOLATED CONVERTERS: Principle of operation, waveforms, design considerations and analysis of forward converter, push-pull converter, fly back converter, half bridge converter and full bridge converter.

SOFT-SWITCHING DC - DC CONVERTERS: Introduction, Principle of operation and analysis of zero-voltage-switching converters, zero-current switching converters, series, parallel and series-parallel resonant converters.

MULTILEVEL INVERTERS: Introduction to multi-level inverters, Advantages of multi-level inverters, conventional three-level neutral point clamped inverter, three-level capacitor clamped inverter, three-level cascaded H-bridge inverter.

4. Books and Materials

Text Books:

1. Robert W. Erickson, Dragan Maksimovic, 'Fundamentals of Power Electronics', Springer Science & Business Media, 2 nd Edition, 2007.
2. Ned Mohan, Tore M. Undeland, and William P.Robbins, 'Power Electronics: Converters, Applications, and Design', 3 rd Edition, Wiley Publishers, 2002.

Reference Books:

1. Simon Ang, Alejandro Oliva, 'Power Switching Converters', Taylor & Francis, 3rd Edition, 2010. M. Rashid, 'Power Electronics: Circuits, Devices, and Applications', Pearson Education, 4th Edition 2013.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

COURSE STRUCTURE

A5257 – NEURAL NETWORKS AND FUZZY LOGICS

(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 addresses the concepts, skills, methodologies, and models of Neural networks and fuzzy logics. The course addresses proper techniques for designing Neural networks for artificial intelligence, logic circuits, and covers concepts for memories of the Neural networks and other fuzzy logic applications in DBMS. Artificial Neural Networks is an extract from the functionalities of a biological brain, and it is a powerful new technology with great potential to help in various electrical applications like forecasting, load flow studies and economic load dispatch.

Course Pre/co requisites

A5420- Switching Theory and Logic Design

2. Course Outcomes (COs)

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

A5257.1 Build the basic model of artificial neuron and compare the functions of both artificial neuron and biological Neuron.

A5257.2 Develop different architectures of Artificial Neural Networks and apply learning laws and the learning rules associated with the neural networks.

A5257.3 Analyze the problem of linearly separable using Perceptron model and relate to the concept of Madaline networks.

A5257.4 Explore the associative learning of the neural network, the architecture of Hopfield network and the error performance of Hopfield network.

A5257.5 Analyze the fuzzy sets and evaluate the fuzzy logic system with fuzzification, rule base and defuzzification methods.

3. Course Syllabus

INTRODUCTION TO NEURAL NETWORKS: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Applications of ANN.

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS: Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

FEED FORWARD NEURAL NETWORKS: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm.

ASSOCIATIVE MEMORIES: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, Bidirectional Associative Memory (BAM) Architecture. Architecture of Hopfield Network: Discrete and Continuous versions.

CLASSICAL & FUZZY SETS: Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

FUZZY LOGIC SYSTEM COMPONENTS: Fuzzification, Membership value assignment, development of rule base and decision-making system, Defuzzification to crisp sets, Defuzzification methods.

4. Books and Materials

Text Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Pai – PHI Publication.
2. Introduction to Neural Networks using MATLAB 6.0 – S. N. Sivanandam, S. Sumathi, S.N. Deepa, TMH.

Reference Books:

1. Neural Networks – James A Freeman and Davis S kapura, Pearson Education, 2002.
2. Neural Networks – Simon Hakins, Pearson Education.
3. Neural Engineering by C. Eliasmith and CH. Anderson, PHI.
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

COURSE STRUCTURE

A5258 – ELECTRIC VEHICLES

(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 focuses on the technology behind Electric and Hybrid vehicles. Students will explore the working principle of electric vehicles, delve into the key roles played by motors and power electronics, learn about battery technology, EV charging, smart charging, EV Business and about future trends in the development of electric vehicles.

Course Pre/co requisites

A5207 – Electrical Machines - II

2. Course Outcomes (COs)

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

A5258.1 Demonstrate different configurations of electric vehicles and its components, hybrid vehicle configuration by different techniques, E-mobility business of Electric Vehicles.

A5258.2 Analyse plug – in hybrid electric vehicle architecture, design and component sizing and the power electronics devices used in hybrid electric vehicles.

A5258.3 Develop the electric propulsion unit and its control for application of electric vehicles.

A5258.4 Discuss different energy storage technologies used for hybrid electric vehicles and their control.

3. Course Syllabus

INTRODUCTION TO ELECTRIC VEHICLES: EV System, Components of an EV, EV History, the early years, recent EVs and HEVs ,EV Advantages, Efficiency Comparison, Pollution Comparison, Capital and Operating Cost Comparison.

