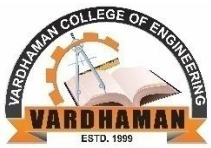

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD
Autonomous Institute, Affiliated to JNTUH
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BACHELOR OF TECHNOLOGY

ELECTRICAL AND ELECTRONICS ENGINEERING

(Accredited by NBA)

CURRICULUM AND SYLLABI (VCE R18)

UNDER CHOICE BASED CREDIT SYSTEM

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2018 - 2019)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2019 - 2020)

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

PROGRAMCURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R18

I YEAR I SEMESTER

Induction Program for Three Weeks

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A4001	Linear Algebra and Ordinary Differential Equations	BS	3	1	0	4	30	70	100
A4003	Semiconductor Physics	BS	4	0	0	4	30	70	100
A4201	Basic Electrical Engineering	ES	3	1	0	4	30	70	100
A4301	Engineering Graphics and Computer Aided Drafting	ES	0	0	3	1.5	30	70	100
A4004	Semiconductor Physics Laboratory	BS	0	0	2	1	30	70	100
A4202	Basic Electrical Engineering Laboratory	ES	0	0	3	1.5	30	70	100
A4022	Engineering Exploration	ES	0	0	2	1	30	70	100
	TOTAL		**10**	**2**	**10**	**17**	**210**	**490**	**700**

I YEAR II SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A4002	Advanced Calculus	BS	3	1	0	4	30	70	100
A4007	Engineering Chemistry	BS	4	0	0	4	30	70	100
A4501	Programming for Problem Solving	ES	3	1	0	4	30	70	100
A4009	Functional English	HS	3	0	0	3	30	70	100
A4302	Engineering Workshop	ES	0	0	3	1.5	30	70	100
A4008	Engineering Chemistry Laboratory	BS	0	0	2	1	30	70	100
A4502	Programming for Problem Solving Laboratory	ES	0	0	3	1.5	30	70	100
A4010	English Language Communication Skills Laboratory	HS	0	0	2	1	30	70	100
A4021	Social Innovation	ES	0	0	2	1	30	70	100
	TOTAL		**13**	**2**	**12**	**21**	**270**	**630**	**900**

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

PROGRAMCURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R18

II YEAR I SEMESTER

Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A4011	Partial Differential Equations and Complex Variables	BS	3	1	0	4	30	70	100
A4203	Network Theory – I	PC	3	0	2	4	30	70	100
A4402	Electronic Devices and Circuit Analysis	PC	3	0	2	4	30	70	100
A4204	Electromagnetic Field Theory	PC	4	0	0	4	30	70	100
A4205	Electrical Machines – I	PC	3	0	2	4	30	70	100
A4019	Verbal Ability and Logical Reasoning	HS	1	0	0	1	30	70	100
A4013	Gender Sensitization	MC	2	0	0	0	-	100*	100*
TOTAL			**19**	**1**	**6**	**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
A4025	Managerial Economics and Financial Analysis	HS	3	0	0	3	30	70	100
A4207	Power Systems - I	PC	4	0	0	4	30	70	100
A4208	Electrical Machines - II	PC	4	0	2	5	30	70	100
A4209	Network Theory-II	PC	3	0	2	4	30	70	100
A4210	Control Systems	PC	3	0	2	4	30	70	100
A4017	Quantitative Aptitude - I	BS	1	0	0	1	30	70	100
A4014	Environmental Science	MC	2	0	0	0	-	100*	100*
TOTAL			**20**	**0**	**6**	**21**	**180**	**420**	**600**

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

PROGRAMCURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R18

III YEAR I SEMESTER									
Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A4211	Power Systems-II	PC	3	0	2	4	30	70	100
A4212	Power Electronics	PC	3	1	2	5	30	70	100
A4213	Electrical Measurements and Instrumentation	PC	3	0	2	4	30	70	100
A4416	Switching Theory and Logic Design	PC	3	0	0	3	30	70	100
	Professional Elective – I	PE	3	0	0	3	30	70	100
A4018	Engineering Design Thinking	ES	0	0	2	1	30	70	100
A4214	Internship – I	PW	0	0	4	2	100	-	100
A4015	Essence of Indian Traditional Knowledge	MC	2	0	0	0	0*	100*	100*
	TOTAL		**17**	**01**	**10**	**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
A4417	Integrated Electronic Circuits	ES	3	0	2	4	30	70	100
A4409	Micro Processors and Micro Controllers	PC	2	1	2	4	30	70	100
A4215	Power systems Analysis and Protection	PC	3	1	2	5	30	70	100
	Open Elective – I	OE	3	0	0	3	30	70	100
	Professional Elective – II	PE	3	0	0	3	30	70	100
A4020	Product Realization	ES	0	0	2	1	30	70	100
A4216	Mini Project	PW	0	0	4	2	100	-	100
A4016	Indian Constitution	MC	2	0	0	0	-	100*	100*
	TOTAL		**16**	**02**	**12**	**22**	**280**	**420**	**700**

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

PROGRAMCURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R18

IV YEAR I SEMESTER									
Code	Course	Category	Periods per Week			Credits	Assessment Tools Maximum Marks		
			L	T	P		CIE	SEE	Total
A4217	Power Semiconductor Drives	PC	3	0	2	4	30	70	100
A4218	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
A4220	Internship – II	PW	0	0	4	2	100	-	100
A4219	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		CIE	SEE	Total
A4026	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
A4221	Project Work Phase – II	PW	0	0	16	8	100	100	200
	TOTAL		**9**	**0**	**16**	**17**	**190**	**310**	**500**

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

PROGRAMCURRICULUM STRUCTURE
B. TECH - ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS: VCE-R18

Professional Elective - I		Professional Elective - II	
A4251	Renewable Energy Systems	A4254	Power System Dynamics and Stability
A4252	Special Electrical Machines	A4255	Power Quality
A4253	Advanced Control Systems	A4256	Neural Networks and Fuzzy Logics
Professional Elective - III		**Professional Elective - IV**	
A4257	Electric Vehicles	A4260	Utilization of Electrical Energy
A4258	Power Switching Converters	A4261	Distributed Generation and Micro-grids
A4259	High Voltage DC Transmission & FACTS	A4262	Digital Control Systems
Open Electives			
Code	**Course**	**Code**	**Course**
A4131	Project Planning and Management	A4531	Fundamentals of JAVA
A4132	Environmental Pollution and Management	A4532	Operation Research
A4133	Disaster Management	A4533	Fundamentals of DBMS
A4231	Transducers and Measurements	A4534	Fundamentals of Operating Systems
A4232	Solar Energy and Applications	A4631	Principles of Software Engineering
A4233	Energy Management and Audit	A4632	E-Commerce Trends
A4331	Basic Mechanical Engineering	A4633	Fundamental of Cyber Security
A4332	Introduction to 3D Printing	A4031	Numerical Techniques
A4333	Fundamentals of Robotics	A4032	Mathematical Programming
A4431	Fundamentals of IoT	A4033	Special Functions
A4432	Principles of Analog and Digital Communications	A4034	Entrepreneurship Development
A4433	Introduction to Signal Processing	A4035	Human Resource Management
		A4036	Logistics and Supply Chain Management

SYLLABI FOR I YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH I SEMESTER

COURSE STRUCTURE

A4001-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	1	0	42	14	0	4	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 system of linear equations, Eigen values and Eigen vectors, Quadratic forms, Differential equations and their applications, Laplace transforms and its applications to ordinary 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

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:

A4001.1 Solve system of linear equations using rank of a matrix.

A4001.2 Examine the nature of Quadratic form using Eigen values and Eigen vectors.

A4001.3 Solve the first and higher order linear ordinary differential equations.

A4001.4 Make use of ordinary differential equations to solve, Rate of growth/decay, Newton's law of cooling, Electrical circuits and Simple harmonic motion problems.

A4001.5 Apply Laplace transforms to solve ordinary differential equations.

3. Course Syllabus

THEORY OF MATRICES: Real, Complex matrices and their properties, Rank of a matrix by reducing to Echelon form and Normal form, Inverse of a matrix by Gauss-Jordan method, Consistency of system of linear equations using the rank of a matrix.

EIGEN VALUES, EIGEN VECTORS AND QUADRATIC FORMS: Linear dependence and independence of vectors, Linear transformation, Eigen values and Eigenvectors of a matrix, Properties of Eigen values and Eigen vectors of real and complex matrices, 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. Equations not of first degree: Equations solvable for p , Equations solvable for y , Equations solvable for x and Clairaut's equation, 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, Non-homogeneous term of the type $Q(x)=e^{ax}$, $\sin(ax+b)/\cos(ax+b)$, x^n, $e^{ax}V(x)$, $x^nV(x)$. Equations reducible to linear 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.

4. Books and Materials

Text Books:

1. B S Grewal, *Higher Engineering Mathematics*, 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. B V Ramana, *Engineering Mathematics*, 23rd Reprint, Tata Mc Graw Hill Education Private Limited, New Delhi, 2015.

Reference Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, 2010.
3. D. Poole, *Linear Algebra: A Modern Introduction*, 2nd Edition, Brooks/Cole, 2005.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH I SEMESTER

COURSE STRUCTURE

A4003-SEMICONDUCTOR PHYSICS

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

Semiconductor physics for engineers is the study of fundamental physics combined with problem solving and engineering skills. This interdisciplinary knowledge of quantum physics, semiconductor physics and devices, lasers and optical fiber physics encourages an understanding of technological applications of physics and its importance as a subject of social, economic and industrial relevance enabling the student to design and innovate.

Course Pre/co-requisites

This course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

A4003.1 Analyze crystal structures in terms of lattice parameters and describe structures using X-rays. Identify various planes in crystals

A4003.2 Interpret the principles of quantum mechanics to classify solids. Relate semiconductor solid properties to the underlying physical concepts.

A4003.3 Analyze the charge carrier dynamics and transport properties in semiconductors

A4003.4 Apply the concepts of semiconductor physics to analyze the various basic electronic devices

A4003.5 Illustrate working of a laser and develop communication systems using optical fibers.

3. Course Syllabus

INTORODUCTION TO CRYSTALLOGRAPHY: 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. Crystal structures of ZnS, Silicon (diamond).
Basic principles of X-ray diffraction, Bragg's law, Laue method, Powder method, applications of X- ray diffraction.

INTRODUCTION TO QUANTUM PHYSICS: De-Broglie hypothesis, wave particle duality, Davison and Germer experiment, G P Thomson experiment, Wave nature of Particles, Time-independent Schrodinger equation, Application of Schrodinger wave equation: Particle in a 1-D box. Infinite and Finite square well potential. Bloch's theorem, Particle in a periodic potential: Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram.

SEMICONDUCTORS: Types of electronic materials: metals, semiconductors, and insulators, Concept of effective mass of electron and hole, Density of states, Intrinsic and Extrinsic semiconductors, Fermi-Dirac distribution function, Fermi level, Carrier concentration in intrinsic semiconductors, donor and accepter impurities, Variation of Fermi level with temperature, Position of Fermi level in intrinsic and extrinsic semiconductor, Mobility of electrons and holes, charge densities in a semiconductor, direct and indirect band gap semiconductors, Carrier transport: diffusion and drift, Hall Effect.

SEMICONDUCTOR DEVICES:P-N junction diode – V-I Characteristics, Diode current equation, Temperature dependence of V-I characteristics, Diode resistances, Diode models, Diode capacitances, Breakdown mechanisms, Zener diode and their I-V characteristics, Recombination mechanisms, LED, Types of semiconductor photo detectors - PN junction, PIN, and Avalanche and their structure, materials, working principle, and characteristics, solar cell.

LASERS & OPTICAL FIBRES: Absorption, spontaneous and Stimulated emission, Einstein's coefficients, population inversion, pumping processes, three and four level laser systems, He-Ne laser, Semiconductor lasers (homo junction and hetero junction), Applications of lasers. Introduction to Optical fibres, total internal reflection, Acceptance angle, Numerical aperture, step and graded index fibre, Losses in optical fibres, Applications of optical fibres.

