

(AUTONOMOUS)

Approved by AICTE, Accredited by NBA & NAAC 'A' Grade, Recognized under 2(f) and 12(b) of UGC, Permanently Affiliated to JNTUK, Kakinada.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

4 Years B.Tech. (Electrical & Electronics Engineering) Course Structure : (2019-20)

I YEAR I SEMESTER

S. N o.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19199101	BSC	Mathematics-I	3	0	0	3	30	70	100
2	19199102	HSMC	Communicative English-I	3	0	0	3	30	70	100
3	19192106	PCC	Engineering Electromagnetic	3	0	0	3	30	70	100
4	19199103	BSC	Applied Chemistry	3	0	0	3	30	70	100
5	19195105	ESC	Problem Solving & Programming in C	2	1	0	3	30	70	100
6	19199194	MC	Professional Ethics & Human Values	2	0	0	0	30*	-	-
7	19199114	BSC	Engineering Chemistry Laboratory	0	0	3	1.5	50	50	100
8	19193112	ESC	Basic Engineering Workshop	0	0	3	1.5	50	50	100
9	19199111	HSMC	Communicative English Laboratory	0	0	3	1.5	50	50	100
10	19195113	ESC	Problem Solving & Programming Laboratory with C	0	0	3	1.5	50	50	100
TOTAL				16	1	12	21	350	550	900
BSC-7.5		HSMC-4.5	PCC-03	ES-6	MC-0					

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I YEAR II SEMESTER

S. No.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19199201a	BSC	Mathematics-II	3	0	0	3	30	70	100
2	19199204	BSC	Engineering Physics	3	0	0	3	30	70	100
3	19199202	HSMC	Communicative English-II	3	0	0	3	30	70	100
4	19199296a	MC	Environmental Studies	2	0	0	0	30*	-	-
5	19192203	PCC	Electrical circuit analysis-I	3	0	0	3	30	70	100
6	19193275	ESC	Engineering Graphics	1	0	3	2.5	30	70	100
7	19199212	BSC	Engineering Physics Laboratory	0	0	3	1.5	50	50	100
8	19199211	HSMC	Communicative English Laboratory II	0	0	3	1.5	50	50	100
9	19192213	PCC	Electrical Engineering workshop	0	0	3	1.5	50	50	100
				15	0	12	19	300	500	800
BSC-7.5		HSMC-4.5	PCC-4.5	ESC-2.5	MC-0					

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II YEAR I SEMESTER

S. No.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19120301	BSC	Complex variables and Transform Techniques	3	0	0	3	30	70	100
2	19120302	PCC	Electrical Circuits Analysis-II	3	0	0	3	30	70	100
3	19120303	PCC	Electrical Machines – I	3	0	0	3	30	70	100
4	19120304	PCC	Electronic Devices & Circuits	3	0	0	3	30	70	100
5	19120305	PCC	Electrical Measurements	3	0	0	3	30	70	100
6	19120306	MC	Design Thinking & Product Innovation	2	0	0	0	30*	-	-
7	19120312	PCC	Electrical Circuits Lab	0	0	3	1.5	50	50	100
8	19120313	PCC	Electrical Machines –I Lab	0	0	3	1.5	50	50	100
9	19120314	PCC	Electrical Measurements Lab	0	0	3	1.5	50	50	100
10	19124311	PCC	Electronic Devices & Circuits Lab	0	0	3	1.5	50	50	100
TOTAL				17	0	12	21	350	550	900
BSC-03	PCC-13.5	ESC-4.5	MC-0							

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II YEAR II SEMESTER

S. No.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19129401	BSC	Numerical Methods and Probability & Statistics	3	0	0	3	30	70	100
2		OEC	Open Elective-I	3	0	0	3	30	70	100
	19123464a		Mech - Robotics							
	19123464b		CSE- Operating Systems							
	19123464c		ECE- Internet of Things							
	19123464d		CE- Environmental Pollution & Control							
	19123464e		AME – Basic Automobile Engineering							
	19123464f		MM – Elements of Mining Technology							

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3	19120405	PCC	Power systems -I	3	0	0	3	30	70	100
4	19120406	PCC	Electrical Machines – II	3	0	0	3	30	70	100
5	19123403	ESC	Fluid Mechanics & Hydraulic Machinery	3	0	0	3	30	70	100
6	19124402	ESC	Internet of things	2	0	2	3	30	70	100
7	19120412	PCC	Electrical Machines – II Lab	0	0	3	1.5	50	50	100
8	19123411	ESC	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	1.5	50	50	100
TOTAL				17	0	8	21	280	520	800
BSC - 03	OEC-03	PCC-12	ESC-3							

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III YEAR I SEMESTER

S. No	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19120503	PCC	Control Systems	3	0	0	3	30	70	100
2	19120504	PCC	Power Systems-II	3	0	0	3	30	70	100
3	19124501	PCC	Digital Electronics	3	0	0	3	30	70	100
4		PEC	Professional Elective - I	3	0	0	3	30	70	100
	19120565a		Power system dynamics & control							
	19120565b		Special electrical machines							
	19120565c		Advanced control systems							
	19120565d		Advanced power conversion systems							
5		OEC	Open Elective – II	3	0	0	3	30	70	100
	19123562a		Mech - MEMS							
	19123562b		CSE- Information Security							
	19123562c		ECE – Digital Image Processing							
	19123562d		CE – Solid Waste Management							

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	19123562e		AME – Hybrid and Electric Vehicles							
	19123562f		MM – Disaster Management in Mining							
6	19120512	PCC	Control Systems Lab	0	0	3	1.5	50	50	100
7	19124511	PCC	Digital Electronics Lab	0	0	3	1.5	50	50	100
8	19129596	MC	Constitution of India	2	0	0	0	30*	-	-
9	19120521	PR	Mini Project-I/ Study Project/ Internship	-	-	-	2	100	-	100
10	19120522	PR	Community service oriented project	0	0	1	0.5	100	-	100
TOTAL				17	0	7	20.5	450	450	900
PC C- 12	PEC-03	OEC-03		MC -0	P R- 2. 5					

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III YEAR II SEMESTER

S. No.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1		PEC	Professional Elective - II	3	0	0	3	30	70	100
	19120665a		Utilization of electrical energy							
	19120665b		Power semi-conductor drives							
	19120665c		Digital control systems							
	19120665d		Solar energy systems							
2		OEC	Open Elective - III	3	0	0	3	30	70	100
	19125662a		CSE – Human Computer Interaction							
	19125662b		ECE – Data Communication							
	19125662c		CE – Global Environment: Problems & Policies							
	19125662d		AME – Modern Vehicle Technology							
	19125662e		MM- Remote Sensing & GIS in Mining							
3	19124601	PCC	Power Electronics	3	0	0	3	30	70	100

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4	19124602	PCC	Microprocessors & Micro-controllers and applications	3	0	0	3	30	70	100
5	19124603	PCC	Switch Gear & Protection	3	0	0	3	30	70	100
6	19124604	PCC	Power system analysis	3	0	0	3	30	70	100
7	19124611	PCC	Microprocessors & Micro-controllers and applications Lab	0	0	3	1.5	50	50	100
8	19120612	PCC	Power Electronics Lab	0	0	3	1.5	50	50	100
9	19129696	HSMC	Soft Skills	0	0	3	1.5	50	50	100
Total				15	0	9	22.5	330	570	900
PEC-03	OEC-03	PCC-15	HSMC-1.5							

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IV YEAR I SEMESTER

S. No.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1		PEC	Professional Elective - III	3	0	0	3	30	70	100
	19120764a		Electrical distribution systems							
	19120764b		Advanced power electronic converters							
	19120764c		Modern control theory							
	19120764d		Wind energy systems							
2		PEC	Professional Elective - IV	3	0	0	3	30	70	100
	19120765a		Flexible Alternating Current Transmission Systems							

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	19120765b		High Voltage Engineering							
	19120765c		Adaptive Control Systems							
	19120765d		Operation of restructured power systems							
3		OEC	Open Elective – IV(MGMT)	3	0	0	3	30	70	100
	19129761a		MEFA							
	19129761b		Organizational behavior							
	19129761c		Human Resource management							
	19129761d		Entrepreneurship Qualities for Engineers							
	19129761e		Principles of Management							
	19129761f		Financial Management for Engineers							
	19129761g		Operations management							
	19129761h		Digital Marketing							
	19129761i		Total Quality Management							
4	19120702	PCC	HVDC	3	0	0	3	30	70	100

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			transmission							
5	19120703	PCC	Power System Operation & Control	3	0	0	3	30	70	100
6	19120711	PCC	Power systems Lab	0	0	3	1.5	50	50	100
7	19120712	PCC	Electrical Simulation Lab	0	0	3	1.5	50	50	100
8	19129796	MC	Intellectual Property Rights and Patents	2	0	0	0	30*	—	-
9	19120721	PR	Internship/Mini Project II	-	-	-	2	100	—	100
TOTAL				17	0	6	20	350	450	800
PEC-06	OEC-03	PCC-09	PR-02							

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IV YEAR II SEMESTER

S. No.	Subject Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1		PEC	Professional Elective - V							
2	19120862a		Smart Grid	3	0	0	3	30	70	100
	19120862b		Power Quality							
	19120862c		Non Linear Control Systems							
	19120862d		Electric Vehicles							
3	19120801	PCC	Energy Audit, Conservation & Management	3	0	0	3	30	70	100
4	19120841	PR	Project Work	-	-	18	9	80	120	200
TOTAL				6	0	0	15	140	260	400
PEC-03	PCC-03	PR-09								

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OPEN ELECTIVE-I
OPEN ELECTIVE-II
OPEN ELECTIVE-III
OPEN ELECTIVE-IV

Mech - Robotics	Mech - MEMS	Mech – Nano Technology	Managerial Economics and Financial Analysis
CSE- Operating Systems	CSE- Information Security	CSE – Human Computer Interaction	Entrepreneurship Qualities for Engineers
EEE- Utilization of Electrical Energy	EEE – Energy management	EEE – Renewable Energy Resources	Principles of Management
ECE- Internet of Things	ECE – Digital Image Processing	ECE – Data Communication	Financial Management for Engineers
CE- Environmental Pollution & Control	CE – Solid Waste Management	CE – Global Environment: Problems & Policies	Operations management
AME – Basic Automobile Engineering	AME – Hybrid and Electric Vehicles	AME – Modern Vehicle Technology	Digital Marketing
MM – Elements of Mining Technology	MM – Disaster Management in Mining	MM- Remote Sensing & GIS in Mining	Total Quality Management
			Organizational behavior
			Human Resource management

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Professional Electives	POWER SYSTEMS	POWER ELECTRONICS & DRIVES	CONTROL SYSTEMS	ENERGY SYSTEMS
ELECTIVE-I	POWER SYSTEM DYNAMICS & CONTROL	SPECIAL ELECTRICAL MACHINES	ADVANCED CONTROL SYSTEMS	ADVANCED POWER CONVERSION SYSTEMS
ELECTIVE-II	UTILIZATION OF ELECTRICAL ENERGY	POWER SEMI-CONDUCTOR DRIVES	DIGITAL CONTROL SYSTEMS	SOLAR ENERGY SYSTEMS
ELECTIVE-III	ELECTRICAL DISTRIBUTION SYSTEMS	ADVANCED POWER ELECTRONIC CONVERTERS	MODERN CONTROL THEORY	WIND ENERGY SYSTEMS
ELECTIVE-IV	FACTS	HIGH VOLTAGE ENGINEERING	ADAPTIVE CONTROL	OPERATION OF RESTRUCTURED POWER SYSTEMS
ELECTIVE-V	SMART GRIDS	POWER QUALITY	NON LINEAR CONTROL	ELECTRIC VEHICLES

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CATEGORY	EEE DEPARTMENT ALLOCATED CREDITS	AICTE	APSCHE
BSC	21	25	24
HSMC	10.5	12	13
PCC	72.0	48	59
ESC	16.0	24	24
MC	0	0	0
OEC	12	18	12
PEC	15	18	12
PR	13.5	15	13
LC	-	-	03
	160	160	160

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
	MATHEMATICS -1 (COMMON TO ALL BRANCHES)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Types of matrices, Limits, continuity.		3	-	-	3

Course Objective:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students understand advanced level mathematics to develop the confidence and ability to handle real world problems and their applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Transform the knowledge of solving system of linear equations using matrices.
C02:	Apply mean value Rolls, Lagranges and Cauchy mean value theorem in engineering applications.
C03:	Acquire the knowledge maxima and minima of function of several variables
C04:	Evaluate multiple integrals and their applications
C05:	Understand Beta and Gamma functions, evaluate improper integrals.

Syllabus:

Unit I: Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, solving system of linear homogeneous and non-homogeneous equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the Quadratic forms, reduction of Quadratic form to canonical form by diagonalisation and orthogonal transformation.

Unit II: Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof).

Unit III: Multivariable calculus

Partial derivatives, total derivatives, chain rule, Homogeneous functions and Euler's theorem, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit IV: Multiple Integrals

Evaluation of double integrals (cartesian and polar coordinates) and triple integrals, change of variables, change of order of integration, areas enclosed by plane curves.

Unit V: Special Functions

Beta and Gamma functions and their properties, relation between Beta and Gamma functions, evaluation of improper integrals.

Text books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. T.K.V.Iyenger, et.al., Engineering Mathematics, Volume-III, .Chand Publicationbns, 2018.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2015.

Web Links:

1. <https://nptel.ac.in/courses/111105121/>
2. <https://nptel.ac.in/courses/111105035/>
3. <https://www.sanfoundry.com/engineering-mathematics-multiple-choice-questions-answers/>
4. <https://ocw.mit.edu/courses/mathematics/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	2	2	2	-	-	-	-	-	-	-	1
C02	3	2	2	2	-	-	-	-	-	-	-	1
C03	3	2	2	2	-	-	-	-	-	-	-	1
C04	3	2	2	2	-	-	-	-	-	-	-	1
C05	3	2	2	2	-	-	-	-	-	-	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code	COMMUNICATIVE ENGLISH –I (common for all the branches)				
Teaching	Total contact hours - 54	L	T	P	C
Prerequisite(s): Learner should be equipped with basic language and communication skills like Reading, Writing, Listening and Speaking.		3	-	-	3

Course Objectives: This course aims

- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- To impart effective strategies for good writing , summarize information and practice writing essays
- To provide the knowledge of grammatical structures, vocabulary and encourage their appropriate use in speech and writing

Course Outcomes:

On Completion of the course, the students will be able to	
C01:	students will be able to develop effective reading strategies
C02:	will be able to demonstrate writing skills that are required for professional development and use graphic elements for communication
C03:	will be able to apply grammatical skills and vocabulary effectively in speech and writing

Syllabus:

UNIT-I

READING: Detailed Text: Exploration- “A Proposal to Girdle the Earth (Excerpt)” by Nellie Bly, from English All Round: Communication Skills for Under Graduate Learners-1 by ORIENT BLACK SWAN.

Non-Detailed Text: ‘An Ideal Family’ by Katherine Mansfield from 'Panorama: A Course on Reading.'-OXFORD

GRAMMAR: Concept of word Formation, Verbs, adjectives, adverbs, Word order in sentences

VOCABULARY: Content words and function words; Word forms

WRITING SKILLS: Paragraph writing-Beginnings and endings of paragraphs - introducing a topic, providing a transition to the next paragraph.

UNIT-II

READING: Detailed Text: On Campus - An excerpt from “The District School as It Was by One Who Went to It” by Warren Burton from English All Round: Communication Skills for Under Graduate Learners-1 by ORIENT BLACK SWAN

Non-Detailed Text: ‘War’ by Luigi Pirandello from 'Panorama: A Course on Reading.' -OXFORD

GRAMMAR: Use of articles and zero article; prepositions.

VOCABULARY: Linkers, sign posts and transition signals.

WRITING SKILLS: Summarizing an oral or written text.

UNIT-III

READING: Detailed Text: Working Together - The Future of Work? (Adopted from web resources) From English All Round: Communication Skills for Under Graduate Learners-1 by ORIENT BLACK SWAN

Non-Detailed Text: 'The Verger' by Somerset Maugham from Panorama: A Course on Reading'- OXFORD

GRAMMAR: Tense and aspect; direct and indirect speech, reporting verbs for academic purposes.

VOCABULARY: Prefixes and suffixes

WRITING SKILLS: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions

Unit-IV

READING: Detailed Text: Fabric of Change- H. G. Wells and the Uncertainties of Progress by Peter J. Bowler from English All Round: Communication Skills for Under Graduate Learners-1 by ORIENT BLACK SWAN

GRAMMAR: Correction of sentences-sequencing jumbled sentences

VOCABULARY: use of antonyms and homophones

WRITING SKILLS: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables -Sensible writing, Defining and classifying

Unit – V

READING: Detailed Text: Tools for Life -Leaves from the Mental Portfolio of a Eurasian by Sui Sin Far From English All Round: Communication Skills for Under Graduate Learners-1 by ORIENT BLACK SWAN.

GRAMMAR: Reading comprehension- framing right answers and editing the given text

VOCABULARY: Idioms and Phrases

WRITING SKILLS: Writing structured essays on specific topics using suitable claims and evidences.

Text Books:

Detailed Textbook: ENGLISH ALL ROUND: Communication Skills for Under Graduate Learners-1 Published by Orient Black swan Pvt Ltd

Non-detailed Textbook: PANORAMA: A COURSE ON READING, Published by Oxford University Press India

REFERENCE BOOKS:

- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
- InfoTech English by Maruthi Publications

WEB REFERENCES:**All Skills (LSRW)**

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	-	-	-	-	2	3	2	-	-	-	-
C02	-	-	-	-	-	3	3	3	-	-	-	1
C03	-	-	-	-	-	2	3	3	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code	ENGINEERING ELECTROMAGNETICS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): semi conductor Physics , mathematics		3	0	0	3

COURSE OBJECTIVES:

1. To introduce the basic mathematical concepts related to electromagnetic vector fields
2. To impart the concepts of Electrostatic fields, electrical potential, energy density and their applications..
3. To Analyze the relation between the fields under time varying situations.
4. To Discuss the principles of propagation of uniform plane waves.
5. To Justify the concepts of electromagnetic waves, means of transporting energy or information, in the form of radio waves, TV signals, radar beams and light rays.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze field potentials due to static changes and static magnetic fields
CO2:	Explain how materials affect electric and magnetic fields.
CO3:	Analyze the relation between the fields under time varying situations.
CO4:	Discuss the principles of propagation of uniform plane waves.
CO5:	Justify the concepts of electromagnetic waves, means of transporting energy or information, in the form of radio waves, TV signals, radar beams and light rays.

UNIT I STATIC ELECTRIC FIELD

Vector Algebra, Coordinate Systems, Vector differential operator, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulombs law, Electric field intensity, Point, Line, Surface and Volume charge distributions, Electric flux density, Gauss law and its applications, Gauss divergence theorem, Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT II CONDUCTORS AND DIELECTRICS

Conductors and dielectrics in Static Electric Field, Current and current density, Continuity equation, Polarization, Boundary conditions, Method of images, Resistance of a conductor, Capacitance, Parallel plate, Coaxial and Spherical capacitors, Boundary conditions for perfect dielectric materials, Poisson's equation, Laplace's equation, Solution of Laplace equation, Application of Poisson's and Laplace's equations.

UNIT III STATIC MAGNETIC FIELDS

Biot -Savart Law, Magnetic field Intensity, Estimation of Magnetic field Intensity for straight and circular conductors, Ampere's Circuital Law, Point form of Ampere's Circuital Law, Stokes theorem, Magnetic flux and magnetic flux density, The Scalar and Vector Magnetic potentials, Derivation of Steady magnetic field Laws.

UNIT IV MAGNETIC FORCES AND MATERIALS

Force on a moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions involving magnetic fields, The magnetic circuit, Potential energy and forces on magnetic materials, Inductance, Basic expressions for self and mutual inductances, Inductance evaluation for solenoid, toroid, coaxial cables and transmission lines, Energy stored in Magnetic fields.

UNIT V TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

Fundamental relations for Electrostatic and Magnetostatic fields, Faraday's law for Electromagnetic induction, Transformers, Motional Electromotive forces, Differential form of Maxwell's equations, Integral form of Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Poynting's theorem, Time harmonic fields, Electromagnetic Spectrum.

TEXT BOOKS:

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014.
3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.

REFERENCES

1. V.V.Sarwate, 'Electromagnetic fields and waves', First Edition, Newage Publishers, 1993.
2. J.P.Tewari, 'Engineering Electromagnetics – Theory, Problems and Applications', Second Edition, Khanna Publishers.
3. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum's Outline Series), McGraw Hill, 2010.
4. S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2012.
5. K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Eighth Reprint : 2015

Web Links:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium];

3: Substantial[High],

'-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	-	-	2	-	-	-	-	2
CO2	3	-	2	2	-	1	2	1	1	-	1	2
CO3	2	1	2	1	-	-	2	-	1	-	-	2
CO4	1	2	2	2	-	2	1	1	-	-	-	2
CO5	2	2	2	1	1	1	2	-	1	1	2	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code 19199103	APPLIED CHEMISTRY EEE				
Teaching	Total contact hours-65	L	T	P	C
Prerequisite (s): Knowledge of theoretical and experimental from Intermediate level, Application of Chemistry theory and calculations required course.		3	-	-	3

Course Objective:

To instruct electrochemical energy systems and their applications , basic concepts of battery technology and Photovoltaic's and to expose the students to latest instrumental techniques such as scanning electronic microscope (SEM) & transmission electron microscope (TEM).