HYBRID ELECTRIC VEHICLES: Types of Hybrids Vehicles, Series and Parallel HEVs, Advantages and Disadvantages, Series-Parallel Combination, Concept of Hybrid Electric Drive Trains, Architectures of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel Hybrid Electric Drive Trains.

ELECTRIC PROPULSION SYSTEMS: Basic Principles of BLDC Motor Drives, BLDC Machine Construction and Classification, application to Electric Vehicles. Switched Reluctance Motor Drives, Basic Magnetic Structure, Torque Production, SRM Drive Converter, Modes of Operation, Generating Mode of Operation, application to Electric Vehicles.

INTRODUCTION TO ENERGY STORAGE REQUIREMENTS: Requirements for Battery Systems in Electric Vehicles, Types of Batteries, Key Battery Management Technologies, Typical Structure of Battery Management Systems.

BUSINESS: E-mobility business, electrification challenges, Connected Mobility and Autonomous Mobility- case study E-mobility Indian Roadmap. EVs in infrastructure system, social dimensions of EVs.

4. Books and Materials

Text Books:

1. Emadi, A. (Ed.), Miller, J., Ehsani, M., “Vehicular Electric Power Systems” Boca Raton, CRC Press, 2003.
2. Iqbal Husain, “ELECTRIC and HYBRID VEHICLES: Design Fundamentals”, CRC PRESS Boca Raton London New York Washington, D.C., 2003.
3. Larminie, James, and John Lowry, “Electric Vehicle Technology Explained” John Wiley and Sons, 2012.

Reference Books:

1. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design”, CRC PRESS Boca Raton London New York Washington, D.C., 2009.
2. Shen, Weixiang_ Xiong, Rui, ”Advanced battery management technologies for electric vehicles” 2019, John Wiley & Sons.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

COURSE STRUCTURE

A5017-PRODUCT REALIZATION

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

This course provides the alternative avenues to develop engineers who are both technically competent and who have significant experience in the design and development of products.

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

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. 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 determined the calibration status, Safeguarded from adjustment and Protection from change and deterioration.
Regulatory Investigation & Identification: Various regulatory bodies, roles and responsibilities, model of comprehensive document for the body of information about an investigational product.

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 centaury 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B.TECH II SEM

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	28	0	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/co-requisites

This course facilitates graduate students to know about importance of the Indian constitution and facilitates students to know about the fundamental rights of the citizens.

3. 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.

4. 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.

5. Books and Materials

Text Book:

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

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH I SEM

COURSE STRUCTURE

A5216 – POWER SEMICONDUCTOR DRIVES

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 focuses on basic principles of speed control of DC & AC machines. The study of Improvement of Speed response by closed loop control is emphasized.

Course Pre/co requisites

A5211-Power Electronics

2. Course Outcomes (COs)

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

A5216.1 Analyze 1 phase and 3phase controlled converters for speed control operation of DC Drives.

A5216.2 Apply the knowledge of DC-Dc Converter and dual converter for speed and torque control of DC Drives.

A5216.3 Analyze variable frequency control of Induction motor on stator side using different converters.

A5216.4 Test the performance of Induction Motor by conducting different speed control methods.

A5216.5 Assess different power electronic converter to control speed of synchronous motor drives.

3. Course Syllabus

Theory

CONTROL OF DC MOTORS BY 1-ϕ CONTROLLED CONVERTERS: Introduction to Thyristor controlled Drives, Single Phase Semi and Full controlled converters connected to D.C separately excited and D.C series motors, continuous operation, output voltage and current waveforms. Speed and Torque expressions, Speed – Torque Characteristics.

CONTROL OF DC MOTORS BY 3-ϕ CONTROLLED CONVERTERS: Three phase semi and fully controlled converters connected to D.C separately excited and D.C series motors, output voltage and current waveforms. Speed and Torque expressions, Speed –Torque characteristics, Numerical problems.

FOUR QUADRANT OPERATIONS OF DC DRIVES: Electric Braking – Plugging, Dynamic and Regenerative Braking operations, Numerical problems.

CONTROL OF DC MOTORS BY CHOPPERS: Single quadrant, Two –quadrant and four-quadrant chopper fed separately excited dc motor. Continuous operation, Output voltage and current waveforms, Speed torque expressions, speed torque characteristics. Closed loop operation of DC motor (Block Diagram Only) Numerical problems.