4. Books and Materials

Text Books:

1. B. K. Pandey and S. Chaturvedi. Engineering Physics. New Delhi: Cengage Learning India Pvt. Ltd., 2014.
2. D. K Bhattacharya and Poonam Tandon. Engineering Physics. New Delhi: Oxford University Press, 2017
3. M S Thyagi. Introduction to Semiconductor Materials and Devices, Wiley, 2008
4. S.M Sze, Semiconductor Devices Physics and Technology, John Wiley & Son, Inc. 2nd edition, 2002.
5. Satya Prakash, Swati Saluja. Quantum Mechanics, Kedar Nath Ram Nath, 2018

Reference Books:

1. Kittel Charles. Introduction to solid state physics. New Jersey: John Wiley and sons, 2005.
2. S.S. Islam. Semiconductor Physics and Devices. Oxford University Press, 2005.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH I SEMESTER

COURSE STRUCTURE

A4201 – BASIC ELECTRICAL ENGINEERING

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

The course addresses the underlying concepts and methods behind Electrical Engineering. The course presents a problem oriented introductory knowledge of the Fundamentals of Electrical Engineering and focuses on the study of basic electrical parameters, basic principles, different types of electrical circuit and methods to solve electrical circuit. The principle and operating conditions of D.C. Machines (Motor & Generator), Transformers, Induction Motors, design of windings, types & characteristics will be discussed. Also the concepts related to electrical installation and protective devices will be discussed.

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:

A4201.1 Apply the network reduction techniques and Knowledge of Alternating quantities to calculate Current, Voltage and Power for complex circuits.

A4201.2 Analyze the electrical Circuits using Nodal Analysis, Mesh analysis and Network theorems.

A4201.3 Study and Analyze the different types of DC Machines, Transformers.

A4201.4 Test the performance of DC Generator, DC Motor, transformer and Induction Motor.

A4201.5 Introduce components of low voltage electrical Installations.

3. Course Syllabus

DC CIRCUITS: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

AC CIRCUITS: Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

TRANSFORMERS: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

ELECTRICAL MACHINES: Generation of rotating magnetic fields, Construction and working of a three phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed Characteristic and speed control of separately excited dc motor. Construction and working of synchronous generator.

ELECTRICAL INSTALLATIONS: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.

4. Books and Materials

Text 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.

Reference Books:

1. E. Hughes, Electrical and Electronics Technology, 10th edition Pearson, 2010.
2. Vincent Deltoro, Electrical Engineering Fundamentals, 2nd edition, Prentice Hall India, 1989.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH I SEMESTER

COURSE STRUCTURE

A4301– 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
0	0	3	0	0	42	1.5	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/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:

A4301.1 Construct various types of curves commonly used in engineering practice.
A4301.2 Distinguish between first, second, third and fourth angle projections of systems
A4301.3 Estimate lateral surface of the sheet metal requirement for making regular solids
A4301.4 Compare isometric and orthographic views of an object.
A4301.5 Select CAD tools for drafting regular solids.

3. Course Syllabus

INTRODUCTION TO ENGINEERING DRAWING: Introduction to engineering drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epi-cycloid, Hypocycloid; Scales – Plain, Diagonal.

ORTHOGRAPHIC PROJECTIONS AND PROJECTIONS OF REGULAR SOLIDS: S Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined to both Planes; Projections of Regular Solids: Prism, Cylinder, Pyramid, Cone-inclined to both planes.

SECTIONAL VIEWS AND DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS: Sectional views of right regular solids: Prism, Cylinder, Pyramid, Cone-Development of surface of right regular solids: Prism, Cylinder, Pyramid, Cone.

ISOMETRIC PROJECTIONS: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa.

COMPUTER BASED DRAWING OVERVIEW OF COMPUTER GRAPHICS: Overview of Computer Graphics, Customisation, Demonstration of a simple team design project: listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software; Customisation& CAD Drawing: consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles; Annotations, layering & other functions: applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings ; Demonstration of a simple team design project: Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids.

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 I SEMESTER

COURSE STRUCTURE

A4004 – SEMICONDUCTOR PHYSICS LABORATORY

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 lab course covers the concepts from semiconductors to electricity and magnetism to modern optics. These experiments have a number of applications in today's world and are a valuable tool in the arsenal of engineers across multiple fields. This Laboratory also prepares the students to study the photovoltaic materials and to compute the various parameters of semiconductor materials and devices. The course also makes the students familiar with instrumental methods and various properties of materials. This basic knowledge will enable the scientific fervour to solve the various engineering problems.

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:

A4004.1 Determination of Planck's constant and work function of a metal.

A4004.2 Evaluation of band gap of a semiconductor and understand the temperature dependence function of resistivity.

A4004.3 Analyze the diode characteristics.

A4004.4 Analyze the I-V characteristics of solar cell and LED.

A4004.5 Apply the principles of laser light and estimate the losses in the propagation of light in optical fibres.

3. Course Syllabus

1. Determination of Planck's Constant
2. Photoelectric effect
3. Temperature dependence of resistivity of a semiconductor material.
4. Energy gap of a semiconductor
5. Forward and reverse bias characteristics of P-N junction diode
6. Zener diode characteristics and Zener diode voltage regulator
7. V-I Characteristics of solar cell
8. V-I Characteristics of Light Emitting Diode

9. Hall Effect
10. Laser wave length
11. Measurement of Numerical Aperture and Acceptance Angle of given Optical Fiber
12. Losses in Optical Fibers

4. Laboratory Equipment/Software/Tools Required

1. Photo Emissive Cell
2. Regulated Power Supply (DC and AC)
3. Energy Gap Kit
4. Hall Effect Setup
5. Light Emitting Diode Kit
6. Solar Cell Kit
7. Semiconductor Laser Source
8. Plane Diffraction Grating
9. Optical Fiber Trainer Kit
10. Meters - Ammeter, Voltmeter, Digital Multimeter
11. Diodes, Resistors, Capacitors, Bread Board

5. Books and Materials

Text Books:

1. M. S. Tyagi, *Introduction to Semiconductor Materials and Devices*, John Wiley & Sons, India, 2008.
2. D. K. Schroder, *Semiconductor Material and Device Characterization*, Third Edition, John Wiley & Sons, New Jersey, 2015.
3. S. M. Sze and K. Ng. Kwok, *Physics of Semiconductor Devices,* 3rd edition, John Wiley & Sons, New Jersey, 2008.

Reference Books:

1. B. L. Worsnop and H. T. Flint, *Advanced Practical Physics for students*, 9th edition, Methuen, London, 1957.
2. M. Nelkon and J. M. Ogborn, *Advanced Level Practical Physics*, 4th edition, Heinemann Educational Publishers, London, 1985.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH I SEMESTER

COURSE STRUCTURE

A4202 – BASIC ELECTRICAL ENGINEERING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

The course addresses the verification and analysis of Kirchhoff laws and Network Theorems. It also gives the exposure of analyzing transient response of series RL, RC and RLC circuit. Testing of Single phase transformer is done to calculate voltage, current, real power, efficiency and regulation, also the performance of DC motor, three phase Induction Motor and Alternator will be analysed.

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:

A4202.1 Verify Ohms law, Kirchhoff laws and Impedance & Current of Series RL, RC and RLC Circuits.
A4202.2 Analyze the transient response of Series RL, RC and RLC series circuits.
A4202.3 Calculate the Voltage, Current Real power in a single phase Transformer.
A4202.4 Test the performance of DC Motor, 1- phase transformer, Alternator and 3 phase Induction Motor.

3. Course Syllabus

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient Response of Series RL and RC circuits using DC excitation.
4. Transient Response of RLC Series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents.(Star-Delta, Delta-Delta, Delta-star, Star-Star).
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit.
11. Performance Characteristics of a Separately Excited DC Shunt Motor.

12. Torque-Speed Characteristics of a DC Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor.
14. Torque-Speed Characteristics of a Three-phase Induction Motor.
15. 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. Sudhakar, Shyammohan S. Palli, *Electrical Circuits,* 2nd Edition, Tata Mc Graw Hill, NewDelhi, 2003.

Reference Books:

1. B. L. Theraja, A. K. Theraja, *A text book of Electrical Technology,* 2nd edition, S. Chand Publishers, New Delhi, 2002.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH I SEMESTER

COURSE STRUCTURE

A4022-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/co-requisites

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

2. Course Outcomes (COs)

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

A4022.1 Compare and contrast the contributions of different types of engineers in the development of a product, process or system.

A4022.2 Apply the common engineering design process to solve complex problems and arrive at viable solution

A4022.3 Explore various contemporary software and hardware tools to provide solutions for the problems.

A4022.4 Applyskillsneededforsuccessfulteamworkincludingthebasicsof project management and written and oral communication.

A4022.5 Identifythekeyelementsofprofessionalcodesofethicsaswellasthe ethicalandsocietalissuesrelatedtothedisciplinesandtheirimpact onsocietyandtheworld.

3. Course Syllabus

Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants.
Various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes
Engineering Design Process, Multidisciplinary facetofdesign,Importance of analysis in engineering design, generalanalysis 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. IdentifyingEthicalDilemmas in different tasks of engineering, Applying Moral Theories and codes of conduct for resolution of Ethical Dilemmas.

Sustainability: Introduction to sustainability,Sustainabilityleadership, Life cycle assessment.

Project Management: Introduction, Significance of team work, Importance of communication in engineering profession.

Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation.

4. Books and Materials

Text Books:

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

Reference Books:

1. Neerparaj Rai, Arduino Projects for Engineers, 1st edition, BPB Publications, 2016. 2.
2. aSimon Monk, Programming Arduino: Getting Started with Sketches, 2nd Edition, McGraw-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 SEMESTER

COURSE STRUCTURE

A4002-ADVANCED CALCULUS

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 offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Evaluation of improper integrals, functions of single, several variables and their applications, Multiple integrals, Vector differential and integral calculus, Fourier series and Fourier transforms. 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 requisite.

2. Course Outcomes (COs)

A4002.1 Evaluate improper integrals and examine the extremum of a function of several variables
A4002.2. Make use of multiple integrals to find the area and volume of a solid
A4002.3. Determine scalar potential function for irrotational force fields
A4002.4. Evaluate line, surface and volume integrals using vector integral theorems
A4002.5. Develop Fourier series and Fourier transforms of a function

3. Course Syllabus

CALCULUS: Evaluation of improper integrals: Beta and Gamma functions and their properties, Rolle's Theorem, Lagrange's mean value theorem and Cauchy's mean value theorem, Taylor's and Maclaurin's series. Functions of several variables: Limit, continuity and partial derivatives of functions of two variables (not to be examined), 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 curves, Triple integrals, Change of variables, Area, volume, mass and centre of gravity (constant and variable densities).

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 identities.

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 integral theorem (without proof), Fourier sine and cosine integrals, Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

4. Books and Materials

Text Books:

1. B.S. Grewal, *Higher Engineering Mathematics*, 43rdEdition, Khanna Publishers, New Delhi, 2014.
2. B.V. Ramana, *Higher Engineering Mathematics*, 23rdReprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.

Reference Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, 2010.
3. G.B. Thomas and R.L. Finney, *Calculus and Analytic Geometry*, 9thEdition, Pearson Education, 2002

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4007-ENGINEERING CHEMISTRY

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

1. Course Description

Course Overview

This course emphasizes a strong base in physical chemistry and organic chemistry to spread over an orientation towards the materials and drug synthesis. This course also focuses on the general applications of chemical principles to the analysis and evaluation of engineering problems such as Water and its treatment, batteries and fuel cells.

Course Pre/co-requisites

This course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

A4007.1. Apply knowledge of three - dimensional arrangements of atoms, molecules and their effects on chemical reactions

A4007.2. Identify differences and similarities of the Batteries

A4007.3. Evaluate the behaviour and interactions between matter and energy at both the atomic and molecular levels

A4007.4. Make use of different methods for softening hardness of water

A4007.5. Apply major chemical reactions in the synthesis of various drugs

3. Course Syllabus

ATOMIC AND MOLECULAR STRUCTURE: Introduction, Concept of atomic and molecular orbitals, Molecular orbital theory, and Molecular orbital energy level diagrams of diatomic molecules - O_2 and N_2.Crystal field theory – crystal field splitting in Octahedral, Tetrahedral and Square planar complexes.