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Compare different types of cells
CO2	Explain the merits of fuel cells
CO3	List various sources of renewable energy
CO4	Distinguish between polymers and plastics
CO5	Distinguish between nano clusters & nanowires, polymers

Syllabus

Unit- I

ELECTROCHEMICAL ENERGY SYSTEMS - I

Introduction- concept of conductivity, Electrode Potential, Measurement of single Electrode Potentials, Nernst equation, Electrochemical Series, Reference electrodes (Calomel electrode, Standard Hydrogen electrode) - electrochemical cell - Galvanic Cell vs Electrolytic Cell - Ion Selective Electrodes- glass membrane electrode- gas sensing electrodes - Concentration Cells.

Unit-II

ENERGY SOURCES AND APPLICATIONS

Basic concepts, battery characteristics, classification of batteries, Important applications of batteries, Classical batteries-dry/ Leclanche cell, Modern batteries-zinc air, lithium cells-Li MnO₂ cell- challenges of battery technology. Fuel cells- Introduction - classification of fuel cells – hydrogen and oxygen fuel cell, propane and oxygen fuel cell- Merits of fuel cell. p and n type semi conductors - PV cell / solar cell- Manufacturing of Photovoltaic Cells using Chemical Vapor Deposition Technique-applications of solar energy.

Unit- III

CORROSION AND ITS PREVENTION

Definition–theories of corrosion (chemical and electrochemical) galvanic corrosion, differential aeration corrosion, Pitting corrosion, Passivity of metals, factors influencing corrosion, corrosion control methods, proper designing and cathodic protection, protective coatings–cathodic and anodic coating, electroplating ,paints.

Unit-IV

POLYMER CHEMISTRY

Introduction to polymers, functionality of monomers, Types of polymerization, mechanism of addition polymerization,Plastics –compounding and fabrication of plastics. Preparation, properties and applications of –PVC,polyethylene, Bakelite, urea-formaldehyde, Nylon-66. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene – mechanism of conduction and applications.

Unit – V

MATERIAL CHEMISTRY

Nonmaterial: Introduction to nanomaterial: nanoparticles, nanocluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterial: sol-gel method. Characterization: Principle and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM). Insulators and magnetic materials-electrical insulators, ferro and ferric magnetism and its applications

Text Books:

1. P.C. Jain and M. Jain, Engineering Chemistry,15/e, Dhanapat Rai & Sons, Delhi (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.
3. O G Palanna, Engineering Chemistry, Tata McGraw Hill Education Private Limited, (2009).

References:

1. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
2. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
3. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).

Weblink:

1. www.chem.tufts.edu
2. www.chem1.com

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	1	1	-	-	2	-	-	1
CO2	2	-	1	-	-	2	-	-	1	-	-	1
CO3	3	-	1	-	1	2	-	-	2	-	-	2
CO4	3	-	2	-	-	2	-	-	3	2	-	3
CO5	3	-	2	-	-	2	-	-	2	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I SEM			
Course Code 19199105	PROBLEM SOLVING & PROGRAMMING IN 'C'				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Logical Ability		2	1	0	3

Course Objective(s)

This course is intended to teach the problem solving through programming and to train the student to the basic concepts of C-programming language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

Course Outcomes:

On completion of the course, the students will be able to-
CO-1. Obtain the knowledge about different languages used in computer programming and basic terminology used in the computer programming.
CO-2. Write algorithm, flow chart, and structure of C program and make use of different C tokens inside C program.
CO-3. Develop program by using Control structure, different looping and Jump statement.
CO-4. Implement applications of Array, Structure and String inside the program. Also acquire the knowledge of different FILE operations.
CO-5. Obtain knowledge about accessing the memory in the program and also to develop the program by using different types of function calls.

UNIT-1

Introduction to Computers: Generations, CPU, Memory, I/o Devices

Introduction to Problem Solving: Algorithm, Pseudo code and Flowchart.

Introduction to Computer Programming: Computer Languages: Machine level, Assembly level and High-level language.

UNIT-2

C' Fundamentals: Structure of a C-program, C-character set, C Tokens: variables, constants, identifiers, data types and sizes, operators, Preprocessor.

I/O Functions: Header files, Standard I/O library functions-formatted I/O functions.

Decision making statements: simple if, if-else, nested if-else, else-if ladder, switch-case statements and sample programs.

Iterative Statements: for, while, do-while. Jump Statements-break, continue, goto

UNIT-3

Introduction to Arrays, Strings

Arrays- Declaration, initialization, storing and accessing elements of 1-D, 2-D and multi-dimensional arrays.

Array Applications: addition, multiplication, transpose, symmetry of a matrix.

Strings: declaration, initialization, reading and writing characters into strings, string operations, character and string manipulation functions.

UNIT-4: Pointers, Functions & Storage Classes

Pointers: Introduction to pointers, defining a pointer variable, Pointer to Pointer, Examples of pointers, using pointers in expressions, pointers and arrays.

Functions: declaration, definition, prototype, function call, return statement, types of functions, parameter passing methods, and function recursion.

Storage Classes: Auto, Static, Extern and Register

UNIT-5

Structures, Unions and Files

Structure and Union: Declaration, initialization, storing and accessing elements by using structure and union.

Files: Definition, Input and output operation into file.

Text Books

1. Problem Solving and Programming Concepts, Maureen Sprankle and Jim Hubbard, Pearson, 9th Edition.
2. "Programming in ANSI C" by E.Balagurusamy, McGraw Hill Publications.
3. "Programming in C" by Ashok N. Kamthane, 2/e Pearson, 2013.
4. "The C – Programming language" B.W.Kernighan, Dennis M. Ritchie.PHI.
5. "Let Us C", 12th Edition by Yashavant P. Kanetkar online in India.

Reference Books

1. Programming in C by Ajay Mittal, Pearson.
2. Programming with C, Bichkar, Universities press.
3. Programming in C, Reema Thareja, OXFORD.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech.			
Course Code	PROFESSIONAL ETHICS AND HUMAN VALUES				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Basic Knowledge on Human Values, moral values and ethics.		3	0	0	

Course Objectives:

The objectives of this course on 'Professional Ethics and Human Values' are:

- (1) to understand the moral values that ought to guide the Engineering profession,
- (2) to resolve the moral issues in the profession, and
- (3) to justify the moral judgment concerning the profession.

Course outcomes:

On Completion of the course, the students will be able	
CO1:	Create awareness on professional ethics and Human values
CO2:	Create awareness on engineering ethics providing basic knowledge about engineering ethics , Variety of moral dilemmas Professional ideas and virtues
CO3:	Provide basic familiarity about engineers as responsible experimenters, Research ethics, codes of ethics, Industrial standards
CO4:	Inculcate knowledge and exposure on safety and risk, risk benefit analysis and have an idea about collective bargaining, confidentiality, professional, employee, intellectual property rights
CO5:	Have an adequate knowledge about MNC's Business environment, computer ethics ,moral leadership Sample code of conduct, cyber crime

UNIT I: Human values

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT II: Engineering ethics:

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer–Self Interest, Customs and Religion–Uses of Ethical Theories–Professional Ethics–Types of Inquiry – Engineering and Ethics–Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.

UNIT III: Engineering as social experimentation:

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering. Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the Instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous Computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

UNIT IV: Engineers' responsibility for safety and risk:

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences – Expected Probability - Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk – Safety and the Engineer - Designing for Safety –Risk - Benefit Analysis-Accidents

UNIT V: Engineer's responsibilities and rights:

Collegiality - Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty – misguided – Loyalty - professionalism and Loyalty- Professional Rights – Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self Interest , Customs and Religion- Ethical egoism-Collective bargaining Confidentiality Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational in other companies- Occupational - price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

TEXT BOOKS

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana - Maruthi -Publications
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications

Reference:

1. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
4. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

Web Links:

1. www.nptel.com

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	3
CO2	1	-	-	-	-	3	-	3	-	-	2	-
CO3	1	-	-	-	-	1	2	-	-	-	-	3
CO4	-	-	-	-	-	3	2	3		3	2	-
CO5	-	-	-	-	-	3	-	-	-	2	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (I Semester)			
Course Code 19199114	ENGINEERING CHEMISTRY LABORATORY (EEE)				
Teaching	Total contact hours 48	L	T	P	C
Prerequisite(s): Basic knowledge of Engineering Chemistry Applications		0	0	3	1.5

COURSE OBJECTIVES

To familiarize the students with the basic concepts of Engineering Chemistry lab, training the students on how to handle the instruments and to demonstrate the digital and instrumental methods of analysis.

COURSE OUTCOMES

On Completion of the course, the students will be able to-	
CO1:	Explain the functioning of the instruments such as pH, Conductivity and Potentiometric meters
CO2:	Determine the total hardness of water
CO3:	Perform various Redox titrations
CO4:	Preparation of polymers
CO5:	Compare viscosities of different oils

LIST OF EXPERIMENTS

1. Determination of strength of an acid by pH metric method
2. Determination of Fe (II) in Mohr's salt by potentiometric method
3. Determination of conductance by conductometric method
4. Determination of Hardness of a ground water sample.
5. Determination of chromium (VI) in potassium dichromate
6. Determination of strength of KMnO_4 using standard Oxalic acid solution.
7. Determination of Zinc by EDTA method.
8. Preparation of Phenol-Formaldehyde resin
9. Determination of viscosity of a liquid
10. Determination of surface tension of a liquid
11. Estimation of active chlorine content in Bleaching powder

TEXT BOOKS

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).

2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	2	-	-	1	-	-	1
CO2	3	2	2	1	1	2	-	-	2	-	-	1
CO3	2	2	2	1	1	2	-	-	-	-	-	1
CO4	3	2	2	1	1	2	-	-	2	1	-	1
CO5	2	2	2	1	1	2	-	-	-	-	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 st Semester)			
Course Code	Basic Engineering Workshop				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s) : Aptitude to learn .		0	0	3	1.5

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Experiment with various basic house wiring techniques such as connecting one lamp with one switch, connecting one lamp with two switches, series and parallel connection.
CO2:	Develop basic prototype in the trade of tin smithy such as square tray and open scoop.
CO3:	Design v-fitting and square fitting in the trade of fitting
CO4:	Making square rod and L-bend from the round rod in black smithy
CO5:	Build various prototype like T lap joint, dovetail joint, cross lap etc. in the trade of carpentry.

List of Experiments:

Note: At least two exercises should be done from each trade.

1. Carpentry

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

2. Fitting

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

3. Black Smithy

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

4. Tin Smithy

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

5. House wiring

1. Ordinary bulb connection
2. Staire case connection
3. Parallel connection
4. Series connection

Workshop Manual by P.Kannaiah & K.L.Narayana-Scitech Publishers

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	3	-	-	3
CO2	3	3	2	2	-	-	-	-	3	-	-	3
CO3	3	3	-	-	-	-	-	-	3	-	-	3
CO4	3	3	-	-	-	-	-	-	3	-	-	3
CO5	3	3	-	-	-	-	-	-	3	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code	COMMUNICATIVE ENGLISH LAB- I				
Teaching	Total contact hours – 48	L	T	P	C
Prerequisite(s) Learner should be equipped with basic language and communication skills like, Listening and Speaking which ensure good pronunciation and ease in communication		-	-	3	1.5

Course Objective: The course aims to

- Adopt activity based teaching-learning methods to ensure effective learning both in the classroom and laboratory sessions.
- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- To improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Learning to communicate in English
C02:	Comprehend native speakers accent.
C03:	Speak appropriately in real life situations

Syllabus:

UNIT 1: BASIC AURAL AND ORAL SKILLS

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and other

Speaking: Phonetics-Accent and pronunciation

UNIT 2 CONVERSATIONAL SKILLS

Listening: Listening to audio texts, framing question in order to find out the gist of the text.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks

UNIT 3: LANGUAGE IN USE

Listening: Listening for global comprehension and summarizing.

Speaking: 1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologizing, Advising, Suggesting, Agreeing and Disagreeing

UNIT 4: LANGUAGE APPLICATION

Listening: Making predictions while listening to conversations/ transactional dialogues; listening to video and narrating the theme.

Speaking: word stress-di-syllabic words, Poly-Syllabic words -Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

UNIT 5: FORMAL INTERPRETATION

Listening: TED Talks – understanding the summary

Speaking: Formal oral presentations on topics from academic contexts and technical background

Suggested Lab Manual: INTERACT from Orient Black Swan

Reference Books:

1. English Pronunciation in use- Mark Hancock, Cambridge University Press
2. English Phonetics and Phonology-Peter Roach, Cambridge University Press.

Web links:

<https://www.usingenglish.com/comprehension/>
<https://www.englishclub.com/reading/short-stories.htm>
<https://www.english-online.at>

CO-PO Mapping:

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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	-	-	-	-	-	3	3	3	-	-	-	3
C02	-	-	-	-	-	2	3	2	-	-	-	1
C03	-	-	-	-	-	3	2	3	-	-	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech.			
Course Code 19199113	Problem Solving & Programming Laboratory Using C				
Teaching	Total contact hours- 36	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Logical Ability		0	0	3	1.5

Course Objective(s):

This course is intended to impart adequate programming skills to solve mathematical problems and to develop programming skills using the fundamentals and basics of C language. This enables effective usage of arrays, strings, functions, pointers and files.

Course Outcomes:

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

CO-1. Know concepts in problem solving.

CO-2. Analyze a problems and Implement programs in C language.

CO-3. Work with arrays, pointers and structures.

CO-4. Apply functions concepts for problem solving.

CO-5. Implement FILE operations for storage purpose.

Programs:

- Write a C Program to
 - Calculate the area of triangle using the formula

$$\text{Area} = (s(s-a)(s-b)(s-c))^{1/2}, \text{ where } s = (a+b+c)/2$$
 - To find the largest of three numbers using ternary operator.
 - To swap two numbers without using a temporary variable.
- Write a C program that perform the following operations:
 - Reading and writing a complex number
 - Addition of two complex numbers
- Write a C program to
 - 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
 - Find the roots of a quadratic equation.
 - Take two integer operands and one operator form the user, Performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
- Write a C Program to print the following patterns
 - Floyd's triangle
 - Pyramid
 - Pascal Triangle

5. Write a C program to
 - a) Check whether the given number is Armstrong number or not.
 - b) Check whether the given number is palindrome or not.
 - c) Find the sum of individual digits of a positive integer and find the reverse of the given number.
 - d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
 - e) Generate all the prime numbers between 1 and n, where n is a value supplied by the user.
6. Write a C Program to
 - a) Print the multiplication table of a given number n up to a given value, where n is entered by the user.
 - b) Enter a decimal number, and calculate and display the binary equivalent of that number.
 - c) Enter a binary number, and calculate the decimal equivalent of that number.
7. Write a C program to
 - a) Interchange the largest and smallest numbers in the array.
 - b) Implement a linear search.
 - c) Implement binary search.
8. Write a C program to
 - a) Examples which explore the use of structures, union and other user defined variables.
 - b) Declare a structure for calculating the percentage achieved by 3 students, by considering the structure elements as name, pin no, mark1, mark2, mark3.
9. Write C Programs
 - a) For the following string operations without using the built in functions to
 - i. length of a string
 - ii. reverse a string
 - iii. append a string to another string
 - iv. compare two strings
 - b) Write a C Programs to check whether the given string "MADAM" is palindrome or not without using the built in functions.
10. Write a C program
 - a) Use functions to perform the following operations:
 - i. To insert a sub-string in to given main string from a given position.
 - ii. To delete n Characters from a given position in a given string.

- b) To replace a character of string either from beginning or ending or at a specified location
11. Write a C Programs for the following string operations with and without using the built in functions
 - a) To reverse a string using pointers.
 - b) To concatenate two strings by using pointer.
 12. Write a C programs that use both recursive and non-recursive functions for the following
 - a. To find the factorial of a given integer.
 - b. To find the GCD of two given integers.
 - c. To find Fibonacci sequence.
 13. Write C programs to
 - a) Find the area of triangle by using call by value and call by reference concepts.
 - b) Pointer based function to exchange value of two integers using passing by address.
 14. Write C programs to
 - a) Read and display the data from a file.
 - b) Copy the data from one file to another file.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common for CIVIL, ECE, MECH, CSE,AME, MINING)				
Teaching	Totalcontacthours-45	L	T	P	C
Prerequisite(s): Basics of Physics		3	0	0	3

Course Objective:

1. To learn the basic principles of electrical law's and analysis of networks.
2. To understand the principle of operation and construction details of DC machines.
3. To learn the principle of operation and constructional details of transformers, alternator and induction motors.
4. To study the operation of PN junction diode, half wave, full Wave rectifiers and OP-AMPS
5. To study operation of PNP and NPN transistors and various amplifiers.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Analyze the various electrical networks
C02:	Understand the operation of DC machines,3-point starter and conduct the Swinburne's Test.
C03:	Analyze the performance of transformer, operation of 3-phase alternator and 3-phase induction motors.
C04:	Analyze the operation of half Wave, full wave rectifiers, op-amps.
C05:	Explain the single stage CE amplifier and concept of feedback amplifier.

Syllabus:

UNIT –I Electrical Circuits

Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, inductive networks, capacitive networks, series, parallel circuits, star-delta and delta-star transformations.

UNIT –II DC Machines

Principle of operation of DC generator- emf equation, types, DC motor types, torque equation, applications, three point starter, Swinburne's Test, speed control methods.

UNIT –III AC Machines

Principle of operation of single phase transformers, e.m.f. equation, efficiency and regulation. Principle of operation of alternators, Principle of operation of 3-Phase induction motor- slip-torque characteristics, efficiency.

UNIT –IV Rectifiers & Linear Integrated Circuits

PN junction diodes, diode applications - Half wave and bridge rectifiers. Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPS (inverting, non-inverting, integrator and differentiator).

UNIT –V Transistors

PNP and NPN junction transistor, transistor as an amplifier, single stage CE amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Text books:

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

Reference Books:

1. Basic Electrical Engineering by M.S.Naidu and S.Kalnakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2th edition
3. Basic Electrical Engineering by Nagsaricar, Sukhija, Oxford Publications, 2nd edition
4. Industrial Electronics by GK. Mittal, PHI

Web Links:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	3	2	1	3	-	-	2	-	1	-	1
C02	2	3	-	-	3	-	-	2	3	-	-	1
C03	2	3	-	-	3	-	-	2	3	-	-	1
C04	2	1	2	-	3	-	-	2	2	-	-	1
C05	2	1	-	-	3	-	-	2	-	1	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB (Common for CIVIL, ECE, MECH, CSE,AME, MINING)				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basics of Electricity		0	0	3	1.5

Course Objective:

1. To determine performance of electrical machines.
2. To determine characteristics of electronic devices
3. To control speed of DC motor
4. To identify the types of different suitable devices for conducting of experiment.
5. To understand Kirchhoff's laws.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Determine performance of electrical machines
C02:	Determine characteristics of electronic devices
C03:	Control speed of DC motor
C04:	Measure current, voltage and power in a circuit.
C05:	Determine current and voltage using Kirchhoff's laws.

List of Experiments:

1. Verification of Kirchhoff's laws
2. Verification of Ohm's laws
3. Measurement of current, voltage, power in R-L-C series circuit excited by single phase supply
4. Verification of voltage & current relations in Star & delta connections
5. Study of various wiring components (wires, switches, fuses, sockets, plugs, Lamp holders, lamps etc. their uses and ratings)
6. Swinburne's test on a DC shunt machine.
7. Speed control of D.C. Shunt motor by Armature Voltage control and Field flux control method
8. Efficiency and regulation of a single phase transformer by OC & SC tests.
9. Brake test on a three phase squirrel cage induction motor

10. PN junction Diode characteristics a). Forward bias b).Reverse bias. (Cut in voltage & Resistance calculations)
11. Zener diode characteristics
12. Half wave rectifier
13. Full wave Rectifier
14. Transistor common emitter characteristics.
15. Transistor common base characteristics.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	-	3	2	-	-	-	-	-	-	-	-	
C02	-	-	2	-	-	-	-	-	-	-	-	
C03	1	-	-	-	-	-	-	-	-	-	3	
C04	-	-	-	-	-	-	-	-	2	-	-	
C05	-	3	-	-	-	-	-	-	2	-	-	

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 nd semester)			
Course Code 19199201	MATHEMETICS -II (ODE, PDE and Multivariable Calculus) (FOR EEE, ECE)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Fundamentals of ODE, PDE and Vectors		3	-	-	3

Course Objective:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Solve higher order differential equations with constant coefficients, apply method of variation of parameters.
C02:	Solve Cauchy's and Legendre's linear equations, applications of differential equations
C03:	Solve first order linear and nonlinear pde's , Solve higher order pde's
C04:	Apply del to Scalar and vector point functions, illustrate Gradient, Divergence and Curl operators
C05:	Understand Green's, Stokes and Gauss divergence theorems and applications

Syllabus:

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT III: Partial Differential Equations

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV: Multivariable Calculus (Vector differentiation)

Scalar and vector point functions, vector operator del, del applied to scalar point functions- Gradient, directional derivative, del applied to vector point functions-Divergence and Curl, irrotational and solenoidal vector fields.

UNIT V: Multivariable Calculus (Vector integration)

Line integral- circulation- work done, surface integral- flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Gauss Divergence theorem (without proof).

Text books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. T.K.V.Iyenger, et.al., Engineering Mathematics, Volume-I, S.Chand Publications, 2016.
5. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
6. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

Web Links:

1. <https://nptel.ac.in/courses/111108081/>
2. <https://nptel.ac.in/courses/111105093/>
3. <https://nptel.ac.in/courses/111105122/>
4. <https://nptel.ac.in/courses/111107108/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	3	2	2	-	-	-	-	-	-	-	1
C02	3	3	3	2	-	-	-	-	-	-	-	1
C03	3	3	3	2	-	-	-	-	-	-	-	1
C04	3	3	3	2	-	-	-	-	-	-	-	1
C05	3	3	2	2	-	-	-	-	-	-	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem			
CourseCode 19199104	ENGINEERING PHYSICS (common for CSE, ECE, EEE)				
Teaching	Totalcontacthours-58	L	T	P	C
		3	-	0	3

Course Objective

Physics Curriculum is re-oriented to the needs of CSE, ECE and EEE branches of graduate engineering courses that serve as a transit to understand the specific advanced topics.