CONTROL OF INDUCTION MOTORS: Variable voltage characteristics, Variable frequency characteristics, V/F Control of Induction motor Voltage source Inverter and Current source Inverter control of induction motor. Comparison of VSI and CSI operations, Speed torque characteristics, numerical on induction motor drives, closed loop operation of induction motor drives (Block Diagram Only) Numerical problems.

PWM CONTROL OF INDUCTION MOTOR DRIVES: Introduction to PWM, Sinusoidal PWM (SPWM) control of Induction Motor, Space vector modulation (SVPWM) control of Induction Motor.
CONTROL OF SYNCHRONOUS MOTOR DRIVES: Control characteristics of Synchronous motor drive, VSI fed and CSI fed Synchronous Motor, Closed Loop operation of synchronous motor drives (Block Diagram Only).

Practice

1. Speed Control of DC Motor using single phase Half Converter.
2. Speed Control of DC Motor using single phase Full Converter.
3. Speed Control of DC Motor using Jone's Chopper.
4. Light intensity control using single phase AC voltage regulator.
5. Speed Control of single phase AC Motor using single phase AC voltage controller.
6. Single phase Cyclo-converter fed AC Motor.
7. Performance characteristics of series inverter for light load.
8. Speed control of PMDC motor using MOSFET based Buck/Boost Converter.
9. Simulation of 3 phase Half Controlled Bridge DC drives using MATLAB/ Simulink.
10. Simulation of three-phase Induction Motor drive with VVVF control using MATLAB/Simulink.
11. Simulation of closed loop control of PMDC Motor with half wave rectifier using MATLAB/ Simulink.
12. Simulation of four quadrant chopper fed DC motor using MATLAB/ Simulink.

4. Laboratory Equipment/Software/Tools Required

1. Speed Control of DC motor using Full converter.
2. Speed Control of DC motor using Half converter.
3. Speed Control of DC motor using Three phase Half Controlled Bridge converter.
4. Speed Control of DC motor by using Jones Chopper.
5. SCR Circuit to Drive Small Load.
6. Speed control of single phase motor using SCR.
7. Single Phase cyclo converter.
8. Three phase AC induction motor drive with VVVF control.

9. Speed measurement and control of PMDC motor using Closed Loop.
10. Thyristorised drive for speed measurement and control of PMDC motor using closed loop
11. Series Inverter.
12. MOSFET based buck Boost converter.
13. DC Motor (0.5kW,230V,2.1A,1500rpm).
14. Single Phase AC Motor (1/4 hp,160-240V, 2A, 1400rpm).
15. PMDC Motor (100W,12V,0.9A,1500rpm).
16. Isolation Transformer (1kVA, 220/220V).
17. Tachometer (0-3000rpm).
18. Rheostat (290Ω/2.8A, 360Ω/1.2A).
19. Light Load (100W,60W (bulbs)).

5. Books and Materials

Text Books:

1. G. K. Dubey (2002), Fundamentals of Electric Drives, 2nd Edition, Narosa Publications, New Delhi.
2. M. H. Rashid (2003), Power Electronic Circuits, Devices and applications, 3rd Edition, Prentice Hall of India, New Delhi, India.

Reference Books:

1. M. D. Singh, K. B. Khanchandani (2008), Power Electronics, 2nd Edition, Tata McGraw Hill Publications, New Delhi.
2. Vedam Subramanyam (2008), Thyristor Control of Electric drives 1st Edition, Tata McGraw Hill Publications, New Delhi, India.
3. S. K. Pillai (2007), A First course on Electrical Drives, 2nd Edition, New Age International (P) Ltd., New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH I SEM

COURSE STRUCTURE

A5217 – POWER SYSTEM OPERATION 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

In this course it is aimed to the students the principles and applications of control system in everyday life. The basic concepts of block diagram reduction, time domain analysis solution analysis to time invariant systems and also deals with the different aspects of the stability analysis of the system in frequency domain and time domain.

Course Pre/co requisites

A5210-Power Systems-II

2. Course Outcomes (COs)

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

A5217.1 Apply the basic knowledge for economic operation, load frequency control and reactive power compensation.

A5217.2 Analyze the static and dynamic performance of single and multi area Load Frequency Control.

A5217.3 Analyzethe techniques and devices used for reactive power compensation.

A5217.4 Evaluate the load scheduling among various thermal and hydrothermal plants.

A5217.5 Model various components of an isolated power system.

3. Course Syllabus

INTRODUCTION TO ECONOMIC OPERATION OF POWER SYSTEMS: Optimal operation of generators in thermal power stations, Heat rate curve, Cost curve, Incremental fuel costs, Production costs, Input-output characteristics, Optimum generation allocation with and without line losses, Loss coefficients, General transmission line loss formula.