STEREOCHEMISTRY OF CARBON COMPOUNDS: Isomerism**:** Definition and their classification: Constitutional isomers: Definition, examples of chain, functional and positional isomers. Stereoisomers: Definition, examples of enantiomers and diastereomers. Optical activity: Definition, chiral centres. Chiral molecules: Definition and criteria - asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and dissymmetric molecules (trans-1, 2-dichlorocyclopropane). R, S nomenclature, Cahn-Ingold-Prelog rules. Geometrical isomerism of alkenes– cis, trans and E, Z configuration.

ELECTROCHEMISTRY AND BATTERIES: Electrochemical cells -Types, cell notation, cell reaction and cell emf - concentration cells – Electrode and Electrolyte concentration cells, numerical problems. Electrochemical series and its applications. Electrode potential, standard electrode potential, types of electrodes –Hydrogen, Calomel and Quinhydrone electrode. Batteries**:** Primary battery (Zinc-Carbon Battery) and Secondary battery (lead acid and lithium ion battery) - Applications. Fuel cells**:** Concept of Fuel-Cells. Hydrogen –Oxygen fuel cell – advantages and applications.

ORGANIC REACTIONS, DRUG MOLECULES AND SPECTROSCOPY: Introduction, Types of organic reactions, reactions involving substitution (S_N1, S_N2), addition of H_2, X_2 andHX to C-C double bond – Markownikoff and Anti-Markownikoff rule, elimination (E1 and E2), reduction: Hydrogenation by H_2 by Nickel and Pd/C (any two examples for each). Drugs: Introduction and classification. Structure, preparation and uses of commonly used drug molecules- paracetamol, aspirin and ibuprofen. Spectroscopy: Introduction. Principle, selection rules and applications ofVibrational, rotational and electronic spectroscopy.

WATER TECHNOLOGY: Introduction, Hardness of water, causes of hardness and types of hardness: temporary and permanent – expression and units of hardness. Numerical problems. Potable water and its specifications. Treatment of water for drinking-filtration, sedimentation, chlorination and ozonization. Boiler troubles**:** Causes and effects.Sludges, scales and caustic embrittlement. Internal treatment of boiler feed water – Calgon conditioning, Phosphate conditioning, Colloidal conditioning – Softening of water by ion- exchange process. Desalination of water – Reverse osmosis.

4. Books and Materials

Text Books:

1. Jain & Jain. *Engineering Chemistry:* Dhanapathrai Publications., 2015.
2. Prsanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy & Subhendu Chakroborty, *Engineering Chemistry:* Cengage Publications., 2018.
3. B. H. Mahan, Rollie. J. Meyers. *University chemistry*: Pearson publications, 4th edition, 2009.
4. C. N. Banwell. *Fundamentals of Molecular Spectroscopy:* McGraw Hill Education India, 4th edition, 2016.
5. GL David Krupadanam, Vijaya Prasad, Varaprasad Rao K. *Drugs: Universities Press (India) Limited.*

Reference Books:

1. B. L. Tembe, Kamaluddin and M. S. Krishnan. *Engineering Chemistry (NPTEL Web-book)*
2. Peter Atkins, Julio de Paula's *Physical Chemistry*, Oxford University Press, Tenth Edition, 2014.
3. D. Nasipuri, *Stereochemistry of Organic Compounds – Principles and Applications*, 3rd Edition, New Age International (P) Limited.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4501 – PROGRAMMING FOR PROBLEM SOLVING

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

The course is a Basic Engineering course for all computation aspiring students. It is designed to provide a comprehensive study of the C programming language that covers the fundamental principles of computer programming, with an emphasis on problem solving strategies using structured programming techniques. The syntax and constructs of data types, control statements, arrays, functions and pointers are elaborated. The derived data types like structures are discussed. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and reusable code to solve mathematical, engineering and simple data processing problems.

Course Pre/co-requisites

No Pre requisites and co-requisites.

2. Course Outcomes (COs)

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

A4501.1 Select right identifiers, data types and operators for effective computation.
A4501.2 Write programs using control statements.
A4501.3 Write programs demonstrating use of arrays, strings and their applications.
A4501.4 Demonstrate the applications of function and recursion.
A4501.5 Write programs for simple real life problems using pointers and structures.

3. Course Syllabus

Theory

INTRODUCTION TO PROGRAMMING: Introduction to components of Computer Systems. Steps to solve logical and numerical problems. Representation of Algorithm, Flowchart and Pseudo code with examples. INTRODUCTION TO THE C LANGUAGE: program structure, identifiers, and data types, Formatting input/output, Syntax and Logical Errors in compilation, object and executable code.

OPERATORS, EXPRESSIONS AND CONTROL STATEMENTS: Arithmetic, Logical, Relational, Conditional, Assignment, Increment and Decrement operators. EXPRESSIONS**:** Arithmetic Expressions, Operator precedence and Associativity. DECISION MAKING AND LOOPING:Writing and evaluation of decision making, branching and looping.

ARRAYS, SORTING AND SEARCHING: Definition, Types of Arrays, declaration and Initialization of n-Dimensional Arrays and Character array, String manipulation. SEARCHING AND SORTING:Linear search, Bubble sort and Selection sort.

FUNCTIONS AND RECURSION: Functions, Parameter passing in functions through call by value, passing arrays to functions, storage classes. RECURSION:Recursion as a different way of solving problems. Example programs, such as finding factorial, Fibonacci series.

POINTERS AND STRUCTURES: Definition, Declaration, Pointer arithmetic, Pointer to Pointer, Pointer to an array (base pointer), Dynamic memory allocation, Command Line arguments, idea of call by reference in functions. STRUCTURES: Defining, Declaring and initialization of structures, nested structures, Array of Structures.

4. Books and Materials

Text Books:

1. B. A. Fouruzan and R. F. Gilberg, C Programming & Data Structures, 3rd Edition, CENGAGE, Learning, India, 2014.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, 2nd Edition, Prentice Hall of India, 2015.
2. E. Balagurusamy, *Programming in ANSI C*, 7th Edition Tata McGraw-Hill,2017.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4009-FUNCTIONAL 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	4	30	70	100

1. Course Description

Course Overview

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic and communicative competencies of Engineering students. In English classes, the focus should be on the development of competence in the areas of grammar and vocabulary and skills development in terms of reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts/poems silently leading to reading comprehension. Reading comprehension passages are given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind. For instance, newspaper articles, advertisements, promotional material etc could be deployed as supplementary material to enhance their communication skills. The focus of the syllabus is on language acquisition and skill development.

Course Pre/co-requisites

This course has no specific prerequisite and co requisite.

2. Course Outcomes (COs)

A4009.1 Demonstrate an understanding of the significance of humanity, love and service to mankind

A4009.2 Utilize appropriate vocabulary in the given contexts

A4009.3 Build competence in grammar

A4009.4 Develop effective academic reading skills

A4009.5 Develop effective academic writing skills

3. Course Syllabus

Vocabulary: Word Formation – Prefixes – Suffixes – Guessing the meanings of the words using prefixes and suffixes- Standard Abbreviations

Grammar: Articles

Reading: Presidential Address by APJ Abdul Kalam: Techniques for effective comprehension - Skimming and Scanning-Types of texts – Summarizing

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

Vocabulary: Synonyms – Antonyms

Grammar: Prepositions

Reading: The Road Not Taken (Robert Frost): Reading using different strategies: Types of Reading – Extensive and Intensive-Do's and Dont's of reading

Writing: Letter Writing – Formats, Styles, Parts – Letters of Requisition, Letters of Inquiry, Letters of Apology.

Vocabulary: Homonyms, Homophones, Homographs, Foreign Words - Redundancies – Clichés **Grammar –** Changing words from one form to another – Concord – Tenses: Present, Past and Future Active and Passive Voice.

Vocabulary: Idiomatic Expressions - One Word Substitutes

Grammar: Noun-Pronoun Agreement – Misplaced Modifiers

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

Writing: Information Transfer: Bar Charts – Flow Charts – Tree Diagrams**.**

Reading: *Exercises for practice

Writing: Essay writing: Introduction – Conclusion- Précis Writing: Introduction – Steps to Effective Précis writing – Guidelines.

*Reading material from Text books and Reference books

4. Books and Materials

Text Books:

1. *Fluency in English – A Course book for Engineering Students* (by Board of Editors: Orient BlackSwan Pvt. Ltd, Hyderabad, 2016.

2. Raman, Meenakshi , Sharma, Sangeeta, *Technical Communication- Principles and Practice,* 3rd Edition, Oxford University Press, New Delhi. Print, 2015.

Reference Books:

1. Green, David *Contemporary English Grammar –Structures and Composition,* MacMillan India, 2014.
2. Rizvi, M. Ashraf, *Effective Technical Communication,* Tata Mc Graw –Hill, 1995.
3. Michael Swan, *Practical English Usage,* 3rd Edition, Oxford University Press, 1995.
4. Wood F. T, *Remedial English Grammar for Foreign Students,* Macmillan, 2007.
5. Zinsser William, *On Writing Well,* Harper Resource Book, 2001.
6. Liz Hamp- Lyons, Ben Heasley, *Study writing,* Cambridge University Press, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4302-ENGINEERING WORKSHOP

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

1. Course Description

Course Overview

The course is intended to familiarize students to all workshops including civil, mechanical, and electricalandelectronicsengineering.Ineachoftheseworkshops,thestudentsareexposedtobasic understandingofcomponents,equipment,tradesandmethods.Civilengineeringworkshopfocuseson surveyinginstrumentsandtypesofbuildingmaterialsanditsidentification.Mechanicalengineering workshop focuses on fitting and carpentry trades, Tin-Smithy, foundry and plumbing. Electronic workshop focuses on basic electronic components, measuring equipment and Multisim software. Electricalworkshopfocusesonbasicelectricalwiringandinstallations.

Course Pre/co-requisites

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

2. Course Outcomes (COs)

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

A4302.1 Identify various surveying tools and choose building materials according to field conditions.

A4302.2 Analyze the basic circuit connections, maintenance and troubleshooting of house hold equipments.

A4302.3 Make use of various electrical and electronic components to constructsimplecircuitsandmeasurevariousphysicalquantities.

A4302.4 Explain basic components used in different trades.

A4302.5 Identify the associated tools used in different trades.

3. Course Syllabus

PART – A (TRADES FOR LECTURES & VIDEOS)

Note: Minimum one Hour Lecture on each Trade, to be discussed by any class room teaching technique in following trades.

Manufacturing Methods:

1. Casting, Forming, Joining, Machining, Advanced Manufacturing Methods
2. CNC machining , Additive Manufacturing

3. Fitting Operation & Power Tools , Carpentry , Plastic Molding , Glass Cutting, Metal Casting
4. Welding (Arc Welding & Gas Welding), Brazing, Sheet Metal Forming

PART-B (TRADES FOR PRACTICE)

1. Fitting Trade: a. L -Fitting Joint b. V- Fitting Joint c. Square - Fitting Joint d. Semicircular - Fitting Joint
2. Carpentry Trade: a. Lap Joint (Two Experiments) b. Bridle Joint (Two Experiments)
3. House wiring Trade: a. House Wiring (5 Experiments)
4. Welding Trade: a. Arc Welding (Two Experiments) b. Gas Welding (Two Experiments)
5. Foundry Trade: a. Single Piece Pattern b. Multiple Piece Pattern
6. Tin Smithy Trade: a. Open Scoop b. Funnel c. Rectangular Tray d. Square & Cylindrical Pipes
7. Black Smithy Trade: a. Round to Square and Vice Versa b. S - Hook c. O – Ring

Note: Minimum one experiment from each Trade with total of 12 Experiments.

4. Books and Materials

Text Books:

1. B. L. Juneja, "Workshop Practice", 1st Edition,Cengage Learning India Private Limited, New Delhi, 2015.
2. H.S. Bawa, "Workshop Practice", 3rd Edition, Mc Graw Hill Education, New Delhi, 2017.
3. S.K.Garg, "Workshop Technology (Manufacturing process)" 4thEdition, Laxmi Publications (P) Ltd., New Delhi, 2017.