Course Outcomes:

On Completion of the course, the students will be able	
CO1:	To impart knowledge of physical optical phenomenon like Interference, Diffraction and polarization involving design of optical instruments with higher resolution To explain the concept of dielectric constant and polarization in dielectric materials and summarize Gauss's law in the presence of dielectrics
CO2:	To interpret dielectric loss, Lorentz field and Claussius- Mosotti relation and classify the magnetic materials based on susceptibility and their temperature dependence. To apply the Gauss' Theorem for divergence and Stokes' Theorem for curl and evaluate Maxwell's displacement current and correction in Ampere's law.
CO3:	To assess the electromagnetic wave propagation in different media and its power and explain the working principle of optical fibers and its classification based on refractive index profile and mode of propagation with their applications. To classify the energy bands of semiconductors and outline the properties of n-type and p-type semiconductors.
CO4:	To study the basic Quantum mechanics, interpretation of the direct and indirect band gap in semiconductors and identify the type of semiconductor using Hall effect.

Syllabus:

UNIT –I OPTICS

12h

Interference of Light -Principle of Superposition- Interference in thin films (reflected light)- Newton's Rings – Theory and Applications
Introduction on Diffraction - Single slit Diffraction (Qualitative) - multiple slits (Grating) – Grating spectrometer to determine the Wavelength
Polarization - Brewster's law - Types of Polarization (plane, circular, elliptical) – Double refraction - Nicol's Prism - Half wave and Quarter wave plate - Engineering applications of Interference, Diffraction and Polarization

UNIT –II DIELECTRICS

12h

Introduction to Dielectrics - Electric polarization - Dielectric polarizability, Susceptibility and Dielectric constant- Types of dielectric polarizations (Quantitative) - Claussius-Mosotti equation (qualitative)-Applications of Dielectrics

MAGNETIC PROPERTIES

Introduction to Magnetism-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites, Magnetic device applications

UNIT –III

10h

Electromagnetic Fields

Divergence and Curl of Electric and Magnetic Fields-Maxwell's Equations, Electromagnetic wave propagation (conducting and non-conducting media)

Fiber Optics

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of Propagation-Acceptance angle - Numerical Aperture-Classification of fibers based on Refractive index profile and modes.

UNIT –IV

12h

QUANTUM MECHANICS:

Introduction to matter waves – Schrodinger -Time Independent and Time Dependent wave equations - Particle in a box

FREE ELECTRON THEORY:

Classical free electron theory –Drawbacks - Quantum free electron theory – Concept of Fermi Level – Density of states (Qualitatively)

UNIT –V

12h

Band Theory of Solids:

Bloch's theorem (Qualitatively) – Kronig Penny model – Origin of Energy Bands -Energy bands in crystalline solids – classification of crystalline solids according to band theory.

Semiconductor Physics:

Introduction – Density of carriers in Intrinsic and Extrinsic semiconductors-Drift & Diffusion-relevance of Einstein's equation – Hall effect in semiconductors

Text books

1. M.N. Avadhanulu, P.G.Kshirsagar "A Text book of Engineering Physics"-S.Chand Publications,2017
2. P.K.Palanisamy, "Engineering Physics", Sci-tech Publications.
3. H.K.Malik&A.K.Singh "Engineering Physics",- McGraw Hill Publishing Company Ltd, 2018

Reference Books

1. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
2. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc GrawHill ,2008
3. S.M.Sze "Semiconductor devices-Physics and Technology"-Wiley,2008
4. R. K. Gaur, S. L.Gupta, Engineering Physics, Dhanpat Rai Publications.
5. P.K.Palanisamy, "Applied Physics"Sci-tech Publishers.

Web Links:

1. <https://www.britannica.com/science/interference-physics>
2. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

CO-PO Mapping:

1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High],
'-' : No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	1	2	2	-	-	2	1	1
CO2	2	2	2	1	2	1	2	1	2	-	2	2
CO3	2	3	2	1	2	2	-	2	2	1	2	1
CO4	2	3	2	1	-	2	1	2	2	2	1	-

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code 19199112	Engineering Physics Laboratory (common for CSE, ECE, EEE)				
Teaching	Total contact hours-48	L	T	P	C
		-	-	3	1.5

Course Objectives:

On Completion of the course, the students will be able	
CO1:	To handle optical instruments like microscope and spectrometer, determine thickness of a hair/paper with the concept of interference and to estimate the wavelength and resolving power of different colors using diffraction grating
CO2:	To demonstrate the importance of dielectric material in storage of electric field energy in the capacitors and plot the intensity of the magnetic field of circular coil carrying current with varying distance
CO3:	To evaluate the acceptance angle of an optical fiber and numerical aperture and determine the resistivity of the given semiconductor using four probe method
CO4:	To identify the type of semiconductor i.e., n-type or p-type using Hall effect and determine the band gap of a given semiconductor

List of Physics Experiments

1. Determination of the radius of curvature of the lens by Newton's ring method
2. Magnetic field along the axis of a circular coil carrying current.
3. To determine the resistivity of semiconductor by Four probe method
4. To determine the energy gap of a semiconductor
5. Measurement of resistance with varying temperature
6. To determine the V-I characteristics of P-N Junction diode
7. To determine the V-I characteristics Zener diode
8. To verify the laws of vibration using sonometer
9. To determine the acceleration due to gravity using compound pendulum.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017

Web link:

1. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

CO-PO Mapping:**1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial [High],****'-' : No Correlation**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	-	3	1	-	1	-	-	2
CO2	2	3	2	3	2	3	1	-	3	-	-	3
CO3	2	3	2	3	2	3	1	-	2	-	-	3
CO4	2	2	3	3	2	2	1	-	2	-	-	3

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. IISem (II semester)			
Course Code	COMMUNICATIVE ENGLISH –II				
Teaching	Total contact hours – 54	L	T	P	C
Prerequisite(s): Learner should possess the primary communicative abilities suitable for global exposure and professional communication		3	-	-	3

Course Objective: This course aims to

- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids.
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal Correspondence.
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Paraphrase short academic texts using suitable strategies and conventions
CO2:	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
CO3:	Build the ability to convey in different communicative forms.

Syllabus:

UNIT: I

READING: Detailed Text: Mohammad Yunus' Speech at the Nobel Prize ceremony. AVENUES- Course Book-II by ORIENT BLACK SWAN Pvt Ltd

Non-Detailed Text: The Scare Crow by Satyajit Ray from 'Panorama: A Course on Reading.'- OXFORD

GRAMMAR: Conjunctions and sentence connectors

VOCABULARY: Adjective-noun collocations

WRITING SKILLS: E-mail writing: structure, etiquette.

UNIT: II

READING: DETAILED TEXT: Biography of A. R. Rahman from AVENUES-Course Book-II by ORIENT BLACK SWAN Pvt Ltd

NON-DETAILED TEXT: A village Lost to the Nation by Krishna Chandra Pujari from 'Panorama: A Course on Reading.'-OXFORD

GRAMMAR: Active and passive voice, foreign expressions in English.

VOCABULARY: ACRONYMS and their usage

WRITING SKILLS: Formal letter writing- structure, conventions and etiquette (enquiry, complaints, seeking permission, seeking internship);

UNIT: III

READING: DETAILED TEXT: “You Start Dying Slowly” by Pablo Neruda. AVENUES-Course Book-II by ORIENT BLACK SWAN Pvt Ltd

Non-Detailed Text: Martin Luther King by Chinua Achebe from 'Panorama: A Course on Reading.'-OXFORD

GRAMMAR: subject agreement, verb-noun collocations

VOCABULARY: word roots

WRITING: Resume- drafting a cover letter for job application.

UNIT IV:

READING: DETAILED TEXT: ‘Most Beautiful’ by Ruskin Bond. AVENUES-Course Book-II by ORIENT BLACK SWAN Pvt Ltd

GRAMMAR: Misplaced modifiers-conditional clauses

VOCABULARY: Idiomatic expressions

WRITING: Note taking- avoiding redundancies and clichés in written communication

UNIT V:

READING: DETAILED TEXT: “Film Making” by Satyajit Ray. From AVENUES-Course Book-II by ORIENT BLACK SWAN Pvt Ltd

GRAMMAR: Editing short texts, correcting common errors in grammar and usage,

VOCABULARY: words often confused

Writing: Structure and contents of a Project Report; identifying sections in project reports; understanding the purpose of each section; significance of references. Writing Introduction and Conclusion

Prescribed Text books:

DETAILED TEXTBOOK: AVENUES-Course Book-II by ORIENT BLACK SWAN Pvt Ltd

NON-DETAIL TEXT BOOK: 'Panorama: A Course on Reading.'-OXFORD

Reference Books:

- Bailey, Stephen. Academic writing: A handbook for international students. Rutledge, 2014.
- Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Henley ELT; 2nd Edition, 2018.

WEB REFERENCES:

English Language Learning Online

BBC Vocabulary Games

Free Rice Vocabulary Game

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], ' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	3	2	-	-	-	1
CO2	-	-	-	--	-	2	3	2	-	-	--	2
CO3	-	-	-	-	-	3	3	2	-	-	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (II semester)			
Course Code 19199293	ENVIRONMENTAL STUDIES (EEE)				
Teaching	Total contact hours - 65	L	T	P	C
Prerequisite(s): Knowledge of environment science		3	0	0	0

Course Objective: To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
C02:	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
C03:	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
C04:	Recognize the interconnectedness of human dependence on the earth's ecosystems
C05:	Influence their society in proper utilization of goods and services.

Syllabus:

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable Energy resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

UNIT – II: Ecosystems, Biodiversity, and its Conservation

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of

biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III: Environmental Pollution and Solid Waste Management

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV: Social Issues and the Environment

SOCIAL ISSUES AND THE ENVIRONMENT: Urban problems – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V: Human Population and the Environment

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health –Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES :

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House

6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

Web Links:

1. <https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf>
2. https://www.tutorialspoint.com/environmental_studies/environmental_studies_tutorial.pdf
3. https://play.google.com/store/apps/details?id=com.techzone.higher.enviroment&hl=en_US

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	2	3	2	3	1	2	2	3	2	3	3	1
C02	3	2	3	2	3	2	3	2	3	3	3	2
C03	3	2	3	2	3	2	3	2	3	3	3	1
C04	2	3	3	2	1	3	2	3	2	3	3	2
C05	3	2	3	3	2	3	2	3	2	3	2	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 semester)			
Course Code	ELECTRICAL CIRCUIT ANALYSIS - I				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Mathematics		3	0	0	3

Course Objective:

1. To study the concepts of passive elements, types of sources and various network reduction techniques.
2. To understand the applications of network topology to electrical circuits.
3. To study the concept of magnetic coupled circuit.
4. To understand the behavior of RLC networks for sinusoidal excitations.
5. To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
6. To understand the applications of network theorems for analysis of electrical networks.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Analyse electrical networks in presence of active and passive elements.
C02:	Analyse magnetic circuit with various dot conventions.
C03:	Analyse steady state circuits
C04:	Analyze series and parallel resonant circuits.
C05:	Analyze electric circuits using Network Theorems.

Syllabus:

UNIT –I Introduction to Electrical Circuits

Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to- delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources.

UNIT –II Network theorems (DC & AC Excitations)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.

UNIT –III Magnetic Circuits

Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT –IV Single Phase A.C Systems

Periodic waveforms (determination of rms, average value and form factor), concept of phase angle and phase difference – waveforms and phasor diagrams for lagging, leading networks, complex and polar forms of representations.

Steady state analysis of R, L and C circuits, power factor and its significance, real, reactive and apparent power, waveform of instantaneous power and complex power

UNIT –V Analysis of AC Networks

Extension of node and mesh analysis to AC networks, series and parallel resonance, selectively band width and Quality factor, introduction to locus diagram.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6 th edition
2. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
3. Networks and Systems by D. Roy Choudhury, New Age International publishers

Reference Books:

1. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd
2. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
3. Circuits by A.Bruce Carlson , Cengage Learning Publications
4. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications
5. Electric Circuits by David A. Bell, Oxford publications
6. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthy, Dhanpat Rai & Co.

Web Links:

1. www.electrical4u.com
2. www.nptel.ac.in

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 semester)			
Course Code	Electrical Engineering Workshop				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basics of Electricity		0	0	3	1.5

Course Objective:

1. To demonstrate the usage of measuring equipment.
2. To train the students in setting up simple wiring circuits.
3. To impart methods in electrical machine wiring.
4. To identify the types of different suitable devices for conducting of experiment.
5. To understand Kirchhoff's laws.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Explain the limitations, tolerances, safety aspects of electrical systems & wiring.
C02:	Select wires/cables and other accessories used in different types of wiring.
C03:	Make simple lighting and power circuits.
C04:	Measure current, voltage and power in a circuit.
C05:	Make disassembling and assembling of PC.

List of Experiments:

1. Study of various electrical tools and symbols.
2. Identify different types of cables/wires and switches, fuses & fuse carriers, MCGB and ELCB, MCCB with ratings and usage.
3. Identification of types of resistors and capacitors.
4. Wiring of light/fan circuit using two way/ three way control (stair case wiring)
5. Go-down wiring/Tunnel wiring
6. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and energy.
7. Measurement of voltage, current, resistance in DC circuit.
8. Measurement of voltage, calculate the power factor of the circuit.
9. Wiring of backup power supply including inverter, battery and load for domestic.
10. Types of earthing, physical implementation.
11. Identification of terminals of different semiconductor devices.

12. Identification of the peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O devices, power rating of computers.
13. A practice on disassembling the components of a PC and Assembling them to back to working condition.
14. Hardware trouble shooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly of peripherals).
15. Software troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	3	2	-	-	-	-	-	-	-	-	
C02	-	-	2	-	-	-	-	-	-	-	-	
C03	1	-	-	-	-	-	-	-	-	-	3	
C04	-	-	-	-	-	-	-	-	2	-	-	
C05	-	3	-	-	-	-	-	-	2	-	-	

Regulation GRBT-19	* Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 Semester)			
Course Code	Engineering Graphics				
Teaching	Total contact hours- 40	L	T	P	C
Prerequisite(s): Aptitude to Learn and Basic Geometry		1	0	0	2.5

Course Objectives:

- To highlight the significance of universal language of engineers.
- To impart basic knowledge and skills required to prepare engineering drawings.
- To impart knowledge and skills required to draw projections of solids in different contexts.
- To visualize and represent the pictorial views with proper dimensioning and scaling. Course

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Apply principles of drawing to represent dimensions of an object.
CO2:	Outline the polygons and engineering curves.
CO3:	Illustrate projections of points, lines, planes and solids.
CO4:	Illustrate the 3D views through isometric views.
CO5:	Create the isometric views and orthographic views

Syllabus:

UNIT-I

POLYGONS: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

CURVES: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes.

UNIT-II

ORTHOGRAPHIC PROJECTIONS: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to one of the reference planes (HP, VP or PP)

PROJECTIONS OF STRAIGHT LINES: Inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III

PROJECTIONS OF PLANES: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV

PROJECTIONS OF SOLIDS: Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V

ISOMETRIC VIEWS: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

COMPUTER AIDED DESIGN: Drawing practice using Auto CAD, Creating 2D&3D drawings of objects using Auto CAD

Note: In the End Examination there will be no question from CAD.

Text Books:

1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing by Agarwal&Agarwal, Tata McGraw Hill Publishers.

Reference Books:

1. Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree by K.C. John, PHI Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers.
4. Engineering Drawing + AutoCad – K.Venugopal, V. Prabhu Raja, New Age

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	3	-	2	-	-	-	-	-	-	-
CO2	-	-	1	-	3	-	-	-	-	1	-	-
CO3	-	-	1	-	2	-	-	-	3	2	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code 19199112	Engineering Physics Laboratory (common for CSE, ECE, EEE)				
Teaching	Total contact hours-48	L	T	P	C
		-	-	3	1.5

Course Objectives:

On Completion of the course, the students will be able	
CO1:	To handle optical instruments like microscope and spectrometer, determine thickness of a hair/paper with the concept of interference and to estimate the wavelength and resolving power of different colors using diffraction grating
CO2:	To demonstrate the importance of dielectric material in storage of electric field energy in the capacitors and plot the intensity of the magnetic field of circular coil carrying current with varying distance
CO3:	To evaluate the acceptance angle of an optical fiber and numerical aperture and determine the resistivity of the given semiconductor using four probe method
CO4:	To identify the type of semiconductor i.e., n-type or p-type using Hall effect and determine the band gap of a given semiconductor

List of Physics Experiments

1. Determine the thickness of the fiber using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Dispersive power of a diffraction grating
5. Resolving power of a grating
6. Magnetic field along the axis of a circular coil carrying current.
7. To determine the resistivity of semiconductor by Four probe method
8. To determine the energy gap of a semiconductor
9. Measurement of resistance with varying temperature
10. To determine the V-I characteristics of P-N Junction diode
11. To determine the V-I characteristics Zener diode
12. To determine the carrier concentration and Hall coefficient
13. To verify the laws of vibration using sonometer
14. To determine the acceleration due to gravity using compound pendulum.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017

Web link:

1. <http://vlab.amrita.edu/index.php> -Virtual Labs, Amrita University

CO-PO Mapping:

1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial [High],

'-' : No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	-	3	1	-	1	-	-	2
CO2	2	3	2	3	2	3	1	-	3	-	-	3
CO3	2	3	2	3	2	3	1	-	2	-	-	3
CO4	2	2	3	3	2	2	1	-	2	-	-	3

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Associate Professor
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Telangana.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (1I semester)			
Course Code	COMMUNICATIVE ENGLISH LAB- II				
Teaching	Total contact hours – 45	L	T	P	C
Prerequisite(s) Learner should be equipped with basic language skills and communication skills like Listening and Speaking			-	3	1.5

Course Objectives the course aims

- To enable students to develop listening skills for better comprehension of academic presentations, lectures and speeches.
- To hone the speaking skills of students by engaging them in various activities such as just a minute (JAM), group discussions, oral presentations, and role plays.
- To expose learners to key Reading techniques such as Skimming and Scanning for comprehension of different texts. .

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	communicate confidently in English in social and professional contexts with improved skills of fluency and accuracy
C02:	speak grammatically correct sentences employing appropriate vocabulary suitable to different contexts
C03:	read for various scholarly materials for information and comprehension

Syllabus:

UNIT1: ARGUMENTATIVE SKILLS

Listening: Listening for presentation strategies and answering questions on the speaker, audience and key points.

Speaking: Debating-dos and don'ts – structure of a debate

UNIT 2: PRESENTATION SKILLS

Formal and informal Presentations-Following an argument/ logical flow of thought; answering questions on key concepts after listening to key concepts and academic discourse

UNIT 3: CO-ORDINATING SKILLS-

Listening: Group Discussion -Identifying views and opinions expressed by different speakers while listening to discussions.

Speaking: Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position- types and styles of G.Ds

UNIT 4: INTERVIEW SKILLS-industry readiness

Listening: Watching and listening to job interviews-understanding interview questions

Speaking: Mock Interviews-Interview etiquette

UNIT 5: PROFESSIONAL COMPETENCE

Listening: Watching and listening to news and panel discussions; workplace communication - formal dialogues/ conversations.

Speaking: speech presentation.

Suggested Lab Manual : INTERACT by Orient Black Swan

SOFTWARE: Train to Success series and Speak Well

References book: Infotech English, Maruthi Publications.

Web Resources:

- 1-language.com
- <http://www.5minuteenglish.com>
- <https://www.englishpractice.com>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	-	-	-	-	-	3	2	3	-	-	-	1
C02	-	-	-	-	-	2	2	3	-	-	--	1
C03	-	-	-	-	-	3	2	2	-	-	-	2

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 rd semester)			
	Complex Variables and Transform Techniques (COMMON TO EEE & ECE)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Derivatives, integration and complex numbers To familiarize the transform techniques and complex variables.		3	-	-	3

Course Objective:

- To familiarize the transform techniques and complex variables.
- To equip the students to solve application problems in their disciplines.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Demonstrate the knowledge of continuity, analytic and C-R equations of complex function, evaluate Taylor and Laurent series and apply Cauchy residue theorem
C02:	Understand properties of Laplace and inverse Laplace transformations, apply to solve differential equations
C03:	Evaluate Fourier series for different functions
C04:	Understand properties of Fourier transformation apply for different function
C05:	Understand properties of Z transformations and apply to solve differential equations

Syllabus:

Unit 1: Complex Variables

Review: Simple functions of a complex variable – real and imaginary parts- No questions may base on this portion.

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate. Integration in the complex plane: Cauchy theorem (without proof), Cauchy integral formula (without proof), zeros and singularities of analytic functions, Residue, Cauchy's residue theorem (without proof), Evaluation of integrals of the type (i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$

and (ii) $\int_{-\infty}^{\infty} R(x)dx$

Unit II: Laplace Transforms

Definition of Laplace transform, existence conditions, properties of Laplace transforms, inverse Laplace transforms, transforms of derivatives, transforms of integrals, multiplication by t^n , division by t , convolution theorem, periodic functions, unit step function, unit impulse function, (without proofs). Applications to ordinary linear differential equations with constant coefficients.

Unit III: Fourier Series

Dirichlet's conditions, Fourier series, conditions for a Fourier expansion, functions of any period, odd and even functions - half range series.