HYDROTHERMAL SCHEDULING: Optimal scheduling of hydrothermal system, Hydroelectric power plant models, Scheduling problems, Short term hydrothermal scheduling problem.

MODELING OF TURBINE, SPEED GOVERNOR, and EXCITATION SYSTEM: First order turbine model, Block diagram representation of steam turbines and approximate linear models, Mathematical

modeling of speed governing system, Derivation of small signal transfer function, Fundamental characteristics of an excitation system Transfer function.

LOAD FREQUENCY CONTROL: Necessity of keeping frequency constant, Definition of control area, Single area control, Block diagram representation of an isolated power system, Steady state analysis, Dynamic response, Load frequency control of 2-area system, Uncontrolled case and controlled case, Tie-line bias control.

LOAD FREQUENCY CONTROLLERS: Proportional plus integral control of single area and its block diagram representation, Steady state response, Load frequency control, Economic dispatch control.

REACTIVE POWER CONTROL: Principle of reactive power control, Load compensation, Specifications of load compensator, Uncompensated and compensated transmission lines, Shunt and series compensation.

4. Books and Materials

Text Books:

1. I. J. Nagrath, D.P. Kothari(2006), modern power system analysis, 3rd Edition, McGraw Hill Publishers, New Delhi.
2. P.S.R. Murthy(2008), power system operation and control, 1st Edition, Tata McGraw Hill Publishers, New Delhi.

Reference Books:

1. Hadi Saadat(2010), power system analysis, revised edition, PSA publishers, New Delhi
2. O.I. Elgerd(2007), Electric Energy Systems Theory, 2nd edition, Tata McGraw Hill Publishers, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH I SEM

OURSE STRUCTURE

A5259 – HIGH VOLTAGE ENGINEERING

(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 the fundamental techniques for the generation and measurement of high voltages, electrostatic fields and field stress control, electrical breakdown in gases, dielectrics, non destructive insulation tests, over-voltages, design and testing of external insulation.

Course Pre/co requisites

A5214- Power system Analysis and Protection

2. Course Outcomes (COs)

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

A5259.1 Analyze the techniques used for high voltage generation and their measurements.

A5259.2 Apply various methods to find field factor for uniform and non-uniform fields.

A5259.3 Discriminate the dielectric strengths used for all electrical apparatus and their breakdown mechanism.

A5259.4 Categories the methods used for testing electrical apparatus and its insulation coordination.

A5259.5 Analyze the protective devices for over voltages, surge voltages and their control.

3. Course Syllabus

INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS: Electric Field Stresses, Estimation and Control of Electric Stress, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

BREAK DOWN IN GASEOUS, LIQUID DIELECTRICS AND SOLID DIELECTRICS: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

GENERATION OF HIGH VOLTAGES AND CURRENTS: Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents.

MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse.

NON-DISTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.
HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS: Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

4. Books and Materials

Text Books:

1. M. S. Naidu, V. Kamaraju (2009), High Voltage Engineering, 4th edition, Tata McGraw Hill Publications, New Delhi.
2. E. Kuffel, W. S. Zaengl, J. Kuffel (2000), High Voltage Engineering: Fundamentals, 2nd edition, Elsevier Publishers, New York, USA.

Reference Books:

1. C. L. Wadhwa (2007), High Voltage Engineering, New Age Internationals (P) Limited, New Delhi.
2. Ravindra Arora Wolfgang Mosch (2011), High Voltage Insulation Engineering, 1st edition, New Age International (P) Ltd., New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH I SEM

COURSE STRUCTURE

A5260 – POWER QUALITY

(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

The course addresses various issues related to power quality in power systems. This course explains the concepts of transients, flickers, voltage sag, Voltage swell, limits for voltage sag and power quality monitoring .

Course Pre/co requisites

A5210-Power Systems-II

2. Course Outcomes (COs)

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

A5260.1 Analyze the severity of power quality problems in distribution system.

A5260.2 Analyze the various causes of voltage flicker and their effects and various means to reduce flickers.

A5260.3 Apply the knowledge of voltage sag/swell interruptions to improve power quality.

A5260.4 Apply the knowledge of harmonic sources and effects to improve the performance of system.

A5260.5 Evaluate the approaches followed in power quality monitoring.

3. Course Syllabus

INTRODUCTION: Importance of power quality, terms and definitions of power quality as per IEEE std. such as transients, short and long duration voltage variations, interruptions, short and long voltage fluctuations, imbalance, flickers and transient. Symptoms of poor power quality: definitions and terminology of grounding, purpose of groundings, good grounding practices and problems due to poor grounding.