Reference Books:

1. K.Venkata Reddy," Workshop Manual", 6th Edition Reprint, BSP Publications, Hyderabad, 2018.
2. S Gowri & T Jeyapoovan, Engineering Practices Lab Manual, 5th Edition, Vikas Publishing House Private Limited, New Delhi, 2017.
3. Singh, Rajender, Introduction to Basic Manufacturing Process & Workshop Technology, 2nd Edition, New Age International (P) Ltd. New Delhi, 2014.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4008-ENGINEERING CHEMISTRY LABORATORY

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 emphasizes a strong background to carryout chemical analysis. The objective of engineering chemistry laboratory is to understand various instrumental techniques, physical properties of organic liquids, separation techniques, and organic synthesis to inculcate the knowledge of engineering chemistry discipline. The experiments on water treatment are proved to be vital in engineering applications on industrial level.

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:

A4008.1 Measure molecular/system properties such as surface tension, viscosity, conductance of solutions and redox potentials.

A4008.2 Apply various titrations for the estimation of strengths of solutions and hardness of water.

A4008.3 Identify different samples from a mixture by using various separation techniques.

A4008.4 Estimate rate constants of reactions from concentration of reactants/products as a function of time.

A4008.5 Evaluate the percentage of yield of chemical substances by organic synthesis.

3. Course Syllabus

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 complexometry 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 R_f 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 methylacetate.

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Books:

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

Reference Books:

1. S. S. Dara, *Experiments and Calculations in Engineering Chemistry,* S-Chand Publications, Revised Edition., 2008.
2. Dr. M.P.S Murali Krishna and M. Gopala Krishna, *Chemistry Lab Manual*, VGS Publications.
3. Dr. A.Ravi Krishnan, Dr. T. Syeda Jeelani Basri, and Mrs. M.B. Lakshmi, *Engineering Chemistry Laboratory Manual.*

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4502 – PROGRAMMING FOR PROBLEM SOLVING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

The course is a Basic Engineering course for all computation aspiring students. It is designed to provide a comprehensive study of the C programming language that covers the fundamental principles of computer programming, with an emphasis on problem solving strategies using structured programming techniques. The syntax and constructs of data types, control statements, arrays, functions and pointers are elaborated. The derived data types like structures are discussed. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and reusable code to solve mathematical, engineering and simple data processing problems.

Course Pre/co-requisites

No Pre requisites and co-requisites.

2. Course Outcomes (COs)

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

A4502.1 Select right identifiers, data types and operators for effective computation.
A4502.2 Write programs using control statements.
A4502.3 Write programs demonstrating use of arrays, strings and their applications.
A4502.4 Demonstrate the applications of function and recursion.
A4502.5 Write programs for simple real life problems using pointers and structures.

3. Course Syllabus

Practice

Week-1: Programs using I/O statements and various operators.
Week-2: Programs using expression evaluation and precedence.
Week-3: Programs using decision making statements and branching statements.
Week-4: Programs using loop statements.
Week-5: Programs to demonstrate applications of n dimensional arrays.
Week-6: Programs to demonstrate searching and sorting.
Week-7: Programs to demonstrate use of string manipulation functions.
Week-8: Programs using user-defined functions.

Week-9: Programs to demonstrate parameter passing mechanism.
Week-10: Programs to demonstrate recursion
Week-11: Programs to demonstrate use of pointers.
Week-12: Programs to demonstrate command line arguments. Programs to demonstrate dynamic memory allocation.
Week-13: Programs to demonstrate applications of structures.
Week-14: Programs to demonstrate file operations.

4. Laboratory Equipment/Software/Tools Required

A computer system with Linux/Ubuntu Operating System, C- Compiler

5. Books and Materials

Text Books:

1. B. A. Fouruzan and R. F. Gilberg, C Programming & Data Structures, 3rd Edition, CENGAGE, Learning, India, 2014.

Reference Books:

1. Yashavant Kanetkar, Let Us C, 15th Edition, BPB Publications, 2017.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4010-ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

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

1. Course Description

Course Overview

The basic idea behind offering English as a practical subject at the undergraduate level is to acquaint the students with a language that enjoys currently as a lingua franca of the globe. In the ELCS lab the students are trained in Communicative English Skills: phonetics, word accent and intonation, making effective oral presentations – both extempore and prepared, role- play, telephonic skills, asking for and giving directions, etc. The lab encourages students 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.

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:

A4010.1. Improve his/her pronunciation
A4010.2. Take part in role-plays and perform effectively in real-life situations
A4010.3. Choose appropriate words and phrases to make effective telephonic conversations
A4010.4. Minimize stage fear and make effective presentations
A4010.5. Build sustained conversations

3. Course Syllabus

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Module – 1:
ALL: Introduction to Phonetics - Speech Sounds – Vowels and Consonants
ICS: Ice-Breaking activity and JAM session.
Module – 2:
CALL: Past Tense Marker and Plural Marker – Syllable Structure – Consonant Clusters - Minimal Pairs
Module – 3:

ICS: Situational Dialogues – Role-Play – Expressions in Various Situations: Greetings: Self-introduction and Introducing others – Apologies – Requests – Complaints – Congratulating – Expressing sympathy/ condolences.

Module – 4:

CALL: Basic Rules of Word Accent – Stress Shift – Weak Forms and Strong Forms

Module – 5:

ICS: Asking for and Giving Directions – Giving Instructions – Seeking Clarifications – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions

Module– 6:

CALL: Neutralization of Mother Tongue Influence-Common Indian Variants in Pronunciation – Differences between British and American pronunciation

Module – 7:

CALL: Intonation Patterns-Types of Tones - Sentence Stress

Module – 8:

ICS: Social and Professional Etiquette - Telephone Etiquette

Module – 9:

ICS: Oral Presentation Skills (short presentations) - Making a Presentation-Prepared –Extempore

Module – 10:

ICS: Listening-Types of Listening-Steps to effective Listening –Business Listening Comprehension exercises

4. Laboratory Equipment/Software/Tools Required

1. Computers with internet
2. K VAN Solutions Software
3. Headphones
4. Audio Visual Equipment

5. Books and Materials

Text Books:

NIL

Reference Books:

1. Mohanraj, J., *Let Us Hear Them Speak,* Sage Texts. Print, New Delhi, 2015.
2. Hancock, M., *English Pronunciation in Use* Intermediate, Cambridge University Press. Print, Cambridge, 2009.
3. Sanjay Kumar and Pushp Lata, *Communication Skills,* Oxford University Press, 2011.
4. *Exercises in Spoken English,* Parts I-III CIEFL, Oxford University Press, Hyderabad.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

I B. TECH II SEMESTER

COURSE STRUCTURE

A4021-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

SocialInnovationisanopenendedcoursetodevelopsocialconnectednessinengineeringstudents throughsocialawarenessandsocialconsciousness.Thiscanbedonethroughlivefieldexposurealong withfacultyledconceptualpresentations,realcasereviews;self-studyassignments,literatureand fieldsurvey.Throughthiscourse,thestudentsareexpectedtousetheirengineeringknowledgeto provideinnovativesolutionstoexistingsocialproblems.Thiscoursealsodevelopscriticalthinking abilityamongthestudents.

Course Pre/co-requisites

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

2. Course Outcomes (COs)

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

A4021.1 Measure molecular/system properties such as surface tension, viscosity, conductance of solutions and redox potentials.

A4021.2 Apply various titrations for the estimation of strengths of solutions and hardness of water.

A4021.3 Identify different samples from a mixture by using various separation techniques.

A4021.4 Estimate rate constants of reactions from concentration of reactants/products as a function of time.

A4021.5 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, distinguishbetween 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, selectpromising ideas,prototypingandtesting.

Social Innovation across Four Sectors - The non-profit sector, publicsector,theprivatesector, the informal sector, linksbetween and cross sectors.

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

5. Books and Materials

Text Books:

1. RobinMurray,JulieCaulier-Grice,GeoffMulgan,"Theopenbookofsocialinnovation:Waysto Design,DevelopandGrowSocialInnovation",TheYoungFoundation,2010.
2. Julie Caulier-Grice, Anna Davies, Robert Patrick & Will Norman, The Young Foundation (2012)SocialInnovationOverview:Adeliverableoftheproject:"Thetheoretical,empirical and policy foundations for building social innovation in Europe" (TEPSIE), European Commission– 7thFrameworkProgramme,Brussels:EuropeanCommission,DGResearch.

Reference Books:

1. GeoffMulgan,"SocialInnovation:Whatitis,WhyitmattersandHowitcanbeaccelerated", TheYoungFoundation,2007.
2. Asset Based Community Development (ABCD) Model –
3. http://www.nurturedevelopment.org/asset-based-community-development/.
4. 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 SEMESTER

COURSE STRUCTURE

A4011 – 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:

A4011.1 Solve partial differential equations of first and higher order.
A4011.2 Test for analyticity of complex functions in the given domain.
A4011.3 Build analytic function in series of complex terms.
A4011.4 Evaluate real and complex integrals along a closed contour.
A4011.5 Apply conformal mapping to transform complex regions into simpler regions.

3. Course Syllabus

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

Higher order Partial Differential Equations: Classifications of second order partial differential equations, Solving linear equations with constant co-efficients by finding complementary function and particular integral, Method of separation of variables, Solution of one dimensional wave and heat equations

Differentiation of Complex Functions: Continuity, differentiability and analyticity of functions of a complex variable, Cauchy-Riemann equations in cartesian and polar form, 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, types of singularities. Complex power series: Taylor's series, Laurent's series.

Calculus of Residues: Residues, Residue theorem, Evaluation of real definite integrals of the form (i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$, (ii) $\int_{-\infty}^{\infty} f(x)dx$. Conformal mapping: Translation, rotation, inversion, bilinear transformation and their properties, determination of bilinear transformation of three given points.

4. Books and Materials

Text Books:

1. B.S. Grewal, *Higher Engineering Mathematics*, 43rdEdition, Khanna Publishers, New Delhi, 2014.
2. B.V.Ramana, *Higher Engineering Mathematics*, 23rdReprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7thEdition, Mc-Graw Hill, 2004.
3. Ian N Sneddon, Elements of Partial Differential Equations, Dover Publications, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B. TECH I SEMESTER

COURSE STRUCTURE

A4203 – NETWORK THEORY-I

3			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:

A4203.1 Illustrate nodal analysis, mesh analysis and network topology for electrical circuits.

A4203.2 Apply network theorems to simplify complex electrical circuits with using simulation tool.

A4203.3 Apply the concept of resonance to electrical networks to determine bandwidth and Q-Factor.

A4203.4 Develop transfer function of a given electrical network using Laplace transforms.

A4203.5 Analyze state space representations of a given electrical network.

3. Course Syllabus

Theory

ANALYSIS OF ELECTRICAL CIRCUITS: Mesh analysis, mesh equations by inspection method, super-mesh analysis, nodal analysis, nodal equations by inspection method, super-node analysis with AC excitation and with dependent sources, star-delta conversion.

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 and with dependent sources.

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.

NETWORK TOPOLOGY: Graph, tree, incidence matrix, and tie set and cut set matrices – Formulation of equilibrium equations based on graph theory. Duality and dual circuits

RESONANCE: Resonance for parallel circuits, Tank circuit, concept of band width and Q factor for series resonance circuits.

LOCUS DIAGRAMS: Current locus diagrams of Series R-L, R-C, R-L-C circuits and Parallel combination of RL, R-C and R-L-C circuits with variation of various parameters.

Practice

1. Determination of Average value, RMS value, Form factor, Peak Factor of a sinusoidal wave.
2. Verification of Thevenin's and Norton's theorems.
3. Verification of Maximum power transfer theorem.
4. Verification of superposition and reciprocity theorems.
5. Verification of Millimans and compensation theorems.
6. Determination of resonance frequency, bandwidth, Q factor of parallel RLC circuit.
7. Verification of Thevenin's and Norton's theorems using MULTISIM.
8. Verification of Maximum power transfer theorem using MULTISIM.
9. Verification of superposition and reciprocity theorems using MULTISIM.
10. Verification of Millimans 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.

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*,2nd Edition,Tata Mc Graw Hill, New Delhi.