Unit IV: Fourier Transforms

Fourier integrals, Fourier sine and cosine integrals, Fourier transform, sine and cosine transforms, properties, convolution theorem.

Unit V: Z-Transforms

Definition of Z-transform, elementary properties, linearity property, damping rule, shifting u_n to the right and left, multiplication by n , initial value theorem, final value theorem, inverse Z-transform, convolution theorem. Formation of difference equations, solutions of linear difference equations using Z-transforms.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

Reference Books:

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Web Links:

1. <https://nptel.ac.in/courses/111103070/>
2. <https://nptel.ac.in/courses/111/106/111106084/>
3. <https://nptel.ac.in/courses/111/106/111106046/>
4. <https://nptel.ac.in/courses/111105123/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	3	3	2	-	-	-	-	-	-	-	1
C02	3	3	3	2	-	-	-	-	-	-	-	1
C03	3	3	3	2	-	-	-	-	-	-	-	1
C04	2	3	2	2	-	-	-	-	-	-	-	1
C05	3	3	2	2	-	-	-	-	-	-	-	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code PCC	ELECTRICAL CIRCUIT ANALYSIS II				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): BASIC ELECTRICAL ENGINEERING & ECA-I		3	0	0	3

Course Objectives:

1. To study the concepts of balanced and unbalanced three-phase circuits.
2. To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
3. To study the performance of a network based on input and output excitation/response.
4. To understand the realization of electrical network function into electrical equivalent passive elements.
5. To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Able to solve three- phase circuits under balanced and unbalanced condition
CO2:	Learn transient response of electrical networks for different types of excitations.
CO3:	To find parameters for different types of network.
CO4:	To realize electrical equivalent network for a given network transfer function.
CO5:	To extract different harmonics components from the response of a electrical network.

UNIT-I Balanced & Unbalanced Three Phase Circuits

Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power. Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter method for measurement of three phase power.

UNIT-II Transient Analysis in DC and AC Circuits

Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

UNIT-III Two Port Networks

Two port network parameters – Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks - Poles and zeros of network functions.

UNIT-IV Network Synthesis

Positive real function - Basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function Foster and Cauer methods.

UNIT-V Fourier Analysis and Transforms

Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of Symmetry-, Analysis of electrical circuits to nonsinusoidal periodic waveforms. Fourier integrals and Fourier transforms – properties of Fourier transforms physical significance of the Fourier Transform and its application to electrical circuits.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, McGraw Hill Company, 6th edition
2. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
3. Networks and Systems by D. Roy Choudhury, New Age International publishers

Reference Books:

1. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd
2. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
3. Circuits by A.Bruce Carlson, Cengage Learning Publications
4. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications
5. Electric Circuits by David A. Bell, Oxford publications
6. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthy, Dhanpat Rai & Co.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	2	-	-	2	-	-	-
CO2	3	3	3	2	-	2	-	-	2	2	-	-
CO3	3	3	3	2	-	1	2	-	2	-	-	-
CO4	3	3	3	-	-	1	-	-	-	-	-	-
CO5	3	3	3	-	-	1	-	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	ELECTRICAL MACHINES - I				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electrical circuit analysis		3	0	0	3

Course Objective:

1. To teach principles of magnetic circuits and electromechanical energy conversion
2. To make students to learn construction and operation of dc machines
3. To train students to conduct tests on dc machines to determine performance by direct and indirect methods
4. To train students to find the performance of transformers from the results of practical tests
5. To Analyze poly phase transformers connections.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Analyze the conditions required of self excitation of dc generators and parallel operation of dc generators the operation of dc machines
C02:	Determine the performance of dc machine using the results of tests
C03:	Distinguish the operation of various dc machine configurations.
C04:	Determine the voltage regulation and efficiency of single phase transformer.
C05:	Analyse poly phase transformers connections

Syllabus:

Unit-I D.C. Generators Construction, Armature windings – lap and wave windings, Numerical problems, commutation Process – methods of improving commutation, Compensating windings – Inter poles Types of DC generators: separately excited and self excited generators. Numerical problems, O.C.C– build-up of E.M.F - critical field resistance and critical speed - causes for failure of inducing E.M.F and remedial measures. Internal & External characteristics of shunt, series and Compound generator, Applications, Losses and Efficiency. applications of dc generators.

UNIT – II D.C. Motors D.C Motors – Principle of operation – Back E.M.F. —characteristics of shunt, series and compound motors – Armature reaction and commutation, Torque equation, Speed torque characteristics, Losses and Efficiency, 3- point and 4- point starters – Numerical problems, applications of dc motors.

UNIT – III Speed Control and Testing of D.C. Machines **Speed control Methods:** D.C. Shunt motor-Armature voltage and field flux control methods, speed control of D.C. Series motor. Testing of D.C. machines: Brake test, Swinburne's test, Hopkinson's test(Regenerative method) - Retardation test and separation of losses.

UNIT – IV Single Phase Transformers Construction & Operation— types of transformers, emf equation - operation on no-load and on-load-phasor diagrams for lagging, leading and unity power factors, Equivalent circuit –Regulation – losses and efficiency - effect of variation of frequency & supply voltage on iron losses-- All day efficiency OC and SC tests - Sumpner's test -separation of losses -parallel operation- equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers, Numerical problems

UNIT – V 3-phase Transformers Poly phase connections - Y/Y, Y/ Δ , Δ /Y, Δ / Δ and open Δ -- Third harmonics in phase voltages-three winding transformers : tertiary windings-determination of Z_p , Z_s and Z_t -- transients in switching - off load and on load tap changers -- Scott connection- Numerical problems.

Text books:

1. J. . Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

Reference Books:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

Web Links:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
CourseCode	ELECTRONIC DEVICES AND CIRCUITS (common for ECE, EEE)				
Teaching	Totalcontacthours-45	L	T	P	C
Prerequisite(s): Knowledge of Engineering physics related to semiconductor, mathematics like trigonometry, integration etc.		3	0	0	3

Course Objective:

1. To learn the basics of Semiconductor physics.
2. To study the operation and construction different diodes and their characteristics.
3. To learn the principle of operation of different rectifiers and filter circuits.
4. To study the operation of different transistors and FETS and their biasing circuits and also to learn the basics of small signal amplifier models using h-parameters.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Apply the Knowledge of semiconductor physics for designing the circuits of electronic devices.
CO2:	Obtain the characteristics of diode in forward and reverse bias and perform mathematical modeling of diode as a resistor and capacitor.
CO3:	Perform analysis and design of a complete AC to DC converter (Eg: Mobile Charger) consisting of Rectifiers, Filters and regulators.
CO4:	Describe the construction and working of a Transistor in various modes and design circuits for stabilization and compensation of both BJT and FET
CO5:	Gain Knowledge of Small Signal Low Frequency Transistor Amplifier Models.

Syllabus:

Unit-I: Semi Conductor Physics:

Introduction to metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi-conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, Mass Action Law, Fermi levels in intrinsic and extrinsic Semiconductors.

Unit-II: Junction Diode Characteristics:

Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Devices

Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Varactor diode, Tunnel Diode, Thyristors (DIAC, TRIAC, SCR), UJT Construction, operation and characteristics of all the diodes is required to be considered.

Unit-III: Rectifiers and Filters:

Basic Rectifier setup, Half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms; Filters; Inductor filter, Capacitor filter, L- section filter, π - section filter, comparison of various filter circuits in terms of ripple factors, Voltage regulators- series and shunt, IC Voltage Regulators.

Unit-IV: Transistor Characteristics, Biasing and Thermal Stabilization:

Bipolar Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through effect, Photo transistor.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics

Unit-V: Biasing and Thermal Stabilization, Transistor Amplifier Models:

Need for biasing, operating point, load line analysis, BJT biasing- methods, Stability factors, (S, Si, S''), compensation techniques, Thermal runaway, Thermal stability, Introduction to Heat Sinks.

FET biasing methods and stabilization

BJT: Two port network, Transistor hybrid model, determination of h- parameters, , generalized analysis of transistor amplifier model using h- parameters.

Text books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuits-B.P.Singh, RekhaSingh,Pearson Publications, Second Edition.

Reference Books:

1. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky, Pearson Publications, Tenth Edition

Web Links:

1. www.iitkgp.ac.in
2. www.electronic4u.com
3. www.nptel.com
4. <http://www.satishkashyap.com/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	2	3	2	1	1	1	1	1
CO2	1	1	1	1	3	1	1	2	1	1	3	2
CO3	2	2	1	1	1	3	1	1	1	1	1	1
CO4	3	1	1	1	1	1	2	2	1	1	1	3
CO5	1	1	1	2	3	2	1	1	1	1	1	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	Design Thinking & Product Innovation				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Engineering physics		2	0	0	0

Course Objective:

1. Build mindsets & foundations essential for designers
2. Learn about the Human-Centered Design methodology and understand their real-world applications
3. Use Design Thinking for problem solving methodology for investigating illdefined problems.
4. Undergo several design challenges and work towards the final design challenge

Apply Design Thinking on the following Streams to

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with Design Challenge and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

TASKS TO BE DONE:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

Task 3: Teams & Problems

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems.

Task 4: Empathizing

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

Task 6: Prototyping

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

Task 8:

- Final Report Submission and Presentation

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. 1Sem (3 semester)			
Course Code	Electrical Circuits Lab				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electrical Circuit analysis		0	0	3	1.5

Course Objective:

1. To apply mesh and nodal analysis to solve electrical circuit problems
2. To analyze circuits in the sinusoidal steady-state domain
3. To apply network theorems for the analysis of circuits and two port networks
4. To measure active and reactive powers
5. To measure Network parameters

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Apply mesh and nodal analysis to solve electrical circuit problems
C02:	Analyze circuits in the sinusoidal steady-state domain
C03:	Apply network theorems for the analysis of circuits and two port networks
C04:	Measure active and reactive powers
C05:	Measure Network parameters

List of Experiments:

1. Verification of Thevenin's theorem and Norton's theorem
2. Verification of superposition and Reciprocity theorem
3. Verification of Maximum power transfer theorem
4. Verification of Compensation theorem
5. Verification of Milliman's theorem
6. Locus diagrams of RL series circuits
7. Determination of self, mutual inductances and co-efficient of coupling
8. Z parameters and Y parameters

9. Measurement of active power for star connected balanced loads
10. Measurement of active power for delta connected balanced loads
11. Measurement of reactive power for star connected balanced loads
12. Measurement of 3-ph power by 2- wattmeter method for unbalanced loads

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	3	2	-	2	-	-	-	-	-	2	-
C02	2	3	2	-	2	-	-	-	-	-	2	-
C03	2	3	2	-	2	-	-	-	-	-	2	-
C04	2	3	2	-	2	-	-	-	-	-	2	-
C05	2	3	2	-	2	-	-	-	-	-	2	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. 1 Sem (3 semester)			
Course Code	ELECTRICAL MACHINES – I LAB				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electrical machines-1		0	0	3	1.5

Course Objective:

1. To determine the performance of DC shunt machine
2. To determine the performance of DC series machine
3. To determine the performance of DC compound machine
4. To connect DC machines in parallel
5. To control speed of DC machine

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Determine the performance of DC shunt machine
C02:	Determine the performance of DC series machine
C03:	Determine the performance of DC compound machine
C04:	Connect DC machines in parallel
C05:	Control speed of DC machine

List of Experiments:

1. Magnetization characteristics of DC Shunt Generator.
2. Brake test on DC shunt motor. Determination of performance curves.
3. Brake test on Dc compound motor. Determination of performance curves.
4. Load test on DC Shunt Generator.
5. Speed Control of DC shunt Motor by Field control method and Armature control method.
6. Swinburne's Test and Predetermination of efficiency DC machine
7. Load test on DC compound Generator .
8. Hopkinson's test on DC shunt machine. Predetermining efficiency of as a generator and as a motor.
9. Retardation test on DC shunt motor. Determination of losses at rated speed.

10. Brake Test on DC series motor
11. Parallel operation of two D.C shunt generators.
12. Field test on two identical D.C series machines.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	3	2	-	-	-	-	-	1	1	2	-
C02	-	3	2	-	-	-	-	-	1	1	2	-
C03	-	3	2	-	-	-	-	-	1	1	2	-
C04	-	2	2	-	-	-	-	-	2	-	-	-
C05	-	-	3	-	-	-	-	-	3	2	2	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	ELECTRONIC DEVICES AND CIRCUITS LAB				
Teaching	Total contact hours-45	L	T	P	C
Prerequisite(s): Knowledge of Engineering physics related to semiconductor, mathematics like trigonometry, integration etc.		0	0	3	1.5

Course Objective:

1. To Observe the working nature of different electronic measuring equipment's
2. To Observe the characteristics of different diodes and transistors
3. To plot the characteristics of different amplifier circuits
4. To implement the biasing circuits
5. To observe the characteristics of LED and LDR.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Able to understand the working nature of different electronic measuring equipment
CO2:	Understand the characteristics of different diodes and transistors
CO3:	Able to understand the working of amplifiers for different frequencies
CO4:	Understand the need of biasing and also knows the different biasing methods
CO5:	Understand the working of LED and LDR

Syllabus:

List of Experiments:

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Analog and Digital Multimeters, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments

(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics
 - Part A: Germanium Diode (Forward bias & Reverse bias)
 - Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
 - Part A: V-I Characteristics
 - Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
 - Part A: Half-wave Rectifier
 - Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
 - Part A: Input Characteristics
 - Part B: Output Characteristics
5. BJT Characteristics (CB Configuration)
 - Part A: Input Characteristics
 - Part B: Output Characteristics
6. FET Characteristics (CS Configuration)
 - Part A: Drain Characteristics
 - Part B: Transfer Characteristics
7. SCR Characteristics
8. UJT Characteristics
9. Transistor Biasing
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier
13. LED Characteristics
14. LDR Characteristics
15. Photo Diode Characteristics
16. Diode Applications

PART C: Equipment required for Laboratory

1. Bread boards.
2. Ammeters (Analog or Digital)
3. Voltmeters (Analog or Digital)
4. Active & Passive Electronic Components
5. Regulated Power supplies
6. Analog/Digital Storage Oscilloscopes

7. Analog/Digital Function Generators
8. Digital Multimeters
9. Decade resistance Boxes/Rheostats
10. Decade Capacitance

Web Links:

1. www.iitkgp.ac.in
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	2	3	2	1	1	1	1	1
CO2	1	1	1	1	3	1	1	2	1	1	3	2
CO3	2	2	1	1	1	3	1	1	1	1	1	1
CO4	3	1	1	1	1	1	2	2	1	1	1	3
CO5	1	1	1	2	3	2	1	1	1	1	1	1

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	ELECTRICAL MEASUREMENTS				
Teaching	Total contact hours – 45	L	T	P	C
Prerequisite(s): Electrical circuits		3	0	0	3

Course Objective:

1. To Know principles of different electrical measurement instruments and to measure voltage and current
2. To understand different types of instruments for measurement of Power and Energy.
3. To understand about different types of A.C and D. C Potentiometers. And to Measure resistance, capacitance, inductance and frequency by using various bridges.
4. To Know about the magnetic measurements
5. To understand about digital measurements.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Know principles of different electrical measurement instruments and to measure voltage and current and different types of instruments for measurement of Power and Energy.
CO2:	Understand about different types of A.C and D. C Potentiometers.
CO3:	Measure resistance, capacitance, inductance and frequency by using various bridges.
CO4:	Know about the magnetic measurements
CO5:	Understand about digital measurements

Syllabus:

UNIT-I

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 -CT and PT: Ratio and phase angle errors – design considerations

UNIT –II

Measurement of Power and Energy

Single phase and three phase dynamometer wattmeter, LPF and UPF, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. . Type of P.F. Meters – single phase and three phase dynamometer and moving iron type. Single phase induction type energy meter – driving and braking torques – errors and compensations –testing by phantom loading using R.S.S. meter. Three phase energy meter – trivector meter, maximum demand meters.

UNIT – III

Potentiometers

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types - standardization – applications

Measurement of Parameters

Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Carey Foster's bridge- Kelvin's double bridge for measuring low resistance– loss of charge method for measurement of high resistance. Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desauty bridge-Wien's bridge – Schering Bridge- Wagner's erthing device.

UNIT – IV

Magnetic Measurements:

Ballistic galvanometer – equation of motion – flux meter – constructional details. Determination of B-H Loop methods of reversals six point method – A.C. testing – Iron loss of bar samples– core loss measurements by bridges and potentiometers.

UNIT-V Digital Meters

Digital Voltmeter-Successive approximation, ramp and integrating type-Digital frequency meter-Digital multimeter-Digital Tachometer

Text Books

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.
2. Electrical & Electronic Measurement & Instruments by A.K.SawhneyDhanpatRai& Co. Publications.
3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers.

Reference Books

1. Electrical Measurements – by Buckingham and Price, Prentice – Hall
2. Electrical Measurements by Harris.
3. Electronic Instrumentation-by H S Kalsi, Tata McGraw-Hill Education

Web-Resources:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	ELECTRICAL MEASUREMENTS LAB				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electrical measurements		0	0	3	1.5

Course Objective:

1. To calibrate the performance of an energy meter and 1- ϕ dynamo meter type wattmeter.
2. To measure the unknown value of given resistance, capacitance and inductance
3. To measure active and reactive powers and also the measurement of power with CTs.
4. To test transformer oil for its effectiveness.
5. To measure the choke coil parameters in a 1- ϕ transformer on any one of the sides.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Measure accurately the electrical parameters voltage, current, power, energy
CO2:	Electrical characteristics of resistance, inductance and capacitance.
CO3:	Measure illumination of electrical lamps.
CO4:	Test transformer oil for its effectiveness.
CO5:	Measure the parameters of inductive coil in a 1- ϕ transformer.

List of Experiments:

1. Calibration and Testing of single phase energy meter
2. Calibration of dynamometer wattmeter using phantom loading UPF
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Calibration of LPF wattmeter – by direct loading
5. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance
6. Capacitance Measurement using Schering bridge
7. Inductance Measurement using Anderson bridge
8. Resistance strain gauge – strain measurements and Calibration
9. Parameters of a choke coil
10. Measurement of 3 phase reactive power with single-phase wattmeter for balanced loading

11. Measurement of 3 phase power with single watt meter and 2 No's of C.T
12. Measurement of Power by 3 Voltmeter and 3 Ammeter methods
13. Dielectric oil testing using H.T. testing Kit
14. Strain gauge measurement

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	3	2	-	-	-	-	-	2	-	-	2
C02	-	3	2	-	-	-	-	-	2	-	-	2
C03	-	3	2	-	-	-	-	-	2	-	-	2
C04	-	3	2	-	-	-	-	-	2	-	-	2
C05	-	3	2	-	-	-	-	-	2	-	-	2

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 th semester)			
Course Code	(Numerical Methods, Probability and Statistics) (COMMON TO CE, ME, EEE, AME & MM)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Knowledge of Mathematics at 10+2 , Basic Statistics with Reasoning ability		3	-	-	3

Course Objective:

- ❖ Familiarize the students with Numerical Methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- ❖ Exemplify probability theory in order to evaluate the probability of real world events;
- ❖ Apply discrete and continuous probability distributions to provide solutions for practical problems.
- ❖ Monitoring hypotheses tests for population parameters
- ❖ Reports in work place situations and in completing papers and research projects in other university and college courses.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Apply the knowledge of approximating and find the roots of polynomial and transcendental equation in practical engineering problems.
CO2:	Apply the Knowledge of different algorithms for approximating the solution of ordinary differential equations in practical Engineering problems.
CO3:	Demonstrate the knowledge of Probability distributions.
CO4:	Enhance knowledge of a classical hypothesis techniques.
CO5:	Enhance Knowledge in inferential methods based on small and large sampling tests.

Syllabus:

Unit I:

Solutions of Algebraic, Transcendental Equations and Interpolation

Solution of algebraic and transcendental equations : bisection method, Newton-Raphson method and Regula-Falsi method. Interpolation: finite differences, relation between operators, interpolation using Newton's Forward and backward difference formulae. Interpolation with unequal intervals- Lagranges interpolation.

UNIT II:

Numerical Integration and Solution of Ordinary Differential Equations

Numerical integration,- Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solutions of ordinary differential equations- Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

Unit III :

Probability

Axioms of probability, addition law and multiplication law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability distribution: Binomial, Poisson and normal distribution-their properties.

Unit IV:

Testing of Hypothesis

Formulation of null hypothesis, alternative hypothesis, the critical regions, level of significance. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means.