FLICKERS AND TRANSIENT VOLTAGES: RMS Voltage variations in power system and voltage regulation per unit system, complex power. Principle of voltage regulation, basic power flow and voltage drop, various devices used for voltage regulation and impact of reactive power management. Various causes of voltage flicker and their effects, Short term and long term flickers.

VOLTAGE SAG, SWELLS AND INTERRUPTIONS: Definitions of voltage sag and interruptions, Voltage sags versus interruptions. Economic impact of voltage sag, Major causes and consequences of voltage sags, Voltage sag characteristics, Voltage sag assessment. Influence of fault location and fault level on voltage sag, Areas of vulnerability.

LIMITS AND MEASURES FOR VOLTAGE SAG: Assessment of Equipment sensitivity to voltage sags and analysis, voltage sag indices, mitigation measures for voltage sags, such as UPS, DVR, SMEs, CVT etc.

WAVEFORM DISTORTION: Definition of harmonics, inter-harmonics, sub-harmonics. Causes and effect of harmonics, votage versus current distortion. Harmonic indices and analysis.

POWER QUALITY MONITORING: Need of power quality monitoring and approaches followed in power quality monitoring. Power quality monitoring objectives and requirements. Initial site survey. Power quality instrumentation. Selection of power quality monitors, selection of monitoring location and period.

4. Books and Materials

Text Books:

1. M. H. J. Bollen (2000), *Understanding Power Quality Problems, voltage sag and interruptions,* 1st Edition*,* IEEE Press, New Delhi.
2. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H. Wayne Beaty (2008), *Electrical Power Systems Quality,* 2nd Edition, Tata McGraw Hill Publications, New Delhi.

Reference Books:

1. J. Arrillaga, M. R. Watson, S. Chan (2007), Power system quality assessment, 1st Edition, John Wiley and sons, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH I SEM

COURSE STRUCTURE

A5261 – HIGH VOLTAGE DC TRANSMISSION & FACTS

(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

The course studies High Voltage Direct Current technologies, their operation, control and interactions with AC systems. The traditional thyristor-based HVDC is introduced with basic 6-pulse rectifiers and analyzed on typical large systems with the main control loops. The interactions with AC systems through controls and harmonics are analyzed. A special study is concerned with weak AC systems and other reported operating problems. The modern VSC HVDC are introduced using basic self-commutating converter principles. The VSC HVDC controls are presented in a rotating DQ coordinate frame and interaction with AC is explored. The course also analyses the latest Modular Multilevel HVDC topologies. In the last segment of this course, the students will learn about multi-terminal HVDC and DC grids. The course is supported with live simulation on SIMULINK HVDC models, which are made available to the students.

Course Pre/co requisites

A5210-Power Systems-II

2. Course Outcomes (COs)

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

A5261.1 Evaluate the HVDC Transmission systems and Lines.

A5261.2 Identify and analyze converter configurations used in HVDC and list the performance metrics.

A5261.3 Compute the filter parameters for elimination of voltage and current harmonics in HVDC system.

A5261.4 Identify HVDC/FACTS devices to address a power quality issues related to power system.

3. Course Syllabus

HVDC CONCEPTS: Introduction to HVDC, Types of HVDC Links, Apparatus required for HVDC Systems. Comparison of AC &DC Transmission, Application of DC Transmission System, Planning & Modern trends in D.C. Transmission, Economics of HVDC transmission systems.

HVDC CONVERTERS & SYSTEM CONTROL: Choice of Converter configuration, characteristics of 6 Pulse converters, Principle of DC Link Control, Converters Control Characteristics, Firing angle control. Current and extinction angle control.

POWER FLOW ANALYSIS & REACTIVE POWER CONTROL IN HVDC: Modeling of DC Links-DC Network-DC Converter, Controller Equations-Solution of DC load flow. P.U. System for DC quantities-solution of AC-DC Power flow-Simultaneous method, Sequential method. Reactive Power Requirements in steady state, Conventional control strategies.

INTRODUCTION TO FACTS: Transmission interconnections, power flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameters Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers.

STATIC SHUNT COMPENSATORS: Objectives of shunt compensation, mid-point voltage regulation for line segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping. Methods of controllable VAR generation: variable impedance type static var generators TCR, TSC, FC-TCR.

4. Books and Materials

Text Books:

1. K. R. Padiyar (2005), HVDC Power Transmission Systems: Technology and system Interactions, 1st edition, New Age International (P) Ltd, New Delhi.
2. N. G. Hingorani, L. Guygi (2001), Understanding FACTS, 1st edition, IEEE Press, USA.