II B. TECH I SEMESTER

COURSE STRUCTURE

A4402 – ELECTRONIC DEVICES AND CIRCUIT ANALYSIS

3			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:

A4402.1 Demonstrate the principle of operation of electronic devices and circuits .
A4402.2 Construct electronic circuits making use of characteristics of diodes and transistors.
A4402.3 Analyze voltage and power amplifiers for DC and AC conditions.
A4402.4 Analyze the effect of feedback and cascading in amplifiers.
A4402.5 Build amplifier and oscillator circuits for the given specifications and verify using appropriate simulation tools.

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 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, analysis of single-stage BJT amplifier in common-emitter mode.

Junction Field Effect Transistor (JFET): Structure, principle of operation, characteristics.

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

Multistage amplifiers and Power Amplifiers: Cascade (CE-CE), Cascode (CE-CB) and Darlington pair (CC-CC) amplifiers, Class A and Class B power amplifiers and their power efficiencies.

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 and Wien bridge, LC oscillators – Hartley and Colpitts.

Practice

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

11. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
12. Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts.

4. Laboratory Equipment/Software/Tools Required

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

5. Books and Materials

Text Books:

1. Millman and Halkias: Electronic Devices and Circuits; Tata Mc Graw Hill.

Reference Books:

1. R.L. Boylestad and L. Nashelsky: Electronic Devices and Circuit Theory; PHI, 6e, 2001.
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 SEMESTER

COURSE STRUCTURE

A4204 – 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:

A4204.1 Understand the physical laws related to Electric and Magnetic fields.
A4204.2 Apply orthogonal coordinate systems to determine Electric and magnetic field components.
A4204.3 Analyze Electric and Magnetic fields in Static and Time Varying fields.
A4204.4 Examine Maxwell's equations for static and Time Varying fields.
A4204.5 Evaluate the capacitance, Inductance and Magnetic force for geometrical conductors in Electromagnetic fields.

3. Course Syllabus.

Theory

STATIC ELECTRIC FIELDS: Introduction to Co-ordinate Systems – Rectangular – Cylindrical and Spherical Co-ordinate System –– Coulomb's Law, Electrostatic Fields – Definition of Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field-Electric Potential – Properties of potential function – Potential due to an infinite uniformly charged line – Electric dipole – Dipole moment -Potential due to electrical dipole- Torque on an Electric dipole in an electric field- Potential gradient. Gauss's law – Applications of Gauss's Law – Maxwell's first law, div (D) = ρ_V

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 and rectangular loop carrying a current I- – Maxwell's second Equation, div(B)=0.

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 $\nabla \times H = J$ -Maxwell's equations for static fields.

ELECTRIC AND MAGNETIC FIELDS IN MATERIALS: Laplace's and Poison's equations – Solution of Laplace's equation in one variable – Behaviour of conductors in an electric field – Conductors and Insulators. Capacitance - Capacitance of parallel plate, spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field- Electric field inside dielectric material – polarization – Boundary conditions for electric fields- Electric Current-Current density – conduction and Convection current densities – 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 and – 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 -Force on a 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 – a differential current loop as a magnetic dipole - Torque on a current loop placed in a magnetic field-Scalar Magnetic Potential and its limitations-Magnetic Vector Potential.

TIME VARYING FIELDS: Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=- B/ t – 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B. TECH I SEMESTER

COURSE STRUCTURE

A4205 – 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:

A4205.1 Demonstrate the construction and operation of DC machines & Induction motors.
A4205.2 Apply speed control techniques and starting methods for DC motors and induction motors.
A4205.3 Select suitable test to determine the performance parameters of electrical machines.
A4205.4 Analyze the characteristics of DC machines and induction motors.
A4205.5 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, armature windings, 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 - separately excited and self-excited generators, build-up of E.M.F, critical field resistance and critical speed, causes for failure of self-excited and remedial measures.

LOAD CHARACTERISTICS OF D.C GENERATORS: Shunt, series and compound generators – parallel operation of D.C series generators, use of equalizer bar and cross connection of field windings.

D.C. MOTORS & SPEED CONTROL OF D.C. MOTORS: D.C Motors - Principle of operation - characteristics and application of shunt, series and compound motors. Speed control methods of D.C. Motors- 3-point and 4 - point starters.

TESTING OF D.C. MACHINES: Testing of D.C. machines-Constant & Variable losses, calculation of efficiency, and condition for maximum efficiency- Types of Testing- Swinburne's test, Brake test, Hopkinson's test, Field's test, Retardation test.

3-Phase INDUCTION MOTORS: Equivalent circuit of 3ph Induction Motors, losses and efficiency, Construction of 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, Induction generator-principle of operation.

Practice

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.

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 SEMESTER

COURSE STRUCTURE

A4019 – 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:

A4019.1Identify efficient and appropriate methods to solve logical reasoning problems
A4019.2 Choose the techniques to solve puzzles on analytical reasoning
A4019.3 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 SEMESTER

COURSE STRUCTURE

A4013 – 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:

A4013.1 Interpreting gender sensitization and problems of other genders.
A4013.2 Identifying the reasons for the female feticide.
A4013.3 Interpreting the role of women in domestic, political and economic spheres.
A4013.4 Developing sensitivity towards sexual and domestic violence.
A4013.5 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 SEMESTER

COURSE STRUCTURE

A4025 – 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:

A4025.1 Explain the concepts of Managerial Economics and Financial Accounting.
A4025.2 Analyze interrelationship among various economic variables and it's impact.
A4025.3 Classify the market structure to decide the fixation of suitable price.
A4025.4 Analyze financial statements to assess financial health of business.
A4025.5 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 SEMESTER

COURSE STRUCTURE

A4207 – 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:

A4207.1 Understand the different components of an electric power system.

A4207.2 Analyze the different conventional methods of generating electrical power to meet the required load demand.

A4207.3 Develop a layout and single line diagram for any given substation.

A4207.4 Model a power system to reduce economic losses.

3. Course Syllabus

STRUCTURE OF POWER SYSTEM: Components of an electric power system - Single line diagram of electrical power system, important terms & factors. Base load and peak load on power station. Interconnected grid system, different types of energy sources and efficiency in their use.

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

THERMAL POWER STATIONS: Thermal Power Station (TPS)- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

NUCLEAR POWER STATIONS: Nuclear Fission and Chain reaction. Nuclear fuels- Principle of operation of Nuclear reactor. Reactor Components- Radiation hazards: Shielding and Safety precautions. Types of Nuclear reactors

GAS POWER STATIONS: Principle of Operation and Components.

SUBSTATIONS: Classification of substations: Air insulated substations, Indoor & Outdoor substations, Bus bar arrangements in the Sub-Stations, Gas insulated substations (GIS)- Advantages, single line diagram of gas insulated substations, 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. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Characteristics of a Tariff Method. 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 econom4208ical 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

II B. TECH II SEMESTER

COURSE STRUCTURE

A4208 – 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

A4205-Electrical Machines-I

2. Course Outcomes (COs)

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

A4208.1 Demonstrate the construction and operation of Synchronous machines & Single Phase motors.

A4208.2 Analyze the characteristics and performance of Synchronous machines, Transformers and single phase motors.

A4208.3 Apply appropriate speed control technique and starting method for Synchronous and single phase motors for any industrial or house hold applications.

A4208.4 Identify suitable test to determine the performance parameters of Synchronous machines and transformers.

A4208.5 Compare various methods for finding voltage regulation of Alternators.

3. Course Syllabus

Theory

SINGLE PHASE TRANSFORMERS: OC and SC test, regulation by direct and indirect methods, Sumpner's test, Load sharing and operation of transformers in parallel, Separation of no load losses by experimental method, All-day efficiency, effect of variations of frequency & supply voltage on iron losses.

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.

SYNCHRONOUS GENERATOR: 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 X_d and X_q (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, Capacitance starting, Shaded pole starting, speed-torque characteristics, Equivalent circuit, Phasor diagrams, Applications.
AC SERIES MOTORS: Construction, Principle of operation, Phasor diagrams and Characteristics of Single phase AC Series motors, Universal motors and their Applications.

Practice

1. O.C. & S.C. Tests on Single phase Transformer.
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 X_d and X_q 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 3 phase alternator.

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 SEMESTER

COURSE STRUCTURE

A4209 – 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

A4203-Network Theory-I

2. Course Outcomes (COs)

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

A4209.1 Understand the basic concepts of magnetic circuits.
A4209.2 Analyze DC and AC transients for given electrical circuit.
A4209.3 Determine various parameters of a given two-port networks using simulation tools.
A4209.4 Develop driving point function and transfer function of a given two port network.
A4209.5 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.

D.C TRANSIENT ANALYSIS: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for D.C. excitations, Initial conditions, Solution using differential equation and Laplace transform method.

A.C TRANSIENT ANALYSIS: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combinations) for sinusoidal excitations, Initial conditions, Solution using differential equation and Laplace transform method.

TWO-PORT NETWORKS: Impedance and Admittance parameters, Hybrid and inverse-hybrid parameters, Transmission and inverse transmission parameters , Inter-relationships between parameter sets , Series, Parallel, and Cascade connection of two-ports , Conditions for reciprocity and symmetry of two-port networks.

NETWORK FUNCTIONS: Basic Network functions, One-port and Two-port networks, Driving point and transfer functions of networks , Properties of driving point and transfer functions , Concept of complex frequency, poles and zeros , Time domain response from pole-zero diagram, amplitude and phase response from pole-zero diagram.

PASSIVE RLC FILTERS: Classification of RLC filters, Low-pass, High-pass, Band-pass, Band-stop filters and their frequency responses.

Practice

1. Determination of self, mutual inductance and coefficient of coupling.
2. Transient analysis of RL & RC circuits using NI-My DAQ.
3. Verification of Z and Y parameters.
4. Verification of Hybrid and Transmission parameters.
5. Effect of cascading of 2 two port networks.
6. Design of High pass and Low pass circuits using NI- My DAQ.
7. Verification of Z and Y parameters using Multisim.
8. Verification of Hybrid and Transmission parameters using Multisim.
9. Verification of symmetry and reciprocity condition of two port network Multisim.
10. Pole –zero plot of a given network using MATLAB.
11. Effect of cascading of 2 two port networks using MATLAB.
12. Effect of parallel connection of 2 two port networks using MATLAB.

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 SEMESTER

COURSE STRUCTURE

A4210 – 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:

A4210.1 Develop the transfer function and state space models of dynamic systems.

A4210.2 Analyze performance indices of linear and nonlinear control systems.

A4210.3 Apply Routh's and Nyquist stability criterion to analyze and design of feedback control systems.

A4210.4 Examine the performance of feedback control system by using graphical techniques.

A4210.5 Design the various compensators and controllers for time invariant systems.

3. Course Syllabus

Theory

BASICS IN CONTROL SYSTEM AND TRANSFER FUNCTION: Introduction of Control Systems, Various types of systems (Open Loop and closed loop) and their differences- Classification and Feed-Back Characteristics of control system-Effects of feedback.

MATHEMATICAL MODELS OF CONTROL SYSTEM COMPONENTS: Differential equations, Transfer Function of LTI systems, Transfer Function of DC Servo motor, AC Servo motor- Synchro transmitter and Receiver, block diagram reduction techniques, Signal Flow Graph representation, Reduction using Mason's gain formula.

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

STABILITY ANALYSIS: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

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

STABILITY ANALYSIS: Polar Plots, Nyquist Plots-Stability Analysis.

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

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

Practice

1. Time response of second order system.
2. Characteristics of Synchros.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Determination of Transfer function of DC motor.
5. Effect of P, PD, PI, PID Controller on a second order systems.
6. Characteristics of magnetic amplifiers.
7. Characteristics of AC servo motor.
8. Time domain and Error analysis of Linear Time Invariant system using MATLAB.
9. Frequency response analysis (Bode, Nyquist) of Linear Time Invariant system using MATLAB.
10. Root locus technique to design of Lag & Lead compensators of Linear Time Invariant system using MATLAB.
11. State space model for classical transfer function using MATLAB.
12. Simulink model for speed control of DC motor using MATLAB.

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 SEMESTER

COURSE STRUCTURE

A4017 – QUANTITATIVE APTITUDE - I

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:

A4017.1 Interpret data using graphs and charts
A4017.2 Apply the concepts of ratios, proportions and percentages to solve problems
A4017.3 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 SEMESTER

COURSE STRUCTURE

A4014 – 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:

A4014.1 Outline the important components of environment.