UNIT V:

Small Sample Tests

Student t-distribution (test for single mean and two means), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes. One-way ANOVA Classified data.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. P.Kandasamy, K.Thilagavathy K.Gunavathi, Numerical Methods, S.Chand & Company, 2/e, Reprint 2012.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
4. Miller and Freund, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
5. Probability and statistics for Engineering and Scientists : Ronald E. Walpole, Sharon L. Meyers and Keying Ye: Pearson.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
3. N.P. Bali and Manish Goyal, A text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Web Links:

1. <https://nptel.ac.in/courses/111107105/>
2. <https://ocw.mit.edu/courses/audio-video-courses/#mathematics>
3. <https://nptel.ac.in/courses/111105041/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	3
CO2	2	2	2	2	-	-	-	-	-	-	-	3
CO3	2	2	2	2	-	-	-	-	-	-	-	3
CO4	2	2	2	2	-	-	-	-	-	-	-	3
CO5	2	2	2	2	-	-	-	-	-	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 th semester)			
Course Code	Robotics (Open Elective-I)				
Teaching	Total contact hours-52	L	T	P	C
Prerequisite(s): Kinematics of machines /Dynamics of machines /Mathematics: Matrices, Differential Equations		3	0	0	3

Course Objectives:

- To acquire the knowledge on advanced algebraic tools for the description of motion.
- To develop the ability to analyze and design the motion for articulated systems.
- To develop an ability to use software tools for analysis and design of robotic systems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify various robot configuration and components.
CO2:	Select appropriate actuators and sensors for a robot based on specific application.
CO3:	Solve kinematic and dynamic problems for simple serial kinematic chains.
CO4:	Plan trajectory for a manipulator for avoiding obstacles.
CO5:	Develop programming principles and languages for a robot control system

Syllabus:

UNIT-I

INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – Present and future applications – Classification by coordinate system and control system. Robot applications in manufacturing

UNIT-II

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-III

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems. **MANIPULATOR KINEMATICS:** Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT-IV

Differential transformation and manipulators, Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT-V

General considerations in path description and generation, Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

ROBOT ACTUATORS AND FEED BACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

Text Books:

1. Industrial Robotics, Groover M P, Mitchell Weiss, Roger N. Nagel, Tata McGraw-Hill, India, edition-3, 2008 / Pearson Education.
2. Introduction to Robotics, SK Saha, Tata McGraw-Hill, India

References:

1. Robotics K .S. Fu, R.C. Gonzalez, C.S.G. Lee .Tata McGraw-Hill, india, edition-2, 2008.
2. Robotic engineering: an integrated approach, Richard David Klafner, Thomas A. Chmielewski, Michael Negin, Prentice Hall, 1989.
3. Robotics and Control R K & Nagrath I J / Tata McGraw-Hill, India, edition, 2003.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 semester)			
Course Code 19150506	OPERATING SYSTEMS (OPEN ELECTIVE)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Basic knowledge about Computer Peripherals and Computer Architecture		3	0	0	3

Course Objective(s):

- To understand the general structure of modern computers
- To acquire the knowledge of general purpose, structure and functions of operating systems
- To identify and illustrate the of OS aspects by example

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Describe the general architecture of computers

CO-2: Describe, contrast and compare differing structures for operating systems

CO-3: Understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

UNIT-1

Computer System and Operating System Overview: Overview of computer operating system, operating system structure, operating system operations, protection and security, services, systems calls, operating system generation.

UNIT-2

Process Management: Process concept- process scheduling, operations, Process scheduling criteria and algorithms, and their evaluation, Multi Thread programming models, Inter process communication.

UNIT-3

Concurrency: Process synchronization, the critical- section problem, Peterson's Solution, synchronization hardware, semaphores, classic problems of synchronization, monitors.

UNIT-4

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

Virtual Memory Management: Virtual memory, demand paging, page-Replacement algorithms, Allocation of Frames, Thrashing

UNIT-5

Mass-Storage Structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling (FCFS, SCAN, CSCAN, SSTF)

Text Books

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education.

Reference Books

1. Operating systems- A Concept based Approach-D.M.Dhamdhare, 2nd Edition, TMH
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

Web References:

<https://nptel.ac.in/courses/106/106/106106144/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	-	-	-	-	-	-	-	-	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-
CO3	1	-	2	3	-	-	-	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	INTERNET OF THINGS (Common for CSE, ECE, EEE, Mining, ME, AME, CE)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Knowledge of Logic Gates, Relays, Registers, Counter, Microcontroller, Microprocessor, Sensors, Interfacing, Digital communication, Basic operations and Internet basics.		3	-	-	3

Course Objectives:

1. Understand the concepts of IOT development infrastructure.
2. Understand the principles of wired and wireless communication protocols.
3. Understand the threats and security issues in the development of IOT.
4. Understand the types of measurement errors and sensors.
5. Understand the design and development process of IOT platform.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Understand IOT development cycles, Infrastructure, challenges and requirements.
CO2:	Learn about the wired and wireless communication protocols implementation.
CO3:	Learn about Privacy, Types of Threats and Security challenges present in IOT and IoT Clouds.
CO4:	Analyze various measurement methods and errors and their impact on IOT development.
CO5:	Develop IOT based products for real life problems.

Syllabus:

UNIT-1 Fundamental of IoT

Internet of things definition, IoT Functional view Internet of things today, Internet of things tomorrow, Potential success factors, Internet of things vision, Future communication challenges-5G scenario, Fundamental characteristics of IoT, IOT Layered Architecture, Detailed IoT layered architecture, IoT Enabling technologies, IoT Smart Environment and smart space creation. IoT Applications and use case scenarios. Resource management for IoT.

UNIT-2 Communication Protocols for IoT

Wired Communication Protocols:

I2C, SPI, One Wire, RS232, Ethernet, RS 485, UART, USART, USB,

Wireless Communication Protocols:

Blue tooth, ZigBee, Z-Wave, LoWPAN, WiFi-ah, NFC, RFID), Application Protocols MQTT, CoAP, HTTP.

UNIT-3 Threats, Security, Privacy and IoT Cloud

IoT as Interconnection of Threats:

Phase attack, Attack as per Architecture, Attack based on Components.

Security Engineering for IOT Development:

Building Security into design and development, Secure Design: Safety and Security Design, Processes and Agreements, Technology Selection.

Mitigating to Privacy Concern:

Privacy Challenges introduced by IoT, Guide to perform PIA, PbD Principles, Privacy Engineering Recommendations

IOT Cloud:

Concepts of Cloud, Your Organization and Cloud Computing, Cloud Computing Services (IaaS, PaaS, SaaS).

Case Study: ThingSpeak Cloud, Blynk Cloud, MQTT Cloud

UNIT-4 Measurement Errors and Sensors

Measurement Errors:

Gross Error, Systemic error, Absolute Error, Relative Error, Accuracy, Precision, Resolution, Significant Figure, Measurement Error Combinations, Basics of Statistical Analysis.

Sensors and Transducers:

Passive and Active Sensors, Resistive Sensors, Capacitive Sensors and Inductive Sensors, Temperature Sensor, Humidity Sensor, Ultra-Sonic Sensor, IR Sensor, PIR Sensor, Vibration Sensor, Gas Sensor, Hall Effect Sensor.

UNIT-5: Development Platform: Hardware, Software, Programming Language Hardware:

Arduino Uno Board, NodeMCU Board

Software Tools:

Arduino IDE, Compilers, Cross-Compilers, Linkers, Libraries, Debuggers, Simulators, Emulators, Serial Monitor, Intel Hex File and Motorola Hex File Format.

Programming Language:

Arduino Programming Structure, Data Types, Operators, Control Statements (IF, IF-ELSE, WHILE, DO-WHILE, FOR, SWITCH-CASE, SWITCH-CASE-BREAK, SWITCH-CASE-CONTINUE) and Precompiled Functions.

Case Studies:

Home Automation, Agriculture 3.0, Health Care, Industry 4.0

Text books:

1. O.Vermesan, P.Friess, "Internet of Things-From Research and Innovation to Market Deployment", River Publishers, 2014.
2. B. Russell and D.VanDuren, "Practical Internet of Things Security", -Packt Publishing, 2016.
3. A. T. Velte, T. J. Velte, R.Elsenpeter, "Cloud Computing – A Practical Approach" McGraw Hill, 2010.
4. R. B. Northrop, "Introduction to Instrumentation and Measurement" Second Edition, CRC Taylor and Francis 2005.

Reference Books:

1. A. T. Velte, T. J. Velte, R. Elsenpeter, "Cloud Computing – A Practical Approach" Mg-Graw Hill, 2010.
2. R. B. Northrop, "Introduction to Instrumentation and Measurement" Second Edition, CRC Taylor and Francis 2005.

Web Links:

1. <https://thingspeak.com>
2. <https://www.blynk.cc/getting-started>
3. <https://www.arduino.cc>
4. <https://mqtt.org>
5. <https://coap.technology>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	2	-	3	2	-	1	3	3
CO2	2	3	-	1	2	-	1	2	-	3	-	-
CO3	2	-	2	3	-	2	3	-	3	1	-	-
CO4	1	-	-	3	1	2	3	3	2	1	-	2
CO5	3	-	-	2	-	1	-	2	-	2	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech, II Sem (4 semester)			
Course Code	ENVIRONMENTAL POLLUTION AND CONTROL (Open Elective)- I				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s)	Basics of Air, Water, Soil and Noise Pollutants. Knowledge of Environmental Engineering-I.	3	-	-	3

Course Objective:

The objective of this course is:

- Impart knowledge on fundamental aspects of air pollution & control, noise pollution, and solid waste management.*
- Provide basic knowledge on sustainable development.*
- Introduces some basics of sanitation methods essential for protection of community health.*
- Differentiate the solid and hazardous waste based on characterization.*

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Identify the air pollutant control devices
CO2	Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
CO3	explain the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
CO4	List out the methods of environmental sanitation and the management of community facilities without spread of epidemics.
CO5	explain the importance of sustainable development while planning a project or executing an activity.

Syllabus:

Unit - I

Air Pollution: Air pollution Control Methods-Particulate control devices - Methods of Controlling Gaseous Emissions - Air quality standards.

Noise Pollution: Noise standards, Measurement and control methods - Reducing residential and industrial noise - ISO14000.

Unit - II

Industrial wastewater Management: - Strategies for pollution control - Volume and Strength reduction - Neutralization - Equalization - Proportioning - Common Effluent Treatment Plants - Recirculation of industrial wastes - Effluent standards.

Unit - III

Solid Waste Management: solid waste characteristics - basics of on-site handling and collection - separation and processing - Incineration- Composting-Solid waste disposal methods - fundamentals of Land filling.

Unit – III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

Separation and Transformation of Solid Waste: unit operations used for separation and transformation; shredding - materials separation and recovery, source reduction and waste minimization.

Unit – IV

Processing and Treatment: Processing of solid waste - Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment - Energy recovery - biogas generation and cleaning- Incinerators.

Unit – V

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems -designated waste landfill remediation.

Text Books:

1. George Tchobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993.
2. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cengage learning, New Delhi, 2004

References:

1. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.

Web References:

1. www.nptel.com
2. https://www.academia.edu/35092171/LECTURE_NOTES_Solid_and_Hazardous_Waste_Management

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	2
CO2	-	-	-	-	-	-	2	-	-	-	-	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	-	-	-	2	-	-	-	-	-
CO5	-	-	-	-	-	-	2	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech 2 nd Sem (4 semester)			
CourseCode XXXXX	OPEN ELECTIVE BASIC AUTOMOBILE ENGINEERING 19170466f				
Teaching	Total contact hours-50	L	T	P	C
Prerequisite(s): principles		3	0	0	3

Course Objectives:

To make the student able to

1. Understand working of different automobile structures and layouts.
2. Recognize different types of automobile engines and different components in it.
3. Identify different transmission elements and control systems.
4. Distinguish the functions of auxiliary systems.
5. Analyze different types of safety systems.
6. Judge effective pollution reduction methods.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Compare different types of automobiles and their components.
CO2:	Differentiate working principles of different types of automobile engines.
CO3:	Illustrate working of different transmission elements and control systems.
CO4:	Implement different types of safety systems.
CO5:	Implement effective pollution reduction methods.

UNIT-I

Introduction to Automobiles & Engines:

Functions and characteristics of different types of automobiles and their power sources. Specifications, Performance Parameters, Quality standards, Trends in automobile design. Engine Specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc. Reciprocating Engines, Rotary Engines.

Engine Lubrication systems, splash and pressure lubrication systems, oil filters, oil pumps, Engine cooling system, Engine fuel systems, Engine intake & exhaust systems.

UNIT-II

Transmission Systems:

Clutches, principle of operations, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel-gear boxes, types, sliding mesh, constant mesh, synchromesh gear boxes, over drive, torque converter, propeller shaft, Torque tube drive, universal joint & slip joint, Hotch-kiss drive, differential rear axles-types-wheels and tyres.

UNIT-III

Control Systems:

Steering geometry-camber, castor, king pin rake, combined angle toe-in, center point steering, types of steering mechanism-Ackerman steering mechanism, steering gears-types, steering linkages. Mechanical, hydraulic, pneumatic & vacuum brakes-brief description, anti lock brake system (ABS)

Dr D. Lingaraju

Dr. P. Senthil Kumar

Sri B. Atcha Reddy

Sri V. Subrahmanyam

Dr. K. Selva Kumar

Dr. S.V.S.N. Murthy

Sri S. Raja Sekhar

Sri Manoj Kumar Roy

Sri T.V. Dharmaraju

Sri S. Ravi Varma

and electromagnetic retarder. Telescopic suspension, Rigid axle suspension and independent suspension, Shock absorbers, Torsion bar, Stabilizer, Different types of springs used in automobile suspension.

UNIT-IV

Auxiliary Systems:

Electrical and electronic systems, voltage regulators, bendix drive mechanism solenoid switch, lighting system, horn, wiper, fuel gauge, Heating, Ventilation, and Air Conditioning (HVAC) systems, Vehicle Thermal Management System and Vehicle body design features, Tipping Systems(lifting).

UNIT-V

Vehicle Safety Systems & Eco Friendly Systems and Vehicles:

Safety: Introduction to safety systems, seat belt, air bags, bumper, wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

Different pollutants, Effects of pollution on environment, human.Regulations, Emission standards.Introduction to Electric Vehicles and Hybrid Vehicles.

TEXT BOOKS:

1. Automotive Mechanics, William H Crouse and Donald L Anglin, Tata McGraw – Hill Publishing Co. Ltd. 2004, 10th Edition.
2. Automobile Engineering – R.B. Gupta.
3. Automobile Engineering (Vol. 1) – Dr. Kirpal Singh
4. Automobile Engineering (Vol. 2) – Dr. Kirpal Singh
5. Automobile Engineering – KK Ramalingam

REFERENCES:

1. Automobile Engineering --- G.B.S. Narang.
2. IC Engines – V.Ganeshan/TMH
3. IC Engines – ML Mathur& RP Shrma
4. IC Engines – Domkundvar
5. BP Obert IC Engines & Air Pollution – Harper & Row pub.
6. Bosch Gasoline Engines Management – Bosch Pub.
7. Bosch Diesel Engine Management – Bosch Pub.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4 : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	3	3				1						
C02	3	2				1						
C03	3	2				1						
C04	3	2							2		1	1
C05	2	2					3					

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	ELEMENTS OF MINING TECHNOLOGY				
Teaching	Total contact hours – 45	L	T	P	C
Prerequisite(s):	NIL	3	-	-	3

Course Objective:

1. To introduce the concept of different methods of mining.
2. To impart the knowledge of classification of coal seams.
3. To explain the concepts of drilling methods.
4. To impart the knowledge of different explosives used in mining.
5. To elaborate the concept of blasting techniques and drill bits used.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Know the various Elements of Mining and stages/phases in Mining
CO2:	Know the concepts of Mining Methods.
CO3:	Know the Drilling methods.
CO4:	Understand the explosives.
CO5:	Blasting practice in mines.

Syllabus:

UNIT -I

Introduction and stages of Mining - Contribution of Mining activities of civilization- Definitions of terms –Mining Industries in the state and in the country.– Pre mining, mining and post-mining – ancillary mining operations, Types of entries to mineral deposits – Shaft, Incline, Adit – applicable conditions- limitations, compare shaft vs incline.

UNIT -II

Concepts and Definition of terms commonly used in coal and non-coal mining Classification of the mineral deposits basing on various factors, shallow, deep, very deep, steeply inclined, moderately inclined, inclined vein, massive deposits. Classification of coal seams - Thick, moderately thick, thin seams, I, II, III degree gassy seams. Classification of methods of working coal-opencast, underground-Bord and Pillar/ longwall-Advancing and retreating.

UNIT -III

Drilling methods Use of boreholes – (Classification) methods – applicable conditions – tools used for drilling –successive and rotary, feed mechanism – Screw feed and hydraulic feed mechanism – mud flushing –sludge and core, core recovery methods of core recovery – reasons for deviation of bore holes. Single tube, double tube and wire line core barrel.

UNIT -IV

Explosives - Uses of explosives in mining industry, characteristics classification basing on strength, speed and application, low and high explosives, their composition, properties - explosives used in underground in opencast workings including LOX, slurries, boosters, primer - their composition application permitted explosives - tools, applicability, examples with their composition. Selection of explosives - factors, Initiation of explosives - fuses - safety fuse, cortex fuse. Detonators - types, composition, constructional details and applications.

UNIT -V

Blasting practice in mines - Solid blasting-rules and provisions related-induced blasting-different types of blasting practice-different types of drill bits-Drill ware - Reconditioning-Dangers and precaution measures of blasting, fuse and electric blasting and misfire dealing.

Text books:

1. Elements of Mining Technology: Vol-I; D.J. Deshmukh
2. Explosives and Blasting practice; G.K.Pradhan

Reference Books:

1. Elements of Mining Technology Vol-II; D.J. Deshmukh
2. Principles and Practices of Modern Coal Mining: R. D. Singh, New Age International, 1997.
3. Modern Coal Mining Technology: S. K. Das, 2nd edition, Lovely Prakashan Publishers, 1994.

Web Links:

1. https://www.slideshare.net/umer_1/elements-of-mining
2. https://en.wikipedia.org/wiki/Drilling_and_blasting
3. http://www.maden.org.tr/resimler/ekler/e04e05fbe48920b_ek.pdf
4. <https://www.cdc.gov/niosh/mining/userfiles/works/pdfs/acobo.pdf>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	1	-	2	3	3	2	3	-	2	2	2
C02	2	1	-	2	3	3	2	3	-	2	2	2
C03	3	2	2	3	3	3	2	3	-	2	1	2
C04	-	2	2	3	2	3	2	2	-	3	1	2
C05	3	2	2	3	3	3	2	3	-	2	1	2

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	POWER SYSTEMS - I				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Fluid mechanics & Hydraulic machinery		3	0	0	3

Course Objective:

The objectives of the course are to make the student learn about

1. Principle of operation of different types of conventional power generating stations
2. Classification of Distribution system and its design.
3. Classification of Substations
4. Types of Underground cables
5. Economic aspects and tariff

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the Principle of operation of different types of conventional power generating stations.
CO2:	Classify Distribution system and its design
CO3:	Classify Substations
CO4:	Types of Underground cables
CO5:	Understand Economic aspects and tariff

Syllabus:

UNIT-I

Thermal Power Stations

Layout of a thermal power plant- path of coal, steam, water, air, ash and flue gasses,- ash handling system- Description of components: Boilers, Super heaters, Economizers, electrostatic precipitators, -steam Turbines: Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers, and Chimney.

Nuclear Power Stations

Nuclear fission- Nuclear fuels, chain reaction- Nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors - description of PWR, BWR and FBR. - Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-II

D.C.distribution :Classification of distribution systems- design features of distribution systems- radial distribution, ring main distribution,- voltage drop calculations: DC distributors for following cases: radial DC distributor fed at one end and at both ends (equal / unequal voltages), ring main distributor, with inter connector- stepped distributor

AC distribution:- voltage drop calculations: AC distributor- fed at one end -fed at both ends (equal / unequal voltages)- ring main distributor- with inter connector. Comparison of DC and AC distribution.

UNIT-III

Air insulated substations - Indoor & Outdoor substations: Substations layout of 33/11KV -Bus bar arrangements in the Sub-Stations - single bus bar- sectionalized single bus bar- double bus bar with one and two circuit breakers- main and transfer bus bar system.

Gas insulated substations (GIS) – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV

Underground Cables: Types of Cables- Construction- Types of insulating materials- Calculations of insulation resistance and stress in insulation,- power factor of cable- Numerical Problems.Capacitance of single core and 3-Core belted Cables- Numerical Problems -Grading of Cables-Capacitance grading, Numerical Problems, Inter sheath Grading

UNIT-V

Economic Aspects :Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor, plant use factor, Base and peak load plants - Numerical Problems.

Tariff Methods : Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods, numerical problems

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND & COMPANY LTD., New Delhi 2004.

Reference Books:

1. Elements of Power Station design and practice by M.V. Deshpande, Wheeler Publishing.
2. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
3. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003.
4. Gas turbine performance, by PP Wals, P.Fletcher, Blackwell Publisher, 2004.

Wed Resources:

1. <http://www.electrical4u.com>
2. <http://www.mtu.edu/ece/departments/faculty/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	Electrical Machines - II				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electrical machines-1		3	0	0	3

Course Objective:

1. To teach students to understand operation and working of 3-Ph induction motor
2. To train students to determine the performance of induction machines from different tests
3. To teach students to understand working and performance of synchronous generator
4. To train students to conduct tests to determine voltage regulation of alternators and parallel connection of alternators
5. To teach students to understand the concepts of synchronous motor's working and methods to start 1-phase induction motor.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Demonstrate ability to understand operation and working of 3-Ph induction motor
C02:	Analyze performance alternator when connected in parallel with infinite bus or with another alternator
C03:	Determine the voltage regulation of alternator through indirect methods and parallel operation of alternators
C04:	Demonstrate ability to understand the concepts of synchronous motor's working and methods to start synchronous motor.
C05:	Explain the working and starting methods of 1-phase induction motor.

Syllabus:

UNIT-I

3-phase Induction Motors

construction details: squirrel cage and wound rotors-skewing-production of rotating magnetic field - principle of operation - slip- rotor induced e.m.f and rotor frequency - rotor current and p.f. at standstill and running conditions, Numerical problems.

Rotor input power, rotor copper loss, mechanical power developed - equivalent circuit - Numerical problems, Torque equation- expressions for maximum torque and starting torque –

slip-torque characteristics. No load and blocked rotor tests- Circle diagram for predetermination of efficiency
Starting methods-from stator side and rotor side- Induction generator- double cage rotor - crawling and cogging

UNIT-II Synchronous Generator

Constructional features of non-salient and salient pole type – Armature windings –Distributed and concentrated windings – Distribution– Pitch and winding factors –E.M.F equation– Improvements of waveform and armature reaction– Numerical problems.