Reference Books:

1. E. W. Kimbark (2006), Direct Current Transmission, 2nd edition, John Wiley & Sons, New Delhi.
2. K. R. Padiyar (2009), FACTS Controllers in power Transmission and Distribution, 1st edition, New Age International (P), Ltd, New Delhi.

IV B.TECH I SEM

COURSE STRUCTURE

A5262 – DISTRIBUTED GENERATION AND MICRO-GRIDS

(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

Distributed energy generation is developing into a significant market in the generation, distribution and utilisation of electrical energy. It includes local fossil-fuel derived energy sources, for example, co-generation from LNG, renewable energy sources, such as wind and hydro, and low-carbon hybrid energy systems that combine energy sources from more than one energy source, whether renewable or fossil-fuelled. This course will equip students with the fundamental technical and economic processes and drivers at play in the electrical power industry. Issues that will be covered include the basics of distribution network modelling, the different types of distributed energy sources utilised (Co-generation/CHP, wind, hydro, photovoltaics) and where they are integrated onto the electrical grid, the impact of the integration of such sources on the fundamental operation of the distribution and transmission networks, and how distributed generation is impacting on the development and operation of market frameworks.

Course Pre/co requisites

A5206- Power Systems - I
A5210- Power Systems-II

2. Course Outcomes (COs)

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

A5262.1 Apply the knowledge of principle of operation, control and modelling of distributed energy systems in connecting them into Grids.

A5262.2 Describe the basic components of a range of distributed energy sources including wind, PV, hydro, cogeneration, and energy storage systems.

A5262.3 Analyse the Economic and control aspects of distributed energy sources and Micro grids.

A5262.4 Compare the various structures available in Micro grids.

3. Course Syllabus

INTRODUCTION TO DISTRIBUTED GENERATION: Need for Distributed generation, renewable sources in distributed generation, current scenario in Distributed Generation, Planning of DGs, Sighting and sizing of DGs, optimal placement of DG sources in distribution systems.

GRID INTEGRATION OF DGS: Different types of interfaces, Inverter based DGs and rotating machine based interfaces, Aggregation of multiple DG units– Transmission systems, Distribution systems, De-regulation – Impact of DGs upon protective relaying, Impact of DGs upon transient and dynamic stability of existing distribution systems.

ECONOMIC AND CONTROL ASPECTS OF DGs: Market facts, issues and challenges, Limitations of DGs, Voltage control techniques, Reactive power control. Reliability of DG based systems, Steady state and Dynamic analysis.

INTRODUCTION TO MICRO-GRIDS: Types of micro-grids, autonomous and non-autonomous grids, Sizing of micro-grids, modeling & analysis, Micro-grids with multiple DGs, Micro- grids with power electronic interfacing units.

AC AND DC COMBINED MICROGRID AND CONTROL: Structure of Combined AC-DC Micro-grid, Operation of Combined Micro-grid, Control Hierarchy, Droop Control in Inverter-based Distributed Generators, Virtual Impedance control.

4. Books and Materials

Text Books:

1. H. Lee Willis, Walter G. Scott, 'Distributed Power Generation – Planning and Evaluation', Marcel Decker Press, 2000.
2. M. Godoy Simoes, Felix A. Farret, 'Renewable Energy Systems – Design and Analysis with Induction Generators', CRC press.
3. Robert Lasseter, Paolo Piagi, 'Micro-grid: A Conceptual Solution', PESC 2004, June 2004.

Reference Books:

1. Z. Ye, R. Walling, N. Miller, P. Du, K. Nelson 'Facility Microgrids', Subcontract report, May 2005, General Electric Global Research Center, Niskayuna, New York.
2. F. Katiraei, M.R. Iravani, 'Transients of a Micro-Grid System with Multiple Distributed Energy Resources',
3. International Conference on Power Systems Transients (IPST'05) in Montreal, Canada on June 19-23, 2005.

SYLLABI FOR IV YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH II SEM

COURSE STRUCTURE

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 co requisite"

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 within 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH II SEM

COURSE STRUCTURE

A5263 – UTILIZATION OF ELECTRICAL ENERGY

(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 deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and electrical traction systems and to clearly understand the basic concepts related to use of electric energy in various industrial, commercial and residential applications and important issues related to such usage.