A4014.2 Identify global environmental problems to come out with best possible solutions.

A4014.3 Make use of environmental laws for the protection of forest and wild life.

A4014.4 Apply environmental ethics to maintain harmonious relation between nature and human being.

A4014.5 Analyze the major environmental effects of exploiting natural resources.

3. Course Syllabus

ECOSYSTEMS: 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. Erach Bharucha. Textbook of Environmental Studies for Undergraduate Courses. 1st Edition, Universities press, 2005.
2. S. Deswal and A. Deswal. A basic course in environmental studies. 2nd edition, Dhanapath rai & Co.,2004.
3. Anubha Kaushik, C.P. Kaushik. Perspectives in Environmental Studies. 4th edition, New age international publishers, 2014.
4. Benny joseph. Environmental studies. 3rd Edition, McGraw Hill Education (India) Private Limited, 2018.

Reference Books:

1. Daniel B. Botkin and Edwards A. Keller. Environmental science. 8th edition, Wiley India (P) Ltd, 2014.
2. Richard T. Wright. Environmental Science: towards a sustainable future. 4th Edition, PHL Learning Private Ltd, 2008.
3. P.D. Sharma. Ecology And Environment. 5th edition, Rastogi Publications, 2005.

SYLLABI FOR III YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B. TECH I SEMESTER

COURSE STRUCTURE

A4211 – 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

A4207-Power Systems-I

2. Course Outcomes (COs)

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

A4211.1 Apply the knowledge of electromagnetic fields to calculate the transmission line parameters.

A4211.2 Analyze the Voltage regulation and efficiency for different Power transmission lines.

A4211.3 Analyze power loss due to corona with various factors and physical strength of transmission line by Sag calculations

A4211.4 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 using PSCAD.
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 SEMESTER

COURSE STRUCTURE

A4212 – 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

A4402-Electronic Devices And Circuit Analysis

2. Course Outcomes (COs)

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

A4212.1 Apply the knowledge of thyristor, IGBT and MOSFET in different PE converters.
A4212.2 Analyze AC-DC, DC-DC, DC-AC, AC-AC converters and commutation circuits.
A4212.3 Apply the knowledge of converters to select suitable converter for a given application.
A4212.4 Calculate different parameters of Converters for the given requirements to investigate the performance of a converters.
A4212.5 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 SEMESTER

COURSE STRUCTURE

A4213 – 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

A4203-Network Theory-I

2. Course Outcomes (COs)

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

A4213.1 Able to analyze the working of various indicating instruments and their suitable applications.

A4213.2 Apply the knowledge in measurement of power, energy and frequency in real time applications.

A4213.3 Able to use the wave analyzers in harmonic measurements and communication also use potentiometer for calibration of ammeter and voltmeter.

A4213.4 To develop the suitable bridge for measurement of resistance, inductance and capacitance.

A4213.5 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, NewDelhi.
2. W. Golding, F.C. Widdis (2010), Electrical Measurements and Measuring Instruments, 5th Edition, Wheeler Publishing, NewDelhi.

Reference Books:

1. J.B.Gupta (2010), Electronics and Electrical Measurements and Instrumentation, 10th Edition, S.K.Katariasons, 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 SEMESTER

COURSE STRUCTURE

A4416 – 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 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

A4203-Network Theory-I

2. Course Outcomes (COs)

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

A4416.1 Apply the knowledge of Boolean algebra concepts to simplify a digital circuit.
A4416.2 Construct and Analyze various digital circuits used in digital systems.
A4416.3 Design various Combinational and sequential digital circuits using basic building blocks
A4416.4 Model and Examine the Sequential Machines based on digital circuit design.
A4416.5 Work in a team to demonstrate an application of digital circuits by engaging in self-learning.

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 Circuits 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 Machines: 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 SEMESTER

COURSE STRUCTURE

A4251 – RENEWABLE ENERGY SOURCES

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

A4207-Power Systems-I

2. Course Outcomes (COs)

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

A4251.1 Apply the principles of renewable energy sources for the construction of Power generating station.

A4251.2 Analyze various harvesting techniques of Renewable energy for different applications.

A4251.3 Apply energy storage methods in renewable energy systems.

A4251.4 Analyze Renewable energy systems for various environmental conditions.

A4251.5 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 SEMESTER

COURSE STRUCTURE

A4252 – SPECIAL ELECTRICAL MACHINES

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

A4205-Electrical Machines-I
A4208-Electrical Machines-II

2. Course Outcomes (COs)

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

A4252.1 Analyze the design of stator, rotor of SR Motors and different types of power converter and its control types of electrical machines.

A4252.2 Evaluate the performance characteristics of stepper motor and servo motor by position Control.

A4252.3 Analyze the torque equation and equivalent circuit of PMDC motor.

A4252.4 Understand the construction and operation control the BLDC motor with and without sensor.

A4252.5 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 SEMESTER

COURSE STRUCTURE

A4253 – ADVANCED CONTROL 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

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

A4210-Control Systems

2. Course Outcomes (COs)

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

A4253.1 Develop the mathematical modeling of linear/non-linear systems in state space.
A4253.2 Investigate the controllability/observability of a given system.
A4253.3 Analyze stability of linear / Non-linear systems using various methods.
A4253.4 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*, 5thEdition, 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 SEMESTER

COURSE STRUCTURE

A4018 – 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

A4022-Engineering Exploration

2. Course Outcomes (COs)

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

A4018.1 Interpret the problem-solving skills and product design skills

A4018.2 Apply foundational knowledge of the primary fields of engineering and scientific concepts to find the solution

A4018.3 Identify various techniques and applications of the engineering design process

A4018.4 Inspect the design and assess a prototype that solves an engineering problem

A4018.5 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 SEMESTER

COURSE STRUCTURE

A4015 – 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

It is very difficult to define what Traditional Knowledge is. The vast majority of the knowledge is old in the sense that it has been handed down through the generations, it is continually refined and new knowledge developed, rather as the modern scientific process proceeds by continual incremental improvement rather than by major leaps forward. The notions of traditional knowledge, indigenous knowledge and indigenous peoples have acquired wide usage in international debates on sustainable development as well as those on intellectual property protection. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.

Course Pre/co-requisites

"The course has no specific prerequisite and co requisite"

2. Course Outcomes (COs)

A4015.1. Interpret the basic structure of traditional knowledge

A4015.2. Organize the need to preserve traditional knowledge through various acts

A4015.3. Identify the role of Indian contribution to modern science

A4015.4. Understanding the importance of traditional knowledge for holistic health

A4015.5. Compare Indian artistic tradition with the present art

3. Course Syllabus

1. Basic structure of Indian Knowledge System.
2. Modern Science and Indian Knowledge System.
3. Yoga and Holistic Health care.
4. Philosophical Tradition.
5. Indian Linguistic Tradition (Phonology, morphology, syntax and semantics).
6. Indian Artistic Tradition.

7. Case studies.

4. Books and Materials

Text Books:

1. V. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014.
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan.
3. Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan.
4. Fritzof Capra, Tao of Physics.
5. Fritzof Capra, The Wave of life.
6. VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Ernakulam.
7. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.

Reference Books:

1. GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan, Delhi 2016.
2. RN Jha, Science of Consciousness Psychotherapyand Yoga Practices, Vidyanidhi Prakashan, Delhi 2016 P B Sharma (English translation), Shodashang Hridayan.

SYLLABI FOR III YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B. TECH II SEMESTER

COURSE STRUCTURE

A4417 – 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

A4402-Electronic Devices and Circuit Analysis

2. Course Outcomes (COs)

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

A4417.1 Demonstrate the working principle and analysis of electronic circuits.

A4417.2 Apply the knowledge of Kirchhoff's voltage and Current laws to observe the response of various Electronic circuits.

A4417.3 Analyze the functioning of various Electronic Circuitry, including wave shaping circuits, signal generation, filtering, timing and control circuits.

A4417.4 Design Signal Processing and Generation circuits for the given specifications.

A4417.5 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: Digitalto 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 SEMESTER

COURSE STRUCTURE

A4409 – 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

A4416- Switching Theory and Logic Design

2. Course Outcomes (COs)

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

A4409.1 Explain the fundamentals of microprocessor & controller to investigate existing designs.

A4409.2 Utilize the assembly language programming proficiency to assemble and run on host machine.

A4409.3 Identify the required driver circuitry to microprocessor and controller I/O ports to interface external devices.

A4409.4 Build and integrate the required hardware & software modules for a functional model.

A4409.5 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, and string manipulation, assembler directives, procedures and macros, Simple programs.

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

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

I/O INTERFACES:8255 Programmable Peripheral Interface, various modes of operation and interfacing to Microprocessor & Microcontroller, 8051 interfacing with seven segment LED displays, stepper motor, D/A converter, 4*4 Matrix Keypad, Alphanumeric Displays (LCD) & A/D converter.

Practice

Formulate/Compose/Compute an assembly language program

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.
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:
    c. 5 rotations in clockwise direction
    d. 5 rotations in anticlockwise direction
    e. 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:
    f. Square wave
    g. Ramp signal
    h. 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* 4thEdition, PrenticeHall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B. TECH II SEMESTER

COURSE STRUCTURE

A4215 – 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

A4211-Power Systems-II

2. Course Outcomes (COs)

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

A4215.1 Develop per-unit reactance diagrams, bus incidence, Y bus and Z bus matrices for modeling the actual power system.

A4215.2 Determine steady state power flow analysis of power system using Gauss-Seidel, Newton Raphson and fast decoupled iterative methods

A4215.3 Analyze symmetrical and unsymmetrical power system faults.

A4215.4 Analyze the operational aspects of different types of circuit breakers.

A4215.5 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 SEMESTER

COURSE STRUCTURE

A4254 – POWER SYSTEM DYNAMICS AND STABILITY

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

A4211-Power Systems-II

2. Course Outcomes (COs)

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

A4254.1 Analyze the steady state behavior of synchronous machine using Park's transformation.

A4254.2 Analyze the dynamic behavior of synchronous generator under system conditions leading to instability.

A4254.3 Analyze the generator excitation, prime mover controls and recognize their role in power system stability control.

A4254.4 Compare different types of power system stabilities and methods to improve overall system stability.

A4254.5 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

III B. TECH II SEMESTER

COURSE STRUCTURE

A4255 – POWER QUALITY

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

A4211-Power Systems-II

2. Course Outcomes (COs)

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

A4255.1 Analyze the severity of power quality problems in distribution system.

A4255.2 Analyze the various causes of voltage flicker and their effects and various means to reduce flickers.

A4255.3 Apply the knowledge of voltage sag/swell interruptions to improve power quality.

A4255.4 Apply the knowledge of harmonic sources and effects to improve the performance of system.

A4255.5 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. 1159 such as transients, short and long duration voltage variations, interruptions, short and long voltage fluctuations, imbalance, flickers and transients.

FLICKERS AND TRANSIENT VOLTAGES: Various causes of voltage flicker and their effects, Short term and long term flickers. Various means to reduce flickers. Transient over voltages, sources, impulsive transients, switching transients, Effect of surge impedance and line termination, control of transient voltages.

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. CBEMA Curve.

WAVEFORM DISTORTION: Definition of harmonics, inter-harmonics, sub-harmonics. Types of harmonics. Causes and effect of harmonics. Harmonic indices, harmonics series and parallel resonances, Consequences of harmonic resonance.

POWER QUALITY MONITORING AND IMPROVEMENT: Need and approaches of power quality monitoring, objectives and requirements. Initial site survey. Selection of power quality monitors, location and period. Principles for controlling harmonics, reducing harmonic currents in loads.

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

III B. TECH II SEMESTER

COURSE STRUCTURE

A4256 – NEURAL NETWORKS AND FUZZY LOGICS

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

A4416- Switching Theory and Logic Design

2. Course Outcomes (COs)

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

A4256.1 Build the basic model of artificial neuron and compare the functions of both artificial neuron and biological Neuron.

A4256.2 Develop different architectures of Artificial Neural Networks and apply learning laws and the learning rules associated with the neural networks.

A4256.3 Analyze the problem of linearly separable using Perceptron model and relate to the concept of Madaline networks.

A4256.4 Explore the associative learning of the neural network, the architecture of Hopfield network and the error performance of Hopfield network.