UNIT – III

Voltage regulation of synchronous generator

Voltage regulation by synchronous impedance method– MMF method and Potier triangle method–Phasor diagrams– Two reaction analysis of salient pole machines and Phasor diagram– Numerical problems.

Parallel operation of synchronous generators

Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing –Transfer of real and reactive power– Numerical problems.

UNIT-IV

Synchronous motor – operation

Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque– Variation of current and power factor with excitation – Synchronous condenser – Mathematical analysis for power developed– Numerical problems.

Starting methods and performance of Synchronous motor

Excitation and power circles – Hunting and its suppression – Methods of starting – Synchronous induction motor.

UNIT-V

1-Phase Induction Motors:

Construction and working of 1-Phase Induction Motors, Double field revolving theory, Starting methods. Types of 1-Phase Induction Motors, Applications.

AC Series motor-working - Applications

Text Books:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
4. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons,

Reference Books:

1. A.E.Fitzgerald and C. Kingsley, "Electric Machinery", McGrawHill Education, 2013.
2. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.

Web-Resources:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
CourseCode	INTERNET OF THINGS (common for CSE, ECE, EEE, Mining, ME, AME, CE)				
Teaching	Totalcontacthours-45	L	T	P	C
Prerequisites: Knowledge of Logic Gates, Relays, Registers, Counter, Microcontroller, Microprocessor, Sensors Interfacing, Digital		3	0	0	3

Course Objectives:

1. Understand the Concepts of IOT Development Infrastructure.
2. Understand the principles of wired and wireless communication protocols
3. Understand the Threats and Securities issues in the development of IOT.
4. Understand the types of measurement errors and sensors.
5. Understand design and development of IOT Platform.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Learn about the IOT Development cycles, Infrastructure, Challenges and Requirements.
C02:	Learn about the Wired and Wireless Communication Protocols implementation.
C03:	Learn about Privacy, Types of Threats and Security challenges present in IOT and IoT Clouds.
C04:	Learn about types of measurement errors and its impact on measurement and various sensor operation and construction mechanism.
C05:	Learn about Development platform "Arduino IDE", Sensors Libraries and Programming

Syllabus:

UNIT-1 Fundamental of IoT

Internet of things definition, IoT Functional view Internet of things today, Internet of things tomorrow, potential success factors, internet of things vision, future communication challenges-5G scenario, fundamental characteristics of IoT,IOT Layered Architecture, detailed IoT layered architecture, IoT Enabling technologies, IoT Smart Environment and smart space creation. IoT Applications and use case scenarios. Resource management for IoT.

UNIT-2 Communication Protocols for IoT

Wired Communication Protocols:

I2C, SPI, One Wire, RS232, Ethernet, RS 485, UART, USART, USB,

Wireless Communication Protocols:

Blue tooth, ZigBee, Z-Wave, LoWPAN, WiFi-ah, NFC, RFID), Application Protocols MQTT, CoAP, HTTP.

UNIT-3 Threats, Security, Privacy and IoT Cloud

IoT as Interconnection of Threats:

Phase attack, Attack as per Architecture, Attack based on Components.

Security Engineering for IOT Development:

Building Security into design and development, Secure Design: Safety and Security Design, Processes and Agreements, Technology Selection.

Mitigating to Privacy Concern:

Privacy Challenges introduced by IoT, Guide to perform PIA, PbD Principles, Privacy Engineering Recommendations

IOT Cloud:

Concepts of Cloud, Your Organization and Cloud Computing, Cloud Computing Services (IaaS, PaaS, SaaS).

Case Study: ThingSpeak Cloud, Blynk Cloud, MQTT Cloud

UNIT-4 Measurement Errors and Sensors

Measurement Errors:

Gross Error, Systemic error, Absolute Error, Relative Error, Accuracy, Precision, Resolution, Significant Figure, Measurement Error Combinations, Basics of Statistical Analysis.

Sensors and Transducers:

Passive and Active Sensors, Resistive Sensors, Capacitive Sensors and Inductive Sensors, Temperature Sensor, Humidity Sensor, Ultra-Sonic Sensor, IR Sensor, PIR Sensor, Vibration Sensor, Gas Sensor, Hall Effect Sensor.

UNIT-5: Development Platform: Hardware, Software,

Programming Language

Hardware:

Arduino Uno Board, NodeMCU Board

Software Tools:

Arduino IDE, Compilers, Cross-Compilers, Linkers, Libraries, Debuggers, Simulators, Emulators, Serial Monitor, Intel Hex File and Motorola Hex File Format.

Programming Language:

Arduino Programming Structure, Data Types, Operators, Control Statements (IF, IF-ELSE, WHILE, DO-WHILE, FOR, SWITCH-CASE, SWITCH-CASE-BREAK, SWITCH-CASE-CONTINUE) and Precompiled Functions.

Case Studies:

Home Automation, Agriculture 3.0, Health Care, Industry 4.0

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Text books:

1. O.Vermesan, P.Friess, "Internet of Things-From Research and Innovation to Market Deployment", River Publishers, 2014.
2. B. Russell and D.VanDuren, "PracticalInternetofThingsSecurity", -PacktPublishing, 2016.
3. A. T. Velte, T. J. Velte, R.Elsenpeter, "Cloud Computing – A Practical Approach" Mg-Graw Hill, 2010.
4. R. B. Northrop, "Introduction to Instrumentation and Measurement" Second Edition, CRC Taylor and Francis 2005.

Reference Books:

1. A. T. Velte, T. J. Velte, R.Elsenpeter, "Cloud Computing – A Practical Approach" Mg-Graw Hill, 2010.
2. R. B. Northrop, "Introduction to Instrumentation and Measurement" Second Edition, CRC Taylor and Francis 2005.

Web Links:

1. <https://thingspeak.com>
2. <https://www.blynk.cc/getting-started>
3. <https://www.arduino.cc>
4. <https://mqtt.org>
5. <https://coap.technology>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	3	2	3	1	2	1	3	2	1	1	3	3
CO2	2	3	2	1	2	2	1	2	3	3	1	2
CO3	2	1	2	3	3	2	3	1	3	1	3	3
CO4	1	3	2	3	1	2	3	3	2	1	3	2
CO5	3	3	2	2	3	1	1	2	3	2	3	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	Electrical Machines - II lab				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electrical machines-II		0	0	3	1.5

Course Objective:

1. To determine the performance of transformer
2. To determine the performance of 1- ϕ Induction motor.
3. To determine the regulation of three-phase alternator by various methods
4. To determine the performance of synchronous machine.
5. To determine the performance of induction machine

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Determine the efficiency and regulation of transformers and asses their performance.
C02:	Determine the performance of 1- ϕ Induction motor.
C03:	Determine the regulation of three-phase alternator by various methods
C04:	Find X_d / X_q ratio of alternator and asses the performance of three-phase synchronous generator.
C05:	Experiment various tests on Induction motor for assessing its performance

List of Experiments:

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase slip ring Induction motor
5. Regulation of a three -phase alternator by synchronous impedance method and MMF method .
6. V and Inverted V curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (3 semester)			
Course Code	Fluid Mechanics & Hydraulic Machinery				
Teaching	Totalcontacthours-55	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

The students completing this course are expected to understand the properties of fluids, its kinematic and dynamic behavior through various laws of fluids like continuity, Euler's, Bernoulli's equations, energy and momentum equations. Further, the student shall be able to understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the properties of fluids and Explain the mechanics of fluids at rest and in motion by observing the fluid phenomena.
CO2:	Distinguish the types of flows and continuity equation.
CO3:	Derive Eulers Equation of motion and Deduce Bernoulli's equation.
CO4:	Examine energy losses in pipe transitions and Sketch energy gradient lines.
CO5:	Describe Basic working of hydraulic turbines and hydraulic pumps.

Syllabus:

UNIT-I

FLUID STATICS: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT-II

FLUID KINEMATICS: stream line, path line and streak lines and stream tube, classification of flows-steady & Unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

FLUID DYNAMICS: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III

CLOSED CONDUIT FLOW: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturi meter, and orifice meter, Flow nozzle.

BOUNDARY LAYER THEORY AND APPLICATIONS: Concepts of boundary layer, boundary layer thickness and equations, momentum integral equation, boundary layer separation and its control, Cavitation. Circulation, Drag and lift on immersed bodies, Magnus effect.

[Handwritten signatures and names of faculty members]

UNIT-IV

BASICS OF TURBO MACHINERY: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

HYDRAULIC TURBINES: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design – draft tube- theory- functions and efficiency.

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, water hammer.

UNIT-V

CENTRIFUGAL PUMPS: classification, working, work done – manometric head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

RECIPROCATING PUMPS: Working, Discharge, slip, indicator diagrams.

Text Books:

1. Fluid Mechanics and Hydraulic Machines by Bansal.
2. Hydraulics, fluid mechanics and Hydraulic machinery by Modi and Seth.

Reference Books:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

Useful Web-links: <http://nptel.ac.in/courses.php>
<http://mit.espe.edu.ec/courses/mechanical-engineering/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	3	-	-	-	-	-	-	3	-	-	-
CO2	-	3	-	-	-	-	3	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. III Sem (3 semester)			
Course Code	Fluid Mechanics & Hydraulic Machinery Lab				
Teaching	Totalcontacthours-50	L	T	P	C
Prerequisite(s):		0	0	3	1.5

Course Objective:

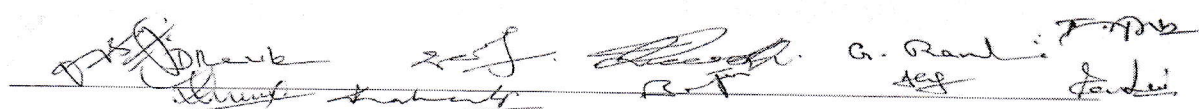
To impart hands-on practical exposure on study of fluid flow and working of hydraulic machinery.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Perform experiments to determine the coefficient of discharge of flow measuring devices.
CO2:	Conduct experiments on hydraulic turbines and pumps to draw characteristics.
CO3:	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
CO4:	Determine the energy flow pattern through the hydraulic turbines and pumps.
CO5:	Exhibit his competency towards preventive maintenance of hydraulic turbines.

List of Experiments:

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Performance Test on Single Stage Centrifugal Pump.
4. Performance Test on Multi Stage Centrifugal Pump.
5. Performance Test on Reciprocating Pump.
6. Determination of friction factor for a given pipe line.
7. Determination of loss of head due to sudden contraction in a pipeline.
8. Turbine flow meter.
9. Performance Test on Pelton Wheel.
10. Impact of jets on Vanes.



- Text Books:**

- ### Reference Books:

- ### CO-PO Mapping:

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	CONTROL SYSTEMS				
Teaching	Total contact hours – 45	L	T	P	C
Prerequisite(s): Mathematics- I		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn about the principle of Operation of different types of Special Electrical Machines
2. To Formulate different types of analysis in frequency domain to explain the nature of stability of the system
3. To know about Lag and Lead Compensators
4. To learn about the Routh Hurwitz Criterion, Nyquist plot and Bode plots

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
C02:	Determine time response specifications of second order systems and to determine error constants
C03:	Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method
C04:	Analyze the stability of LTI systems using frequency response methods

UNIT – I

Mathematical modeling of control systems: Introduction of control systems, Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks,

Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II

Time response analysis: Standard test signals - Time response of first order systems –Time response of second order systems - Time domain specifications - Steady state errors and error constants – Effects of P, PI, PD, PID controllers.

UNIT – III

Stability and rootlocus technique: The concept of stability – Routh's stability criterion – limitations of Routh's stability – The root locus concept - construction of root loci (Simple problems).

UNIT-IV

Frequency response analysis and Classical control design techniques: Introduction, Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion- Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

UNIT-V

State space analysis of continuous systems: Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and Observability.

Text Books

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition

Reference Books

1. Control Systems, ManikDhanesh N, Cengagepublications .
2. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
3. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02											✓	
C03			✓									
C04			✓	✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	POWER SYSTEMS-II				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Systems-I, Mathematics- I		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To understand the electrical power plant operation and control with respect to its economic aspect
2. To expose the students to the different electrical & mechanical aspects of the power network along with its environmental and safety constraints.
3. To know the importance of compensation in power system and study the different compensating techniques
4. Study about different transients and their protection those are introduced in power system
- 5.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Understand the parameters of various types of transmission lines and to understand the performance of short, medium, long transmission lines
C02:	Understand the effects of skin, proximity, Ferranti, corona effects on transmission lines
C03:	Understand the power system transients & sag, mechanical design of overhead lines and insulators
C04:	Understand different methods of generation, distribution, control and compensation involved in the operation of power systems

UNIT-I

Transmission Line Parameters: 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 and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition– Numerical Problems–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–Numerical Problems.

UNIT-II

Performance of Short and Medium Length Transmission Lines: Classification of Transmission Lines – Short, medium, long line and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants Mathematical Solutions to estimate regulation and efficiency of all types of lines – Numerical Problems.

UNIT-III

Performance of Long Transmission Lines: Long Transmission Line–Rigorous Solution – Evaluation of A,B,C,D Constants–Interpretation of the Long Line Equations – Incident, Reflected and Refracted Waves –Surge Impedance and SIL of Long Lines–Wave Length and Velocity of Propagation of Waves – Representation of Long Lines – Equivalent-T and Equivalent Pie network models (Numerical Problems).

UNIT-IV

Performance of transmission lines under transients: Types of System Transients – Travelling or Propagation of Surges – Termination of lines with different types of conditions – Open Circuited Line–Short Circuited Line – T-Junction– Lumped Reactive Junctions–Skin and Proximity effects – Description and effect on Resistance of Solid Conductors –Ferranti effect – Charging Current – Effect on Regulation of the Transmission Line–Corona – Description of the phenomenon–Factors affecting corona–Critical voltages and power loss – Radio Interference- Shunt Compensation – Power factor improvement methods-numerical problems.

UNIT–V

Sag and Tension Calculations and Overhead Line Insulators: Sag and Tension calculations with equal and unequal heights of towers– Effect of Wind and Ice on weight of Conductor–Numerical Problems – Stringing chart and sag template and its applications–Types of Insulators – String efficiency and Methods for improvement–Numerical Problems – Voltage distribution–Calculation of string efficiency–Capacitance grading and Static Shielding.

Text Books

1. Electrical power systems – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.
2. Modern Power System Analysis by I.J. Nagarath and D.P.Kothari, Tata McGraw Hill, 2nd Edition.
3. Electrical Power Systems by P.S.R. Murthy, B.S. Publications.

Reference Books

1. Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R. Gupta, Wheeler Publishing.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S. Bhatnagar A .Chakrabarthy, DhanpatRai& Co Pvt. Ltd.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓					✓					
C02			✓								✓	
C03				✓								
C04								✓				

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	DIGITAL ELECTRONICS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electronic Devices and circuits		3	0	0	3

Course Objectives:

1. To know different number systems, its conversions,
2. To know different types of logic gates and fundamentals of karnaugh maps.
3. To understand the design of combinational and sequential circuits using logic gates
4. To understand the fundamentals of op-amps, its circuits and parameters

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Analyze different number systems, its conversions
C02:	Analyze different types of logic gates and fundamentals of karnaugh maps
C03:	Understand the design of combinational and sequential circuits using logic gates
C04:	Understand the fundamentals of op-amps, its circuits and parameters

Syllabus

Unit-I

Review of number systems & codes: Representation of different radix, Number systems base conversion methods, complements of numbers, r 's, $r - 1$'s compliment of signed numbers, problem solving. 4-bit codes, BCD, excess-3, gray code.

Logic operations: Basic Logic gates- NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR gates, standard SOP and standard POS.

Unit-II

Minimization of switching functions: Boolean theorems, Minimization of logic functions using theorems, K – map up to 6-variables, Minimization using Quine Mccluskey method

UNIT-III

Combinational Circuits: Design of half adder, full adder, half sub tractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, BCD adder, excess – 3 adder, carry look – a – head adder. Design of decoder, encoder, multiplexer, de-multiplexer, priority encoder, comparators

UNIT-IV

Sequential logic circuits: Classification of sequential circuits, flip-flops with truth tables and excitation tables. Conversion of flip-flops. Design of ripple counters, synchronous counters, Johnson and ring counters. Design of buffer register, control buffer register, shift register, bi – directional shift register and universal shift register.

UNIT-V

Introduction to Operational Amplifier: Block diagram of Typical Op–Amp With Various Stages– BJT Differential Amplifier With RE DC Analysis– AC Analysis – inverting, non inverting, virtual ground, Adders, subtractors, summing amplifier, voltage follower, op-amp parameters, voltage to current convertor , integrator, differentiator, differential amplifier, Logarithmic amplifier.

Text Books

1. Anandkumar. A 8th printing (second edition) – January 2015.
2. Digital design – Moris Mano, PHI, 2/e.
3. OP–AMPS and liner integrator circuits by Ramakanth A Gayakwad (PHI).
4. Linear Integrated Circuits by D.Roy chowdary, New age international.
5. Op–amp and linear integrated circuits by sanjay sharma, S.K.Kataria & son's New Delhi.

6. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005

Reference Books

1. Switching and Finite automata theory – ZviKohavi, Tata Mcgraw – Hill, 1978,2/e.
2. Fundamentals of Logic Design – Charles H.RothJr, Jaico Publishers.
3. Micro Electronics– Milliman Mc Graw Hill.
4. Linear Integrated circuits by S.Salivahan, TMH.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓	✓										
C02	✓		✓									
C03	✓				✓							
C04	✓				✓			✓				

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	Power System Dynamics & Control				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power System Analysis		3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about:

1. The kinds of power stability problems & The basic concepts of modelling and analysis of dynamical systems.
2. Modelling of power system components - generators, transmission lines, excitation and prime mover controllers.
3. Stability of single machine and multi-machine systems is analyzed using digital simulation and small-signal analysis techniques.
4. The impact of stability problems on power system planning and operation.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Understand the power stability problems
C02:	Understand the basic concepts of modelling of synchronous machine and power system components
C03:	Analyse the stability issues in interconnected systems
C04:	Understand the power system stability analysis tools and enhancement of power system stability

Unit – I:

Introduction to Power System Stability: Power System Operation and Control - Stability Problems faced by Power Systems - Impact on Power System Operation and Control - Analysis of

Dynamical Systems - Concept of Equilibria, Small and Large Disturbance Stability - Example: Single Machine Infinite Bus System - Modal Analysis of Linear Systems - Analysis using Numerical Integration Techniques - Issues in Modelling: Slow and Fast Transients, Stiff Systems

Unit – II:

Modelling of a Synchronous Machine: Physical Characteristics - Rotor Position Dependent model - D-Q Transformation - Model with Standard Parameters - Steady State Analysis of Synchronous Machine - Short Circuit Transient Analysis of a Synchronous Machine - Synchronous Machine Connected to Infinite Bus.

Unit – III:

Modelling of power system components: Physical Characteristics and Models - Control system components - Excitation System Controllers - Prime Mover Control Systems - Transmission Line Physical Characteristics - Transmission Line Modelling - Load Models - induction machine model - Other Subsystems - HVDC, protection systems.

Unit – IV:

Stability Issues in Interconnected Power Systems: Single Machine Infinite Bus System - Multi-machine Systems - Stability of Relative Motion - Frequency Stability: Centre of Inertia Motion - Concept of Load Sharing: Governors - Single Machine Load Bus System: Voltage Stability - Torsional Oscillations

Unit – V:

Enhancing System Stability: Planning Measures - Stabilizing Controllers (Power System Stabilizers) - Operational Measures- Preventive Control - Emergency Control - Power System Stability Analysis Tools: Small Signal Analysis Program - Transient Stability Program - Real-Time Simulators.

Text Books:

1. K.R.Padiyar, Power System Dynamics, Stability & Control, 2nd Edition, B.S. Publications, Hyderabad, 2002.
2. P.Kundur, Power System Stability and Control, McGraw Hill Inc, New York, 1995.

Reference Books

1. P.Sauer&M.A.Pai, Power System Dynamics & Stability, Prentice Hall, 1997.
2. Jan Machowski, JanuszBialek, James Richard Bumby, Power system dynamics and control , John Wiley & Sons, 1997.

Web-Resources:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	SPECIAL ELECTRICAL MACHINES				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic Knowledge on Electrical Machines		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn about the principle of Operation of different types of Special Electrical Machines
2. To learn about the theory of torque production in brushless DC motor
3. To know about the features of electric motors for traction application
4. To learn about the control aspect of special electrical machines

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Explain theory of operation and control of switched reluctance motor
C02:	Explain the performance and control of stepper motors, and their applications
C03:	Describe the operation and characteristics of permanent magnet dc motor
C04:	Understand operation and characteristic of brush less dc motor.

UNIT I

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

UNIT II

Switched Reluctance Motor: Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

UNIT III

Permanent Magnet DC Motors: Construction – Principle of working – Torque equation and equivalent circuits – Performance characteristics – Moving coil motors.

UNIT IV

Permanent Magnet Brushless DC (BLDC) Motor: Construction – Principle of operation – Theory of brushless DC motor as variable speed synchronous motor – sensor based and Sensor less control of BLDC motors

UNIT V

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

Text Books:

1. Special Electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.
2. Brush less Permanent magnet and Reluctance Motor Drives, Clarendon press, T.J.E. Miller, 1989, Oxford.
3. Special Electrical Machines, E.G. Janardhanan, PHI learning private limited, 2014.