Course Pre/co requisites

A5206- Power Systems - I
A5210- Power Systems-II

2. Course Outcomes (COs)

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

A5263.1 Analyze various types Electric drives and their applications.
A5263.2 Identify the various modern methods of speed control & braking techniques.
A5263.3 Analyze the modern circuits for generation of high frequency power for induction & electric heating.
A5263.4 Explain the various welding processes used in industry.
A5263.5 Model the different illumination schemes for different applications.

3. Course Syllabus

ELECTRIC DRIVES: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

ELECTRIC HEATING AND WELDING: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

ILLUMINATION: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, source of light, Introduction to LED lights, Numerical Problems..

ELECTRIC TRACTION-I: Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostat braking and regenerative braking, Numerical Problems.

ELECTRIC TRACTION-II: Mechanics of train movement. Speed-time curves for different services, trapezoidal and quadrilateral speed time curves. Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion, Numerical Problems.

4. Books and Materials

Text Books:

1. G. C. Garg (2005), Utilization of Electrical Power & Electric traction, 8th edition, Khanna publishers, New Delhi.
2. N. V. Suryanarayana (2005), Utilization of Electrical Power including Electric drives and Electric traction, 1st edition New Age International (P)Ltd., New Delhi.

Reference Books:

1. Partab (2007), Art & Science of Utilization of electrical Energy, 2nd Edition, Dhanpat Rai & Sons, New Delhi.
2. C.L.Wadhwa (2005), Generation, Distribution and Utilization of Electrical Energy, 2nd Edition, New Age International (P)Ltd., New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH II SEM

COURSE STRUCTURE

A5264– EXTRA HIGH VOLTAGE AC TRANSMISSION

(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 topics such as Transmission line parameters, Corona, RIV and Audible noise on transmission lines, Mechanical vibration of conductors, Electric fields under transmission lines, Overhead line insulators and their performance under polluted environments, Grounding of Towers, HV substations, Over voltages , Surge protective devices, Insulation Co-ordination, etc.

Course Pre/co requisites

A5210 – Power Systems-II

2. Course Outcomes (COs)

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

A5264.1 Apply the knowledge, of basics in power systems, in EHVAC Transmission for computing various parameters such as inductance, capacitance, power transfer, surge impedance loading etc.

A5264.2 Analyze the voltage gradients of conductors to suit corona characteristics calculations.

A5264.3 Evaluate the corona power loss, audible noise, radio interference, modes of propagation etc.

A5264.4 Develop power circle diagrams and its use, voltage control using synchronous condensers and other compensating devices.

3. Course Syllabus

INTRODUCTION: Necessity of EHV AC transmission - Standard transmission voltages, power handling capacity and line losses - Resistance of conductors, properties of bundled conductors, inductance and capacitance of EHV lines, sequence inductances and capacitances, line parameters for modes of propagation, ground return with examples.

VOLTAGE GRADIENTS OF CONDUCTORS: Electrostatics, field of sphere gap, field of line charges and properties, charge-potential relations for multi-conductor lines, surface voltage gradient on conductors, distribution of voltage gradient on sub-conductors of bundle.

CORONA EFFECTS: Corona loss in EHV lines, corona-loss formulae, charge voltage diagram, Attenuation of traveling waves due to corona - audible noise generation, characteristics and limits, formulae for audible noise - Radio interference generation, properties, limits, excitation function, measurement of RI, RIV, and excitation function.

TRAVELLING WAVES AND STANDING WAVES: Travelling waves and standing waves at power frequency, traveling wave expression and solution, source of excitation, terminal conditions, standing waves and natural frequencies, Open circuited and short-circuited end, reflection and refraction coefficients, transient response of systems with series and shunt lumped parameters and distributed lines.

VOLTAGE CONTROL: No-load voltage conditions and charging current, Power circle diagram and its use, voltage control using synchronous condensers, cascade connection of components-shunt and series compensation, sub-synchronous resonance in series capacitor compensated lines, static VAR compensating system.

4. Books and Materials

Text Books:

1. Rakosh Das Begamudre (2011), Extra High Voltage AC Transmission Engineering, 4th Edition, New Age International (P) Ltd, New Delhi.

Reference Books:

1. S. Rao (2009), EHVAC - HVDC transmission and Distribution Engineering, 3rd Edition, Khanna Publishers, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH II SEM

COURSE STRUCTURE

A5265– DIGITAL CONTROL SYSTEMS

(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

The core course in electrical engineering introduces the fundamental concepts, principles and application of digital control system analysis .The course goes deeper into the various aspects of digital control engineering. Each topic is developed in logical progression with up-to-date information.