A4256.5 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 SEMESTER

COURSE STRUCTURE

A4020 – PRODUCT REALIZATION

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

1. Course Description

Course Overview

The accelerating demand for rapid product design and manufacturing, calls for constant technological innovation. The art of launching latest technological concepts and creating better products for future is achieved by strong Engineering judgment. Current research in this area includes lean product development, integration of knowledge and learning into design through product realization and rapid prototyping. In a similar note an initiative is taken to further explore and implement concepts like product realization and concurrent engineering 1. 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

A4018- Engineering Design Thinking

2. Course Outcomes (COs)

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

A4020.1 Interpret the specifications of product and solve it for Practical realization.
A4020.2 Analyze the Costumers mindset and accordingly designing of the product.
A4020.3 Applying Gantt Charts to define timeline for Product Realization.
A4020.4 Conceptualize the terms called Product, Purchase, Production and Monitoring of products.
A4020.5 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 needed. Case study on timeline of Product realization planning (Gnatt Chart).

Customer-Related Processes :

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

Design and Development:

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

Purchasing, Production and Service Provision:

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

Control of Monitoring and Measuring Equipment:

Monitoring and measurements - Calibrated or verified, Adjusted or re-adjusted, Identified to 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.

4. Books and Materials

Text Books:

1. Mileta M Tomovic, Sowping Wang, Product Realization – A Comprehensive Approach, Springer.
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 SEMESTER

COURSE STRUCTURE

A4016 – 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

"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:

A4016.1 Identify the important components of Indian Constitution.
A4016.2 Apply the fundamental rights in right way and become a more responsible citizen.
A4016.3 Illustrate the evolution of Indian Constitution.
A4016.4 Explain the basic structure of Indian Constitution.
A4016.5 Define the basic concepts democracy, liberty, equality, secular and justice.

3. Course Syllabus

EVOLUTION OF INDIAN CONSTITUTION: Indian independence act 1947. Formation of constituent assembly of India. Committees of the constituent assembly. Constitution of India drafting committee. Brief study about *Dr.* B. R. Ambedkar. Time line of formation of the constitution of India.

STRUCTURE OF THE CONSTITUTION OF INDIA: i. Parts ii. Schedules iii. Appendices. Constitution and government. Constitution and judiciary.

PREAMBLE TO THE CONSTITUTION OF INDIA: Brief study about i. Sovereignty ii. Socialist iii. Secular iv. Democracy v. Republic vi. Justice (political justice, social justice, economic justice) vii. Liberty viii. Equality ix. Fraternity x. Unity & integrity.

ACTS: Right to education act. Right to information act. Anti-defection law. Jan lokpal bill.

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

4. Books and Materials

Text Books:

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

Reference Books:

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

SYLLABI FOR IV YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B. TECH I SEMESTER

COURSE STRUCTURE

A4217 – 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

A4212-Power Electronics

2. Course Outcomes (COs)

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

A4217.1 Analyze1phase and 3phase controlled converters for speed control operation of DC Drives.

A4217.2 Apply the knowledge of DC-Dc Converter and dual converter for speed and torque control of DC Drives.

A4217.3 Analyze variable frequency control of Induction motor on stator side using different converters.

A4217.4 Test the performance of Induction Motor by conducting different speed control methods.

A4217.5 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. Speed Control of single phase AC Motor using single phase AC voltage controller.
5. Speed control of PMDC motor using MOSFET based Buck/Boost Converter.
6. Single phase Cyclo-converter fed AC Motor.
7. Simulation of pulse width modulated 3 phase inverter fed induction motor drive using MATLAB/ Simulink.
8. Simulation of series inverter characteristics for light load using MATLAB/ Simulink.
9. Simulation of 3 ph 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 SEMESTER

COURSE STRUCTURE

A4218 – 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

A4211-Power Systems-II

2. Course Outcomes (COs)

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

A4218.1 Apply the basic knowledge for economic operation, load frequency control and reactive power compensation.

A4218.2 Analyze the static and dynamic performance of single and multi area Load Frequency Control.

A4218.3 Analyze the techniques and devices used for reactive power compensation.

A4218.4 Evaluate the load scheduling among various thermal and hydrothermal plants.

A4218.5 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 SEMESTER

COURSE STRUCTURE

A4257 – ELECTRIC VEHICLES

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

A4208 – Electrical Machines - II

2. Course Outcomes (COs)

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

A4257.1Demonstrate different configurations of electric vehicles and its components, hybrid vehicle configuration by different techniques, E-mobility business of Electric Vehicles.

A4257.2Analyse plug – in hybrid electric vehicle architecture, design and component sizing and the power electronics devices used in hybrid electric vehicles.

A4257.3 Develop the electric propulsion unit and its control for application of electric vehicles.

A4257.4 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

IV B. TECH I SEMESTER

COURSE STRUCTURE

A4258 – POWER SWITCHING CONVERTERS

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

A4212 – Power Electronics

2. Course Outcomes (COs)

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

A4258.1 Apply the knowledge of thyristor, IGBT and MOSFET in different Power Electronic converters.

A4258.2 Analyze various power electronic converters.

A4258.3 Apply the knowledge of converters to select suitable converter for a given application.

A4258.4Calculate 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

IV B. TECH I SEMESTER

COURSE STRUCTURE

A4259 – HIGH VOLTAGE DC TRANSMISSION & FACTS

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

A4211-Power Systems-II

2. Course Outcomes (COs)

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

A4259.1 Evaluate the HVDC Transmission systems and Lines.

A4259.2 Identify and analyze converter configurations used in HVDC and list the performance metrics.

A4259.3 Compute the filter parameters for elimination of voltage and current harmonics in HVDC system.

A4259.4 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.

SYLLABI FOR IV YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B. TECH II SEMESTER

COURSE STRUCTURE

A4026 – 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:

A4026.1 Explain and infer the concepts and aspects of management

A4026.2 Analyze the different organizational structures, plant layouts, work study tools for enhancement of productivity in an organization.

A4026.3 Apply statistical quality control techniques to know quality of product with in control limits.

A4026.4 Use Human resource management techniques for better people management.

A4026.5 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 SEMESTER

COURSE STRUCTURE
A4260 – 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

A4207- Power Systems - I
A4211- Power Systems-II

2. Course Outcomes (COs)

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

A4260.1 Analyze various types Electric drives and their applications.
A4260.2 Identify the various modern methods of speed control & braking techniques.
A4260.3 Analyze the modern circuits for generation of high frequency power for induction & electric heating.
A4260.4 Explain the various welding processes used in industry.
A4260.5 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, 8thedition, 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 SEMESTER

COURSE STRUCTURE

A4261 – DISTRIBUTED GENERATION AND MICRO-GRIDS

(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

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

A4207- Power Systems - I
A4211- Power Systems-II

2. Course Outcomes (COs)

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

A4261.1 Apply the knowledge of principle of operation, control and modelling of distributed energy systems in connecting them into Grids.
A4261.2 Describe the basic components of a range of distributed energy sources including wind, PV, hydro, cogeneration, and energy storage systems.
A4261.3 Analyse the Economic and control aspects of distributed energy sources and Micro grids.
A4261.4 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', International Conference on Power Systems Transients (IPST'05) in Montreal, Canada on June 19-23, 2005.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

IV B. TECH II SEMESTER

COURSE STRUCTURE

A4262– 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

A4210 – Control Systems

2. Course Outcomes (COs)

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

A4262.1 Apply the Sampling & quantization in A/ D conversion & sampling and hold circuit in reconstruction process D/A Conversion.

A4262.2 Analysis of the given system in time domain, frequency domain and Z domain.

A4262.3 Inspect the Stability, Controllability and Observability of digital systems.

A4262.4 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, NewDelhi.
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

OPEN ELECTIVE

COURSE STRUCTURE

A4131 - 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 requisite.

2. Course Outcomes (Cos)

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

A4131. 1 Identify project characteristics and various phases of a project.
A4131. 2 Explain project organization, staffing and feasibility of projects.
A4131. 3 Apply the techniques of Project planning, scheduling and Execution Control.
A4131. 4 Analyse the role of stakeholders.
A4131. 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

A4132 – ENVIRONMENTAL POLLUTION 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

The course has been designed to improve the understanding of the students about different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil. The course will also be dealing about the sources of pollution in air, soil, water, and noise and the impacts these sources on the environment and health. In addition, the students will be given the knowledge to develop the particular skills required in pollution related structured research and environmental management.

Course Pre/ Co-requisites

A4014 - Environmental Science

2.Course Outcomes (COs)

After the completion of the course, the student will be able to:
A4132.1. Identify water pollution sources, types and treatment methods.
A4132.2. Apply knowledge on Prevention and control of air pollution.
A4132.3. Inspect sources, effects and mitigation methods of noise pollution.
A4132.4. Examine soil pollution sources, effects and control measures.
A4132.5. Formulate Environmental management plan to minimize environmental pollution.

3. Course Syllabus

Water pollution: Water Pollution - Introduction - Sources and types of water pollutants Physical, Chemical and Biological. Ground water - Surface water - lake water - seawater. Effects of water pollution. Water Quality standards (drinking and industrial) - water treatment - physical, chemical and biological. Water Pollution Prevention and Control Act, 1974.

Air pollution: Structure and composition of atmosphere – classification, sources and effects of air pollution – Acid rain –green house effect – global warming – Ozone depletion, Prevention and control of air pollution particulate control – settling chamber, scrubber, bag filter, cyclones electrostatic precipitators. Gaseous emission control methods. Air pollution prevention and control Act 1981.

Noise Pollution: Noise Pollution Basics of acoustics- propagation of indoor and outdoor sound- noise profiling effects of noise – measurement, index and mitigation methods- health effects of noise- Vibration and its Effects, Whole body vibration problems in opencast mines-ground vibration and Air blast. Green Belt Development--Principles and design considerations, Industrial Noise Pollution Control methods.

Soil Pollution: Sources - solid waste disposal and their effects - pesticides - types and effect of pollutants on Plants - animals and human beings - biomagnifications - fertilizers and its Effect of pollutants on plants - animals and human beings - soil pollution Control measures - soil microbes and function - biofertilizer.

Environmental management: Environmental impact assessment and statement; Government strategies in pollution control: subsides, polluter pays principle and regulations; Government Agencies and Programs – The Tiwari committee – creation of NCEPC, Department of Environment & Forest – Function of State Pollution Control Board. Sources of environmental information and regulations; Sustainable development and environmental protection.

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

A4133 – DISASTER MANAGEMENT (OPEN 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 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:

A4133. 1. Identify concepts, hazards and vulnerabilities of different types of disasters.
A4133. 2. Examine the components of disaster management mechanism.
A4133. 3. Select suitable capacity building frame work for disaster management
A4133. 4 Interpret various disaster coping strategies
A4133. 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
A4231 – 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 requisite

2. Course Outcomes (Cos)

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

A4231.1. Aware the basic concepts of measurement parameters as well as instrument standards, characteristics and errors.

A4231.2. Construct and design various measuring devices like voltmeters, Ammeters, Ohmmeters, analog, digital multi-meters and analyze different types of cathode ray oscilloscopes.

A4231.3. Design different bridge networks and analyze balanced condition for finding out values of resistance, capacitance and inductance.

A4231.4. Analyze different physical parameters like pressure, force, velocity, acceleration, sound, torque, strain and stress etc. using non-electrical transducers.

A4231.5. 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

A4232 – SOLAR ENERGY AND APPLICATIONS (OPEN ELECTIVES-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 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 requisite.

2. Course Outcomes (Cos)

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

A4232.1 Compare the present and future available electrical power from solar energy in the world based on the knowledge of global solar horizontal irradiation.

A4232.2 Assimilate and acquire the skills for design and engineering of solar thermal and solar photovoltaic technology and systems.

A4232.3 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.

A4232.4 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.

A4232.5 Analyze the techno economics interaction of developments in the solar energy systems

3. Course Syllabus

PRINC PLES 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

A4233 – 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 requisite

2. Course Outcomes (Cos)

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

A4233.1 Analyze the influence of energy availability on the development of Industries and various other organizations.

A4233.2 Discuss the concepts and technologies used for energy conservation.