Reference Books:

1. Fractional and Sub fractional HP electric motors- Cyril G. Veinott - TMH International 1987

CO-PO Mapping:

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	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	ADVANCED CONTROL SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Knowledge on Optimal controls in systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To understand energy efficiency, scope, conservation and technologies.
2. To design energy efficient lighting systems.
3. To estimate/calculate power factor of systems and propose suitable compensation Techniques.
4. To understand energy conservation in HVAC systems.

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	State space representation of control system and formulation of different state models are reviewed.
C02:	Design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
C03:	Analyses of nonlinear system using the describing function technique and phase plane analysis.
CO4:	Analyze the stability analysis using liapunov method

Syllabus

UNIT – I

State space analysis: State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form.

UNIT – II

Controllability, observability and design of pole placement: Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controlled and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

UNIT – III

Describing function analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase-plane analysis.

Stability analysis: Stability in the sense of Liapunov – Liapunov stability and Liapunov instability theorems – Direct method of Liapunov for the linear and nonlinear continuous time autonomous systems.

UNIT-IV

Calculus of variations: Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangian equation.

UNIT –V

Optimal control: Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Liapunov method) – Optimal regulator design by continuous time algebraic riccati equation (CARE) - Optimal controller design using LQG framework

Text Books:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2ndedition, 1995

Reference Books:

1. Energy management by W.R. Murphy & G. McKay Butter worth, Elsevier publications.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition.
4. Energy management hand book by W.C.Turner, John wiley and sons.
5. Energy management and conservation –k v Sharma and pvenkatasessaiah-I K International Publishing House pvt.ltd,2011.

Web-Resources:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓										
C02		✓										
C03			✓									
C04			✓					✓				

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	ADVANCED POWER CONVERSION SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn the principles of power conversion using converters& energy conversion with electric drives
2. To learn about the principles of energy conversion from renewable energy sources
3. To know the power conversion techniques in electric vehicles
4. To learn about the applications of electrical energy

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Understands the basics in the electric power conversion using power switching devices
C02:	Evaluate the conversion for range of renewable energy sources with the help of available electrical machines drives
C03:	Analyzes the different energy storage systems
C04:	Identify the various Industrial and domestic applications

Syllabus:

UNIT-I

Power Devices and Converters: Characteristics of Voltage controlled devices, principles of power conversion using Converters and Inverters.

UNIT II

Performance of Electric Drives: Energy conversion with DC, AC and Special machine drives

UNIT III

Energy Conversion from Renewable Energy Sources: Construction and working principles of solar panels, Solar Tracking system, energy conversion from wind and other renewable energy sources, grid interconnected systems.

UNIT IV

Electric Vehicles: Energy storage in different types of batteries, Super capacitors, pumped storage systems, fly-wheels and electric vehicles applications

UNIT V

Electrical Energy Applications: Induction heating: melting, hardening, lighting applications and their control, UPS, battery chargers.

Reference Books:

1. M.H. Rashid: Power electronics-circuits, Devices and applications, Prentice Hall India, New Delhi,2009
2. P.S. Bhimbra: Power electronics, Khanna publishers, New Delhi,2012
3. Ned Mohan, Undeland and Robbin: Power electronics converters, applications and design, John Willey & Sons, Inc. NewYork,2006.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '0' : No Correlafion)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5 th Semester)			
Course Code	Micro Electro Mechanical Systems (Open Elective-II)				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s):	Engineering Physics, Basic Electrical & Electronics Engineering.	3	0	0	3

Course Objectives:

- To understand the operation of major classes of MEMS sensors and actuators.
- To familiarize with the principles and concepts related to the micro electro mechanical systems.
- To learn the required properties of a material used for fabrication of micro systems.
- To learn the fundamentals of standard micro fabrication techniques and processes.
- To understand the unique demands, environments and applications of MEMS devices.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the working principles of micro-sensors and actuators.
CO2:	Explain the application of scaling laws in the design of micro systems.
CO3:	Identify the typical materials used for fabrication of micro systems.
CO4:	Discuss the principles of standard micro fabrication techniques.
CO5:	Analyze various micro electro mechanical systems and their construction.

Syllabus

UNIT – I

INTRODUCTION: Definition of MEMS, MEMS history and development – micro machining – lithography principles & methods, photolithography – structural and sacrificial materials, thin film deposition – impurity doping – etching – surface micro machining – wafer bonding – LIGA.

MICRO MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation, beam and cantilever, capacitive sensors, piezo-electric sensors and actuators – measurement of strain, pressure and flow, pressure measurement by micro phone – MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT – II

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, – thermistors, thermo devices – thermo couple, micro machined thermo couple probe – Peltier effect heat pumps – thermal flow sensors – micro hot plate gas sensors – MEMS thermo vessels – pyro-electricity – shape memory alloys (SMA), – U-shaped horizontal and vertical electro thermal actuator – thermally activated MEMS relay – micro spring thermal actuator – data storage cantilever.

UNIT – III

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology – properties of light – light modulators, beam splitter, micro lens, micro mirrors – digital micro mirror device (DMD) – light detectors – grating light valve (GLV) – optical switch, wave guide and tuning, shear stress measurement.

UNIT – IV

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties – magnetic sensing and detection – magneto resistive sensor, hall effect – magneto diodes, magneto transistor – MEMS magnetic sensor – pressure sensor utilizing MOKE – mag MEMS actuators – bi directional micro actuator – feedback circuit integrated magnetic actuator – large force reluctance actuator – magnetic probe based storage device.

UNIT – V

MICRO FLUIDIC SYSTEMS: Applications – considerations on micro scale fluid – fluid actuation methods, Dielectrophoresis (DEP), Electro wetting, Electro thermal flow, thermo capillary effect, electro osmosis flow, Opto-electro wetting (OEW) – tuning using micro fluidics – typical micro fluidic channel, – microfluid dispenser – micro needle – molecular gate – micro pumps.

CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle – membrane-transducer materials – chem.-lab-on-a-chip (CLOC) – chemoresistors, chemocapacitors, chemotransistors – electronic nose (E-nose) – mass sensitive chemosensors – fluorescence detection – calorimetric spectroscopy.

Text Books:

1. MEMS, Nitaigour Premch and Mahalik, TMH Publishers, 1st Edition, 2008.
2. Foundation of MEMS, Chang Liu, Prentice Hall Ltd., 2009.

References:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd., 2009.
2. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers, 2002.
3. Introductory MEMS, TM Adams, R A Layton, Springer International Publishers, 2007
4. Fundamentals of Micro fabrication, Marc Madou, CRC press 2002.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 semester)			
Course Code 19150605e	INFORMATION SECURITY Open Elective				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):	Basic Concepts of Computer Science and Security Systems	3	0	0	3

Course Objective(s):

- Confidentiality, integrity, and availability and these are the three main objectives of information security
- Principal concepts, major issues, technologies, and basic approaches in information security.
- Foundation for understanding the key issues associated with protecting Computer Systems & Information Assets.

Course Outcome(s):

After successful completion of this course, a student will be able to-

CO-1: Evaluate vulnerability of an information system and establish a plan for risk management.

CO-2: Demonstrate basic principles of Web application security

CO-3: Evaluate the authentication and encryption needs of an information system.

CO-4: Demonstrate how to secure a network and Evaluate a company's security policies and procedures

UNIT-1

INTRODUCTION TO INFORMATION SECURITY: Introduction to Information Security, Need for Security - Threats to security & Attacks, Computer System Security and Access Controls - System access and data access.

UNIT-2

COMMUNICATION SECURITY: Introduction to cryptography, cryptosystems, Encryption & Decryption Techniques - classical encryption techniques, communication channel used in cryptographic system, various types of ciphers, Cryptanalysis, Hash function and Data integrity, Security of Hashing function.

UNIT-3

NETWORK: Introduction to Network Security, Email Security, IP Security, Web Security, Kerberos, X.509 techniques.

UNIT-4

SCANNING & ENUMERATION TECHNOLOGY: Malicious software's, Firewalls, Honey pots, Intrusion Detection system, Intrusion Prevention system

UNIT-5

ETHICS IN INFORMATION SECURITY: Implementing Information Security, Legal Ethical & Professional issues in Information Security.

Text Books

1. Matt Bishop, "Computer Security: Art and Science", Addison-Wesley Professional, First Edition, 2003. ISBN: 0201440997.
2. William Stallings, "Cryptography and Network Security", Pearson Education, Fourth Edition, 2006. ISBN: 8177587749

Reference Books

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security" Cengage Learning, Fourth Edition, 2010, ISBN: 1111138214
2. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network security: private communication in a public world", Second Edition, ISBN: 0130460192.
3. Dieter Gollmann, "Computer Security", Third Edition, ISBN: 0470741155.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	2	-	-	-	-	-	-	-	-
CO2	1	-	-	-	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	3	-	-	-	-	-	-	-

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code	DIGITAL IMAGE PROCESSING (Open Elective-II)				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Knowledge of Signals and Systems, Digital Signal Processing		3	-	-	3

Course Objectives:

1. To understand the fundamental concepts and applications of Image Processing.
2. To understand the concepts of Intensity Transformations and Spatial Filtering.
3. To understand Image Restoration and Reconstruction.
4. To understand the concepts of Color image processing.

On Completion of the course, students will be able to	
CO1:	Understand the fundamental steps in digital image processing.
CO2:	Examine various types of images, intensity transformations and spatial filtering.
CO3:	Develop Fourier transform for image processing in frequency domain.
CO4:	Evaluate the methodologies for image restoration and segmentation.
CO5:	Understand color image processing models

UNIT-1 Digital Image Fundamentals

Fundamental steps in DIP, Components of digital image processing, Elements of visual perception, Structure of the human eye, Image formation in the eye, Brightness adaptation and discrimination, Image sensing and acquisition, Sampling and quantization of images, Representation of digital image, Spatial and gray level resolution, zooming and shrinking, some basic relationships between pixels.

UNIT-2 Image Enhancement in the Spatial Domain

Gray Level Transformations, Piecewise linear transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters, Use of first order and second order derivative in enhancement.

UNIT-3 Image Enhancement in the Frequency Domain

Two-dimensional Fourier Transform, some properties of the 2-D Discrete Fourier transform,

correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.

UNIT-4 Image Restoration

A model of the image Degradation/Restoration process, Noise models, Restoration in the presence of noise only - Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear Position Invariant Degradations, Estimation of the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering.

UNIT-5 Color Image Processing

Color Fundamentals, Color Models, Pseudo color Image Processing.

Text Books:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.

Reference Books:

1. B. Chanda and D. Dutta Majumdar, "Digital Image Processing and Analysis" PHI, 2003.
2. R. C. Gonzalez, R. E. Woods and Steven L. Eddins, Digital Image Processing Using MATLAB, 2nd edition, Prentice Hall, 2009.
3. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill Education, 2011.

Web Links:

1. NPTEL online courses.
2. MOOCS online courses by JNTUK.

CO-PO Mapping:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) ' ': No Correlation

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 semester)			
Course Code 19110661	SOLID WASTE MANAGEMENT (OPEN ELECTIVE-II)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Basics of Waste and Environmental Engineering		3	0	0	3

Course Objective:

- To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste.*
- To acquire the principles of treatment of municipal solid waste*
- To know the impact of solid waste on the health of the living beings*
- To learn the criterion for selection of landfill and its design*
- To plan the methods of processing such as composting the municipal organic waste.*

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the Objects of Solid waste management
CO2	Understand the elements of Solid waste management
CO3	Design the Transportation facility in Solid waste management
CO4	Characterise the solid waste and design a composting facility
CO5	Know the criteria for selection of landfill

Syllabus:

Unit – I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

Unit – II

Basic Elements in Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste
Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

Unit – III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

Separation and Transformation of Solid Waste: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

Unit – IV

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

Unit – V

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text Books:

1. George Tchobanoglous “Integrated Solid Waste Management”, McGraw Hill Publication, 1993.

References:

1. Vesilind, P.A., Worrell, W., Reinhart, D. “Solid Waste Engineering”, Cenage learning, New Delhi, 2004
2. Charles A. Wentz; “Hazardous Waste Management”, McGraw Hill Publication, 1995.

Web-Resources: www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	2	-	-	-	-	-	-	-	-



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code	HYBRID AND ELECTRIC VEHICLES (Open Elective-II)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering, Automotive Engines		3	0	0	3

COURSE OBJECTIVES

1. Analyzing various aspects of hybrid and electric drive trains such as their configuration, types of electric machines that can be used, energy storage devices, etc.
2. Get exposed to research and development challenges involved in various types of fuel cells.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Operate of fuel cell technology
CO2:	Identification of fuel based vehicles
CO3:	Determination of hybrid electric technology and electronic drive trains
CO4:	Construction of hybrid electric vehicles
CO5:	Construction of hybrid vehicle technology

Syllabus:

UNIT I

ELECTRIC DRIVETRAINS: Basic concept of electric traction, introduction to various electric drive-train topologies. Electric Propulsion unit: Introduction to electric components used in electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives.

UNIT II

HYBRID ELECTRIC TECHNOLOGY: Impact of modern drive-trains on energy supplies. Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III

HYBRID VEHICLE TECHNOLOGY: Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, supporting subsystems. Energy

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Management Strategies in hybrid and electric vehicles, Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

UNIT IV

HYBRID ELECTRIC VEHICLES: Principles of Hybrid Electric Drive trains, Architectures – Electrical distribution, Hybrid control Strategies – Parallel Hybrid, Series Hybrid - Practical Models – Toyota Prius, Honda Insight. Heavy Vehicles Hybrid Electric Heavy Duty Vehicles.

UNIT V

FUELCELL TECHNOLOGY : Structures, Operations and properties of Fuel cells – (Phosphoric Acid Fuel cell, Proton Exchange membrane Fuel cell, Direct Methanol fuel cell Alkaline Fuel Cells, Solid Oxide Fuel Cell, Molten Carbonate Fuel Cell)

FUEL CELL BASED VEHICLES STRUCTURE: PEMFC: Operating principle, DMFC: Operating principle

TEXT BOOKS

1. Basu .S, "*Recent Trends in Fuel cell Science and Technology*", Anamaya Publishers, New Delhi.,2007.
2. Viswanathan, B. and AuliceScibioh, M., "*Fuel Cells Principles and Applications*", Universities Press (India) Pvt. Ltd., Hyderabad, 2006.

REFERENCES

1. Larminie, J. and Dicks, A., "*Fuel Cell Systems Explained*" John Wiley & Sons, Ltd., New York, 2001.
2. Ali Emadi, MehrdadEhsani, John M. Muller, "*Vehicular Electric Power Systems*", Marcel Dekker, Inc., 2004.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	1	1	-	1	-	-	-	-	-	-
CO2	-	1	1	2	-	1	-	-	-	-	-	-
CO3	-	1	1	1	-	1	1	-	-	-	-	-
CO4	-	1	1	1	-	1	-	-	-	-	-	-
CO5	-	1	1	-	-	1	1	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5 th Semester)			
Course Code	Disaster Management in Mining (Open Elective-2)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To elaborate the concepts of hazard and disaster.
2. To impart the knowledge on classification of hazards and their consequences.
3. To discuss the approaches and measures in disaster management.
4. To elaborate different disaster management techniques.
5. To impart the knowledge on disaster management in India.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Comprehend the concepts of hazard and disaster management.
CO2:	Assess the types of hazards and their consequences.
CO3:	Comprehend the approaches and measures in disaster management.
CO4:	Distinguish various techniques in disaster management.
CO5:	Comprehend the statutory provisions related to disaster management in India.

Syllabus

UNIT I

Concept of Hazards and Disasters

Concept of environmental hazards, environmental disasters; Different approaches & relation with human ecology – landscape, ecosystem and perception approach, human ecology & its application in geographical researches; Natural hazards and disasters – Man induced hazards & disasters - Natural hazards- Planetary hazards/ disasters- Endogenous hazards - Exogenous hazards.

UNIT II

Classification of Hazards

Volcanoes- volcanic hazards/disasters, causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions; Earthquake Hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception & mitigation of earthquakes; Landslides- causes and impacts; Avalanches-causes and impacts; Infrequent events: Cyclones – Lightning – Hailstorms,

cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms-causes, distribution human adjustment, perception & mitigation; Floods, droughts and their impacts.

UNIT III

Approaches and Measures in Disaster Management

Emerging approaches; Pre- disaster stage-preparedness, emergency stage, post disaster stage-Rehabilitation provision of immediate relief measures to disaster affected people; Prediction of hazards & disasters; Measures of adjustment to natural hazards.

UNIT IV

Disaster Management

Meteorological observatory; Seismological observatory; Hydrology laboratory; Industrial safety inspectorate; Institution of urban & regional planners; Chambers of architects; Engineering council; National standards committee; Integrated planning- Contingency management; Preparedness - Education on disasters; Community involvement; Adjustment of human population to natural hazards & disasters; Role of media monitoring management- Discuss the programme of disaster research & mitigation of disaster by different organizations.

UNIT V

Disaster Management in India

Ecological planning for sustainability & sustainable development in India; Sustainable rural development: A remedy to disasters; Role of panchayats in disaster mitigations; Environmental policies & programmes in India; Institutions & National centers for natural disaster reduction, NDMA, NDRF; Environmental Legislations in India, awareness, conservation movement, education & training; Recent disaster that occurred in India.

Text books

1. Jagbirsingh, *Disaster management - Future challenges and opportunities*, I.K. International publishing house, 1st edition, 2005.
2. Coppala P Damon, *Introduction to International Disaster management*, ABD publishers, 2007.

Reference Books

1. R. B. Singh, *Environmental Geography*, Heritage Publishers, New Delhi, 1st edition, 1990.
2. Kates, B.I & White. G.F, *The Environment as Hazards*, Oxford publishers, 5th edition, New York, 1978.
3. R.B. Singh, *Disaster Management*, Rawat Publication, New Delhi, 1st edition, 2000.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	CONTROL SYSTEMS LAB				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisite(s): Control Systems		0	0	3	1.5

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn about the modeling of dynamical systems and characteristics of control components.
2. To Formulate different types of analysis in frequency domain to explain the nature of stability of the system
3. To know about Lag and Lead Compensators
4. To learn about the Routh Hurwitz Criterion, Nyquist plot and Bode plots

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
C02:	Determine time response specifications of second order systems and to determine error constants
C03:	Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method
C04:	Analyze the stability of LTI systems using frequency response methods

All the experiments are to be done compulsorily

1. Time response of Second order system
2. Lag compensation – Magnitude and phase plot
3. Lead compensation – Magnitude and phase plot
4. Potentiometer as an error detector
5. To study the Characteristics of magnetic amplifier-series connection
6. To study the Characteristics of magnetic amplifier-parallel connection
7. To study the Characteristics of magnetic amplifier-self saturated
8. Study of DC position control system
9. Effect of P controller on a second order system
10. Effect of PD controller on a second order system
11. Effect of PI controller on a second order system
12. Effect of PID Controller on a second order system
13. Study the Temperature controller using PID
14. Experimentally determine Transfer function of DC motor
15. To study Characteristics of DC servo motor
16. Study the effect of feedback on DC servo motor
17. To study the characteristics of AC servo motor
18. To study the characteristics of Synchros
19. Programmable logic controller – characteristics of stepper motor
20. Frequency response of second order system

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	DIGITAL ELECTRONICS LAB				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisite(s): Digital Electronics		0	0	3	1.5

Course Objectives:

The objectives of the course are to make the student learn about

1. Design Adder and subtractor using logic gates.
2. Design multiplexer and demultiplexer using logic gates.
3. Design of Synchronous counter
4. Apply IC's to different applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Design Adder and subtractor using logic gates.
C02:	Simplify Boolean expression using NAND-NAND and NOR-NOR realization.
C03:	Design multiplexer and demultiplexer using logic gates.
C04:	Apply IC's to different applications.

The following experiments are required to be conducted as compulsory experiments:

1. Verification of Logic gates & Universal gates.
2. Implementation of Boolean laws and theorems.
3. Simplification & Implementation of Boolean expression using basic gates.

4. Design and implementation of Half adder & Full adder circuits
5. Design & Implementation of subtractor circuit.
6. Simplify & Implementation of Boolean expression using NAND-NAND realization.
7. Simplify & Implementation of Boolean expression using NOR-NOR realization.
8. Design & Implementation of Excess-3 code converter using logic gates.
9. Design & Implementation of binary to gray code converter using gates.
10. Design & Implementation of gray to binary code converter using gates.
11. Implementation of 1×4 multiplexer using logic gates.
12. Implementation of 4×1 De-Multiplexer using logic gates.
13. Implementation of Decoder circuits using logic gates.
14. Implementation of Encoder circuits using logic gates.
15. Implement 2-bit comparator using logic gates.
16. Design & Implement Flip-flop using logic gates.
17. Design & Implement Mod-10 counter using IC7490.
18. Design & Implement binary counter using IC7493.
19. Design & Implement Shift register using IC7495.
20. Design & Implement synchronous counter using IC's.
21. Design & Construct of Synchronous Counter

Text Books

1. Anandkumar. A 8th printing (second edition) – January 2015.
2. Digital design – Moris Mano, PHI, 2/e

Reference Books

1. Micro Electronics– MillimanMcGraw Hill.
2. Analog Electronics– L.K.Maheswari, PHI.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01	✓	✓										
C02	✓		✓									
C03	✓				✓							
C04	✓				✓			✓				

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	CONSTITUTION OF INDIA				
Teaching	Total contact hours - 32	L	T	P	C
Prerequisite(s):		2	0	0	0

Cou
rse
Obj
ecti
ves:
The
obje

ctives of the course are to make the student learn about

1. To Enable the student to understand the importance of constitution
2. To understand the structure of executive, legislature and judiciary & philosophy of fundamental rights and duties
3. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
4. To understand the central and state relation financial and administrative.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Understand historical background of the constitution making and its importance for building a democratic India
C02:	Understand the functioning of three wings of the government ie., executive, legislative and judiciary & the value of the fundamental rights and duties for becoming good citizen of India
C03:	Analyze the decentralization of power between central, state and local self-government
C04:	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

Syllabus

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissioner at State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01						✓						
C02						✓						
C03						✓						
C04						✓						

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	MINI PROJECT –I/ STUDY PROJECT/ INTERNSHIP				
Teaching		L	T	P	C
Prerequisite(s):		0	0	0	2

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th semester)			
Course Code	COMMUNITYSERVICE ORIENTED PROJECT				
Teaching		L	T	P	C
Prerequisite(s):		0	0	1	0.5

The following are examples for students to do community service oriented projects

- Deliver demonstrations on energy conservation to schools, PTA, service clubs, etc.
- Offer to do home surveys to advise on weatherproofing and energy conservation.
- Present science demonstrations in elementary schools.
- Tutor younger kids who have trouble in science
- Mentor young children to introduce them to computers.
- Make wooden holiday gifts for needy children etc

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	UTILIZATION OF ELECTRICAL ENERGY				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To Understanding of selection of drives for industrial application.
2. To Understanding the heating and welding methods for industrial applications.
3. To Understanding of the concepts of Electrolysis processes and illumination engineering.
4. To Understanding of electric traction system and drives.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Identify most appropriate heating or welding techniques for suitable applications
C02:	understand various level of luminosity produced by different illuminating sources
C03:	Identify a suitable motor for electric drives and industrial applications
C04:	Identify the various types of Industrial loads

UNIT – I

Electric Heating: Advantages and methods of electric heating–Resistance heating, induction heating and dielectric heating.