Course Pre/co requisites

A5209 – Control Systems

2. Course Outcomes (COs)

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

A5265.1 Apply the Sampling & quantization in A/ D conversion & sampling and hold circuit in reconstruction process D/A Conversion.

A5265.2 Analysis of the given system in time domain, frequency domain and Z domain.

A5265.3 Inspect the Stability, Controllability and Observability of digital systems.

A5265.4 Design an appropriate compensator, state feedback controller and observer of digital Systems.

3. Course Syllabus

SAMPLING AND RECONSTRUCTION: Introduction, Examples of Data control systems, Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

THE Z - TRANSFORMS: Introduction, Linear difference equations, pulse response, Z - transforms, Theorems of Z - Transforms, the inverse Z - transforms, Modified Z – Transforms.

Z - PLANE ANALYSIS OF DISCRETE - TIME CONTROL SYSTEM: Z - Transform method for solving difference equations, Pulse transforms function, block diagram analysis of sampled data systems, mapping between S - plane and Z - plane.

STATE SPACE ANALYSIS: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's

Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations.

CONTROLLABILITY AND OBSERVABILITY: Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

STABILITY ANALYSIS: Mapping between the S - Plane and Z – Plane, Primary strips and Complementary Strips, Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z - Plane. Jury stability test, Stability Analysis by Bilinear Transformation and Routh Stability.

4. Books and Materials

Text Books:

1. K. Ogata (2011), Discrete-Time Control systems, 2nd Edition, Pearson Education/Prentice Hall of India, New Delhi.
2. Kuo (2003), Digital Control Systems, 2nd Edition, Oxford University Press, New Delhi.

Reference Books:

1. M. Gopal (2009), Digital Control and State Variable Methods, New Delhi, 3rd Edition, Tata McGraw Hill Publications.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B.TECH II SEM

COURSE STRUCTURE

A5266 – SMART GRID (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 basics of smart grids, the main difference between the smart grid and traditional grids. The course starts with an overview of smart grid systems and covers the standards and communication technologies applied to smart grids. Next, the challenges related to the smart grid and IOT for Smart Grid Applications are.

Course Pre/co requisites

A5206 – Power Systems-I

2. Course Outcomes (COs)

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

A5266.1 Describe about smart grid and internet of Energy Systems.

A5266.2 Describe different measuring methods and sensors used in smart grid.

A5266.3 Introduce advanced architectures used in Smart Grid Network.

A5266.4 Evaluate technology options pertaining to renewable energy generation, data handling and communications for Smart Grids.

3. Course Syllabus

INTRODUCTION TO SMART GRID AND INTERNET OF ENERGY SYSTEMS: Overview of smart grid evolution, Fundamental components of smart grids, sensors, networks, PMU, meters. Evolution of internet of energy concept, Energy internet as smart grid 2.0.

SMART METERING AND SMART MONITORING SYSTEMS: Smart metering concept and systems, Hardware and accurate metering, Communication interface, Remote control features, Demand side management, Theft and fraud control.

SMART GRID NETWORK ARCHITECTURES: Premises network schemes, HAN, BAN, IAN. Neighbour area networks (NANs), Field area networks (FANs), Wide area networks (WANs) QoS requirements for SG networks.

SMART GRID TECHNOLOGIES: Communication Technologies for Smart Grid, Interoperability and connectivity, Layered Architecture and Protocols, Standards for Information Exchange. Information Security in smart grid - Encryption and decryption, Authentication, Digital Signatures, Cyber Security standards.

INTERNET OF THINGS FOR SMART GRID APPLICATIONS: Driving factors of IoT for smart grid, Smart grid applications in generation, transmission, consumption level, IoT applications in smart home environment, IoT-based metering and monitoring applications.

4. Books and Materials

Text Books:

1. Ersan Kabalci, Yasin Kabalci "From smart grid to internet of energy "academic press, Elsevier, 2019.
2. Stuart Borlase 'Smart Grid: Infrastructure, Technology and Solutions', CRC Press 2012.

Reference Books:

1. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart Grid: Technology and Applications', Wiley, 2012.
2. James Momoh, "Smart Grid: Fundamentals of Design and Analysis", Wiley-IEEE Press, March 2012.
3. Ali Keyhani and Muhammad Marwali, "Smart Power Grids 2011", Springer, 2011.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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

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

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 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

2. 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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

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

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

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

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

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

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

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

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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

A5023.1. Determine series solutions of ordinary differential equations about ordinary and regular singular points.

A5023.2. Solve problems in cylindrical and spherical coordinate systems using Bessel functions.

A5023.3. Relate algebraic polynomials with Legendre and Hermite polynomials.

A5023.4. 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,

Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

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.