A4233.3 Develop methods for evaluating worth of project.

A4233.4 Investigate the schemes for demand side management.

A4233.5 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
A4331 - 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

A4003 - Semiconductor Physics
A4001 - Linear Algebra and Ordinary Differential Equations

2. Course Outcomes (Cos)

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

A4331.1. Develop the general energy equations for thermal systems by laws of thermodynamics.
A4331.2. Compare types of fluids, fluid flows, pressure and flow measuring devices, losses in pipes, laminar and turbulent boundary layer concepts.
A4331.3. Evaluate design parameters of hydraulic turbines at given efficiency and discharge
A4331.4. Analyze an expression for force, workdone and efficiency of vane, turbines and pumps.
A4331.5. 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 Book(s)

1. B S Grewal, *Higher Engineering Mathematics*, 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. B V Ramana, *Engineering Mathematics*, 23rd Reprint, Tata Mc Graw Hill Education Private Limited, New Delhi, 2015.

Reference Book(s)

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, 2010.
3. D. Poole, *Linear Algebra: A Modern Introduction*, 2nd Edition, Brooks/Cole, 2005.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

OPEN ELECTIVE

COURSE STRUCTURE
A4332 - 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

A4332.1. Understand the fundamental concepts of Additive Manufacturing (i.e. Rapid Prototyping) and 3-D printing, its advantages and limitations.

A4332.2. Apply engineering knowledge, techniques, skills and modern tools to analyze problems in 3D PRINTING .

A4332.3. Appraise additive manufacturing through 3d printing.

A4332.4. Solve Complex manufacturing problems for significant technological and societal development

A4332.5. 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
A4333 - 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 requisite

2. Course Outcomes (Cos)

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

A4333.1. Understand the basic concepts and components of a robotic system.

A4333.2. Identify the use of actuators and sensors for designing robot mobility system.

A4333.3. Solve transformation problems to describe the robot position and orientation of robot.

A4333.4. Apply the concepts of robot work cell design and control.

A4333.5. 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
A4431 - 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-requisite.

2. COURSE OUTCOMES (Cos)

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

A4431.1. Identify the basic building blocks of IoT and its characteristics

A4431.2. Choose the application-layer protocols and web services architectures for a seamless integration of various components within an IoT ecosystem

A4431.3. Utilize Python standard libraries for implementing various IoT Applications

A4431.4. Examine the communication between a machine or a device with a remote system

A4431.5. 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 Books:

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

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

OPEN ELECTIVE

COURSE STRUCTURE

A4432 - 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-requisite.

2. Course Outcomes (Cos)

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

A4432.1. Analyze linear and non - linear modulators and demodulators in time as well as frequency domain.

A4432.2. Design a linear and non linear modulators and demodulators for the analog signals

A4432.3. 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

A4432.4. Estimate a overall digital communication system for the improvement of the system performance.

A4432.5. 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.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

OPEN ELECTIVE

COURSE STRUCTURE

A4433 - 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-requisite.

2. Course Outcomes (COs)

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

A4433.1. Understand mathematical description of signals and representation of systems
A4433.2. Identify the spectrum of continuous-time periodic and non-periodic signals
A4433.3. Apply various transforms to analyze continuous and discrete-time systems
A4433.4. Analyze digital systems using various transform techniques
A4433.5. 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
A4531 – 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

- Programming for Problem Solving (A4501)

2. Course Outcomes (Cos)

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

A4531.1. Understand the principles of Object Oriented Programming to model real world problem.

A4531.2. Use various constructs / concepts to write programs in OOP paradigm.

A4531.3. Analyze the applications for Handling Exceptions and Multithreading in Java runtime environment.

A4531.4. Implement Collection Frameworks to retrieve and process data efficiently.

A4531.5. 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 Books:

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

A4532 – OPERATION RESEARCH

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

Operation Research facilitates the comparison of every possible alternative (courses of action or acts) to Know the potential outcomes, permits examination of the sensitivity of the solution to changes or errors in numerical values, and encourage rational decision-making based on the best available approaches or Techniques.

Course Pre/co requisites

- A4001- Linear Algebra and Ordinary Differential Equations
- A4012- Probability and Statistics.

2. COURSE OUTCOMES (COS)

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

A4532.1. Explain the Operations Research features, models, applications and methods such as linear programming, transportation, sequencing, assignment, replacement, games theory.

A4532.2. Build mathematical models for finding optimum solutions for various real world problems and case studies.

A4532.3. Evaluate various alternatives available to aid in decision making situations.

A4532.4. Choose the best strategies to maximize the profit in the presence of a competitor

A4532.5. Devise operating policies for the efficient and effective management of men, materials and machines, production, distribution and service systems.

3. COURSE SYLLABUS

Theory

INTRODUCTION TO OPERATIONS RESEARCH: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation and Graphical solution of Linear Programming Problem. Simple Method, Artificial variables Techniques, big -M method.

TRANSPORTATION PROBLEM: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions, North-West corner rule, least cost method and Vogel's approximation

method. Optimality test – MODI method. Assignment Problem-formulation, types, application to maximization cases and travelling salesman problem.

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.

QUEUING THEORY: Introduction, Single Channel, Poisson arrivals, exponential service times with infinite population and finite population models

REPLACEMENT MODELS and GAME THEORY: 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. GAME THEORY: Formulation of games, types, solution of games with saddle point, graphical method of solving mixed strategy games, dominance rule for solving mixed strategy games.

4. BOOKS AND MATERIALS

Text Books:

1. S.D. Sharma (2010), Operations Research – Theory and Applications, 15th edition, Kedar Nath Ram Nath, , India.
2. Frederick S Hillier; Gerald J Lieberman (2015), Introduction to Operations Research,10th Edition, McGraw-Hill , New York

Reference Books:

1. Hamdy Abdelaziz Taha (2015), Operations Research: an Introduction, 9 th edition, Pearson, Boston
2. Prem Kumar Gupta & D S Hira (2015), Operations Research, Revised edition, S. Chand Publishing, New Delhi, India.
3. P Shankara Iyer (2008), Operations Research 1st Edition, Tata McGraw Hill, Publishing Company, New Delhi, India.
4. S Kalavathi (2012), Operations Research, 4th Edition, Vikas Publication.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

OPEN ELECTIVE

COURSE STRUCTURE

A4533 – 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

A4531- Object oriented Programming

2. Course Outcomes (COs)

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

A4533.1: Understand design and implementation of a database for a given problem domain.
A4533.2: Construct Queries in Relational algebra, relational calculus and SQL.
A4533.3: Apply Normalization techniques to reduce data redundancy in data base.
A4533.4: 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

A4534 – 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

A4505- Digital Design and Computer Organization

2. Course Outcomes (Cos)

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

A4533.1. Understand the various services provided by the operating system.
A4533.2. Analyze the concepts of Process management and Synchronization in a multi processing system.
A4533.3. Apply the Memory management techniques for efficient usage.
A4533.4. Use File and Disk management schemes for effective storage management.
A4533.5. 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

A4631 - 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:

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:

A4631.1. Understand metrics in the process and project domains.

A4631.2. Identify the right process model to develop the right software system.

A4631.3. Gather requirements and analyze them scientifically in order to develop the right product, besides authoring software requirements documents.

A4631.4. Apply testing strategies for application being developed.

A4631.5. 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: The Object Oriented 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 Book (S)

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
A4632 - 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:

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:

A4632.1. Illustrate the components and roles of the E-Commerce environment.

A4632.2. Understand legal and ethical issues related to E-Commerce and web marketing approaches.

A4632.3. Identify how to sell products and services on the web as well as to meet the needs of web site Visitors.

A4632.4. 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 (S)

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.Michael Chang.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

OPEN ELECTIVE

COURSE STRUCTURE

A4633 - 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

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:

A4633.1. Understand how to protect them self and ultimately society from cyber-attacks by studying various case studies.
A4633.2. Summarize different government cyber laws and cyber-forensics techniques.
A4633.3. Apply different techniques to classify different types of cybercrimes
A4633.4. Analyze cyber-attacks on different online web applications
A4633.5. 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 Books:

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

A4031 - 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 corequisite.

2. Course Outcomes (Cos)

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

A4031. 1. Apply appropriate Numerical method to find a root of an equation.

A4031. 2. Make use of interpolation to find approximate values of the function at intermediate points.

A4031. 3. Evaluate definite integral using appropriate Numerical methods.

A4031. 4. Construct curve of best fit for the bivariate data using method of least squares.

A4031. 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

A4032 – 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 requisite.

2. Course Outcomes (Cos)

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

A4032.1.Identify LPP and express in mathematical form to solve by graphical or simplex method
A4032.2.Apply artificial variable techniques to obtain the optimal solution of an LPP
A4032.3.Interpret various methods under transportation model toget optimal results
A4032.4.Solve travelling salesmen problem using Hungarian method
A4032.5.Develop various replacement and sequencing models toarrive 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. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), Entrepreneurship, Tata Mc Graw Hill, New Delhi

Reference Books:

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

A4033 - 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 analyze the 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 requisite.

2. Course Outcomes (COs)

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

A4033.1. Determine series solutions of ordinary differential equations about ordinary and regular singular points.

A4033.2. Solve problems in cylindrical and spherical coordinate systems using Bessel functions.

A4033.3. Relate algebraic polynomials with Legendre and Hermite polynomials.

A4033.4. Apply Z - Transforms to solve difference equations.

3. Course Syllabus

Series Solutions of Second Order Ordinary Differential Equations: Classification of Singularities, series solutions to Differential Equations around zero, Frobenius Method around zero.

Bessel Functions: Bessel's Differential equation, Recurrence formulae for $J_n(x)$, Generating function for $J_n(x)$, Orthogonality of Bessel functions.

Legendre Functions: Legendre's Differential equation, Rodrigue's formula, Legendre Polynomials, Generating function for $P_n(x)$, Recurrence formulae for $P_n(x)$, Orthogonality of Legendre functions.

Hermite Functions: Hermite's equation, Generating function of Hermite Polynomials, Orthogonal Property, Recurrence formulae for $H_n(x)$.

Z-Transforms: Definition, Some standard Z-transforms, Damping rule, Shifting rule, Multiplication by n, Initial and final value theorems. Inverse Z-transforms using partial fractions, Convolution theorem, Solution of difference equations by Z - transforms.

4. Books and Materials

Text Books:

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

Reference Books:

1. *M.D. Raisinghania, Ordinary and Partial Differential Equations, 6th Edition,* S.Chand& Co. Ltd. New Delhi.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.

VARDHAMAN COLLEGE OF ENGINEERING, HYDERABAD

OPEN ELECTIVE

COURSE STRUCTURE

A4034 – 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 prerequisite and co requisite.

2. Course Outcomes (Cos)

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

A4034.1. Understand the role, characteristics, qualities and functions of entrepreneur and use this knowledge to become future entrepreneurs.

A4034.2. Interpret various Institutional supports for setting up a business enterprise and apply this knowledge while approaching these institutions for financial support.

A4034.3. Illustrate role, importance and functions of women entrepreneur and use this knowledge to become future women entrepreneurs.

A4034.4. Infer the concept of Project Management and steps in Project development and analyze while taking future project assignments.

A4034.5. 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 ofTrainees, NSIC, Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Telangana Academy for Skill and Knowledge (TASK).

4. Books and Materials

Text Book:

1. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), Entrepreneurship, Tata Mc Graw Hill, New Delhi

Reference Books:

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

A4035– 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

1. 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 requisites.

2. Course Outcomes (COs)

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

A4035.1. Identify functions of Human Resource Management
A4035.2. Illustrate the process of Recruitment and selection
A4035.3. Analysis the needs and methods for training
A4035.4. Outline the functional relationship of performance and compensation
A4035.5. 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 Books:

1. BiswajeetPattnayak (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 Books:

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

A4036 – 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

2. 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 requisites.

2. Course Outcomes (COs)

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

A4036.1. Explain the concepts of Logistics & Supply chain management.
A4036.2. Analyze the role of Supply chain drivers & Customer services of supply chain.
A4036.3. Examine the Benchmarking process and role of Sourcing in supply chain.
A4036.4. Analyze Network design in supply chain along with Coordination in supply chain.
A4036.5. 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.Shridharabhat, “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.