Electric Welding: Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

UNIT – II

Illumination Fundamentals: Introduction, terms used in illumination–Laws of illumination–Polar curves– Integrating sphere–Lux meter–Sources of light

Various Illumination Methods: Discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting.

UNIT – III

Selection of Motors: Choice of motor, type of electric drives, starting and running characteristics– Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

UNIT – IV

Electric Traction – I: System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves.

UNIT – V

Electric Traction – II: 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– Principles of energy efficient motors.

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	POWER SEMICONDUCTOR DRIVES				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Electronics, Electrical Machines- I & II		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. Understanding of power semiconductor drives operations, modes, characteristics.
2. Understanding How to control machines using power semiconductor drives.
3. Understanding to differentiate the classical and newly developed control methods.
4. Understanding motoring and braking operation.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Know the fundamentals of electric drive and different electric braking methods
C02:	Analyse the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
C03:	Know the converter control of dc motors in various quadrants
C04:	Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters

UNIT-I

Fundamentals of Electric Drives: Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.

UNIT-II

Three Phase Converter Controlled DC Motor Drives: Revision of speed control techniques – Separately excited and series motors controlled by full converters – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Numerical problems – Four quadrant operation using dual converters.

UNIT-III

DC-DC converters Controlled DC Motor Drives: Single quadrant – Two quadrant and four quadrant chopper fed separately excited and series excited motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operations – Closed loop operation (Block diagram only).

UNIT-IV

Control of Induction Motor Drives : Stator side: Variable voltage characteristics–Control of Induction Motor by AC Voltage Controllers – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by voltage source inverter – PWM control – Closed loop operation of induction motor drives (Block Diagram Only).

Rotor side: Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages – Applications.

UNIT-V

Control of Synchronous Motor Drives: Separate control & Self-control of synchronous motor Drives – Operation of self-controlled synchronous motor by VSI– Closed Loop control operation of synchronous motor drives (Block Diagram Only) –Variable frequency control–Pulse width modulation

Text Books

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications
2. Power Semiconductor Drives, by S.B. Dewan, G.R.Slemon, A.Straughen, Wiley-India Edition.

Reference Books

1. Electric Motors and Drives Fundamentals, Types and Applications, by Austin Hughes and Bill Drury, Newnes.
2. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.
3. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	DIGITAL CONTROL SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Control Systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. Knowledge about principles and techniques of A/D and D/A conversions and basics of Z-transform
2. Knowledge in stability analysis of digital control systems
3. Knowledge about the design of digital control systems for different engineering model

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	learn the advantages of discrete time control systems and the “know how” of various associated accessories
C02:	understand z-transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems).
C03:	learn stability criterion for digital systems and methods adopted for testing
C04:	understand the conventional and state space methods of design

UNIT – I:

Introduction and signal processing: Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

UNIT–II:

z-transformations: z-Transforms – Theorems – Finding inverse z-transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

UNIT–III:

State space analysis and the concepts of Controllability and observability : State space representation of discrete time systems – State transition matrix and methods of evaluation – Discretization of continuous – Time state equations – Concepts of controllability and observability – Tests(without proof).

UNIT – IV:

Stability analysis: Mapping between the s-Plane and the z-Plane – Primary strips and Complementary strips – Stability criterion – Modified Routh's stability criterion and Jury's stability test.

UNIT – V:

Design of discrete-time control systems by conventional methods: Transient and steady state specifications – Design using frequency response in the w-plane for lag and lead compensators – Root locus technique in the z-plane. State feedback controllers: Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

Text Book:

1. Discrete-Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition.
2. Digital Control and State Variable Methods by M.Gopal, TMH, 4th Edition.

Reference Books:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	SOLAR ENERGY SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Renewable Energy systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn the basic terms of solar energy
2. To learn the design of solar collector plates
3. To learn about solar heating and cooling systems
4. To learn PV applications

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Understand various terms in solar energy
C02:	Design solar collector plates
C03:	Understand solar heating and cooling systems and solar energy storage techniques
C04:	Analyze the PV system applications and know the government support for solar energy

Unit I:

Introduction: Solar angles, day length, angle of incidence on tilted surface, Sunpath diagrams, Shadow determination, Extraterrestrial characteristics, Effect of earth atmosphere, Measurement & estimation on horizontal and tilted surfaces

Flat-plate Collectors - Effective energy losses; Thermal analysis; Heat capacity effect; Testing methods; Evacuated tubular collectors; Air flat-plate Collectors: types; Thermal analysis; Thermal drying.

Unit II:

Concentrating Collector Designs: Classification, design and performance parameters, Tracking systems, Compound parabolic concentrators, Parabolic trough concentrators, Concentrators with point focus, Heliostats, Comparison of various designs: Central receiver systems, parabolic trough systems, Solar power plant, Solar furnaces

Unit III:

Solar Heating & Cooling System : Liquid based solar heating system, Natural, forced and gravity flow, mathematical modeling, Vapor absorption refrigeration cycle, Water, ammonia & lithium bromide-water absorption refrigeration systems, Solar operated refrigeration systems, Solar desiccant cooling, Solar Thermal Energy Storage - Sensible storage, Latent heat storage, Thermo-chemical storage.

Unit IV:

Solar Cell Physics: P-N junction: homo and hetero junctions, Metal-semiconductor interface, Dark and illumination characteristics, Figure of merits of solar cell, Efficiency limits, Variation of efficiency with band-gap and temperature, Efficiency measurements, High efficiency cells, Tandem structure

.

Unit V:

SPV Applications: Centralized and decentralized SPV systems; Stand alone, hybrid and, grid connected system, System installation, operation and maintenances; Field experience; PV market analysis and economics of SPV systems – Government Schemes and Policies

References:

1. Garg H P., Prakash J., Solar Energy: Fundamentals & Applications, Tata McGraw Hill, New Delhi, 1997
2. S P Sukhatme, Solar Energy, Tata McGraw Hill, 2008
3. J F Kreider and Frank Kreith, Solar Energy Handbook, McGraw Hill, 2000
4. D Y Goswami, Frank Kreith and J F Kreider, Principles of Solar Engineering, Taylor & Francis, 1998
5. Tiwari G.N., Suneja S., Solar Thermal Engineering System, Narosa Publishing House, New Delhi, 1997.
6. Alan L Fahrenbruch and Richard H Bube , Fundamentals of Solar Cells: PV Solar Energy Conversion, Academic Press, New York , 1983
7. Larry D Partain (ed.), Solar Cells and their Applications, John Wiley and Sons, Inc, New York, 1995
8. Richard H Bube, Photovoltaic Materials, Imperial College Press, 1998 H S Rauschenbach, Solar Cell Array Design Handbook, Van Nostrand Reinhold Company, New York, 1980.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code 19150701	HUMAN COMPUTER INTERACTION (OPEN ELECTIVE)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Fundamentals of Programming		3	0	0	3

Course Objective(s):

- How to design and evaluate interactive technologies.

Course Outcome(s):

After successful completion of this course, a student will be able to-

- CO-1:** Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- CO-2:** Describe typical human-computer interaction (HCI) models, styles, and various historic HCI paradigms.
- CO-3:** Apply an interactive design process and universal design principles to designing HCI systems.

UNIT-1

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing **Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

UNIT-2

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT-3

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in **Computing Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

UNIT-4

Balancing Function and Fashion: Introduction, Error Messages, Non-anthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

UNIT-5

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces

Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Text books

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design, 2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books

1. Human Computer, Interaction Dan R.Olsan, Cengage, 2010
2. Designing the user interface. 4/e, Ben Shneidermann, PEA.
3. User Interface Design, SorenLauesen , PEA
4. 4.Interaction Design PRECE, ROGERS, SHARPS, Wiley.

Web Links:

<https://nptel.ac.in/courses/106/103/106103115/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	2	-	-	-	-	-	1	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th Semester)			
Course Code	DATA COMMUNICATION (Open Elective)				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites Electronic Devices & Circuits, Switching Theory and Logic, Electronic Circuit Analysis.		3	-	-	3

Course Objectives:

1. To comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
2. To explain the basics of data communication and various types of computer networks.
3. To illustrate TCP/IP protocol suite and switching criteria.
4. To demonstrate Medium Access Control protocols for reliable and noisy channels.
5. To expose wireless and wired LANs along with IP version.

On Completion of the course, students will be able to	
CO1:	Understand and explain Data Communications System and its components.
CO2:	Enumerate the layers of the OSI model and TCP/IP and explain function(s) of each layer.
CO3:	Apply error detection and correction techniques to determine the error rate.
CO4:	Identify the different types of network topologies and protocols.
CO5:	Familiarity with the basic wireless networks, and how they can be used to assist in network design and implementation.

Unit-I

Introduction: Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

Signals, Noise, Modulation, And Demodulation: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and *M*-ary Encoding, Digital Modulation.

Unit-II

Metallic Cable Transmission Media: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves

Optical Fiber Transmission Media: Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber

Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

Unit-III

Digital Transmission: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to- Quantization Noise Voltage Ratio, PCM Line Speed, PCM and Differential PCM.

Data Communications Codes, Error Control and Data Formats: Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization

Unit-IV

Wireless Communications Systems: Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Unit-V

Telephone Instruments and Signals: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

Cellular Telephone Systems: First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, 5th Edition, Tata McGraw-Hill, 2013.
2. Data and Computer Communication - William Stallings, 8th Edition, Pearson Education, 2007.

Reference Books:

1. Communication Networks - Fundamental Concepts and Key architectures, Alberto Leon-Garcia and Indra Widjaja, 2nd Edition, Tata McGraw-Hill, 2004.
2. Computer Networks – A Systems Approach, Larry L. Peterson and Bruce S. Davie, 4th Edition, Elsevier, 2007.
3. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007.

CO-PO Mapping:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) ' ': No Correlation

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
CourseCode 19116761	GLOBAL ENVIRONMENT PROBLEMS & POLICIES (OPEN ELECTIVE III)				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s): Basics of Environmental science		3	0	0	3

Course Objectives:

- To study the explain the scientific basis of the global environmental issues.*
- To discuss social, psychological, economic and political issues surrounding each of the global environmental issues.*
- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.*
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.*
- Appreciate the concern of environmental agreement.*

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	To Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
CO2	To Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO3	To Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	To know environmental laws and grasp the concept of environmental legislation and its application in international environmental agreement.
CO5	To appreciate the concern of environmental agreement.

Syllabus:

Unit – I

Unit-I: Environmental problems and protection:

Environmental pollution and its consequences – Air pollution, water pollution, land pollution, nuclear pollution, Ozone depletions – Urbanization and its impacts on environment – Deforestation and its impacts on environment – Ways of protecting, Management of Environment, Preserving and Restoring of environment.

Unit – II

India and Environmental Issues and Policies:

Environmental Awareness – Environmental problems of India - Environmental ethics - Nature conservation education movement – Social forestry scheme. Conservation of biodiversity :Meanings and need conservation of natural resources – soil, forest, water and wildlife In-situ conservation -National parks and sanctuaries – Biosphere Reserves –Man and Biosphere programme (MAP) –Ex –situ conservation, in –situ conservation, IUCN Red list categories, hot spots

Unit – III

Human population and environment:

Population growth, Indian population situations population explosion – family welfare programme – Environment and Human health.-Factors affecting environment-Acid rain, green house effect-Extinction

of species-soil erosion and energy crisis.

Unit – IV

International Efforts for Environmental Protection:

The Stockholm conference 1972 – Brundtland commission 1983 – Nairobi conference 1982 – The Rio Summit 1992 – the Rio Declaration at the earth charter – Major achievement of the Rio Summit – Main features of the Rio Declaration – Kyoto conference and part on Global Warming 1997 – present developments.

Unit – V

Environmental laws in India:

Environmental Legislation, Acts, Rules, Notifications and Amendments. International Environmental Agreements. Role of mass media and technology in developing awareness about environmental problems and its prevention; Role of NGO's and Government organization in developing Environmental education. Environmental Movements and Developments: Environmental movements in India: Silent Valley movement, Chipko movement, Narmada Bachao, Andolan, National Test Range at Balipal, Orissa. - Conditions for achieving the goals of sustainable development Strategies for sustainable development in India.

Text books:

1. Agarwal s.k. (1997). Environmental Issues themes New Delhi: APH Publishing Corporation.
2. C.E.E (1994) Essential Learning in Environmental Education. Ahmadabad. C.E.E. Publication
3. Garg, B. & Tiwana. (1995) Environmental Pollution and Protection, Deep & Deep publication, New Delhi.

References:

1. Karpagam M. (1991) Environmental Economics – A text book. New Delhi. Sterling Publishers.
2. Kelu.P (2000) Environmental Education – A conceptual Analysis Calicut: Calicut University
3. Nanda V.K. Environmental Education, New Delhi: Anmol Publications PVT LTD.

Web references:

1. <http://www.bdu.ac.in/cde/docs/ebooks/B-d/II/ENVIRONMENTAL%20EDUCATION.pdf>
2. https://www.terisas.ac.in/uploads/1551863268_980872_NRE%20155.pdf
3. <http://moef.gov.in/>

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-	-



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code	MODERN VEHICLE TECHNOLOGY Open Elective – III				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		3	0	0	3

Course Objectives:

1. To make the student to design and develop modern vehicles
2. To make the student to analyze and control the exhaust emissions and noise
3. To make the student to analyze the vehicle operation and incorporate and develop the electronic control systems
4. To make the student to distinguish and choose the fuel injection system

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Design and develop modern vehicles
CO2:	Analyze and control the exhaust emissions and noise
CO3:	Analyze the vehicle operation and incorporate and develop the electronic control systems
CO4:	Distinguish and choose the fuel injection system
CO5:	Classify the design analysis of injection systems

Syllabus:

UNIT-I

Trends in Automotive Power Plants: Hybrid Vehicles - Stratified charged / lean burn engines -Hydrogen Engines-Electric vehicles-Magnetic track vehicles solar powered vehicle Combined power source vehicle, types of hybrid drives, Toyota hybrid system.

UNIT-II

Suspension: Interconnected air and liquid suspensions, Hydrolastic suspension system, Hydra gas suspension.

Braking systems and safety: Modern rear wheel brake, indirect floating caliper disc brake, self energizing disc brake, brake limiting device, anti-slide system, Ford Escort and Orion anti lock system. Closed loop suspension; Regenerative braking; Passenger comfort.



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UNIT-III

Emission and Noise Pollution Control: Introduction, Engine emissions, types of catalytic conversion, open loop and closed loop operation to the oxidizing catalytic converter, Evaporative emissions, Internal and External Noise, Identification of Noise sources, Noise Control Techniques. SCR, DPF and DOC.

UNIT-IV

Vehicle Operation and Control: Fundamentals of Automotive Electronics - sensors, actuators, Processors, Computer Control for pollution, noise and for fuel economy - Electronic Fuel Injection and Ignition system.

UNIT-V

Fuel Injection Systems: SPFI, MPFI, DI, Pilot Injection, Unit Injection. CRDI; Two Wheeler Technology: DTS- i, DTS - Fi, DTS - Si; Four Wheeler Technology: WT, Cam less Engine, GDI.

TEXT BOOKS:

1. Crouse/Anglin "Automotive Mechanics"
2. K.Newton, W.Steeds "The Motor Vehicle"

REFERENCES

1. K.K. Ramalingam, "Automobile Engineering", Scitech Publications Pvt. Ltd., 2005
2. Dr. N.K. Giri, "Automobile Mechanic", Khanna Publishers, 2006
3. Heinz Heisler "Advanced Vehicle Technology" ELSEVIER

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	-	2	-	-	-	1	1	1	-
CO2	1	1	1	-	3	-	-	-	-	-	-	-
CO3	1	1	2	-	1	1	-	-	-	-	-	-
CO4	1	1	1	-	1	-	-	-	-	-	-	-
CO5	1	2	2	1	1	-	-	-	-		1	-



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UNIT-III

Control Systems: Steering geometry-camber, castor, king pin rake, combined angle toe-in, center point steering, types of steering mechanism-Ackerman steering mechanism, steering gears-types, steering linkages. Mechanical, hydraulic, pneumatic & vacuum brakes-brief description, anti lock brake system (ABS) and electromagnetic retarder. Telescopic suspension, Rigid axle suspension and independent suspension, Shock absorbers, Torsion bar, Stabilizer, Different types of springs used in automobile suspension.

UNIT-IV

Auxiliary Systems: Electrical and electronic systems, voltage regulators, bendix drive mechanism solenoid switch, lighting system, horn, wiper, fuel gauge, Heating, Ventilation, and Air Conditioning (HVAC) systems, Vehicle Thermal Management System and Vehicle body design features, Tipping Systems(lifting).

UNIT-V

Vehicle Safety Systems & Eco Friendly Systems and Vehicles: Safety: Introduction to safety systems, seat belt, air bags, bumper, wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

Different pollutants, formation, Effects of pollution on environment, human. Regulations, Emission standards, Pollution control methods. Electric Vehicles and Hybrid Vehicles.

TEXT BOOKS:

1. Automotive Mechanics, William H Crouse and Donald L Anglin, Tata McGraw - Hill Publishing Co. Ltd. 2004, 10th Edition.
2. Automobile Engineering - R.B. Gupta.
3. Automobile Engineering (Vol. 1&2) - Dr. Kirpal Singh

REFERENCES:

1. Automobile Engineering --- G.B.S. Narang.
2. IC Engines - V.Ganeshan/TMH
3. BP Obert IC Engines & Air Pollution - Harper & Row pub.
4. Bosch Gasoline Engines Management - Bosch Pub.
5. Bosch Diesel Engine Management - Bosch Pub.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	1	-	-	1	1	1	-
CO2	3	2	1	-	-	1	-	-	-	-	-	-
CO3	3	2	-	-	-	1	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	2	-	1	1
CO5	3	2	-	1	-	-	3	-	-	-	1	-



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 th semester)			
Course Code	BASIC AUTOMOBILE ENGINEERING Open Elective – I				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

To make the student able to

1. Understand working of different automobile structures and layouts.
2. Recognize different types of automobile engines and different components in it.
3. Identify different transmission elements and control systems.
4. Distinguish the functions of auxiliary systems.
5. Analyze different types of safety systems.
6. Judge effective pollution reduction methods.

Course Outcomes:

On completion of the course, the students will be able to-	
C01:	Compare different types of automobiles and their components.
C02:	Differentiate working principles of different types of automobile engines.
C03:	Illustrate working of different transmission elements and control systems.
C04:	Implement different types of safety systems.
C05:	Implement effective pollution reduction methods.

Syllabus:

UNIT-I

Introduction to Automobiles & Engines: Functions and characteristics of different types of automobiles and their power sources. Specifications, Performance Parameters, Quality standards, Trends in automobile design. Engine Specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc. Reciprocating Engines, Rotary Engines.

Engine Lubrication systems, splash and pressure lubrication systems, oil filters, oil pumps, Engine cooling system, Engine fuel systems, Engine intake & exhaust systems.

UNIT-II

Transmission Systems: Clutches, principle of operations, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel-gear boxes, types, sliding mesh, constant mesh, synchro- mesh gear boxes, over drive, torque converter, propeller shaft, Torque tube drive, universal joint & slip joint, Hotch-kiss drive, differential rear axles-types-wheels and tyres.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6 th Semester)			
Course Code	Remote Sensing & GIS in Mining (Open Elective-3)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Basic computer knowledge and Basic physics, Mine surveying		3	0	0	3

Course Objectives

1. To discuss the basic principles of Remote Sensing.
2. To elaborate the concepts of visual and digital image analysis.
3. To illustrate the concepts of GIS.
4. To impart the knowledge on the concept of spatial analysis.
5. To communicate the applications of remote sensing and GIS.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the basic principles of Remote Sensing.
CO2:	Develop the concepts of visual and digital image analysis.
CO3:	Summarize the basic concepts of GIS.
CO4:	Perform spatial analysis.
CO5:	Apply knowledge of remote sensing and GIS in various fields.

Syllabus

UNIT -I

Introduction to remote sensing

Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere; energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms

Introduction, types of sensors; airborne remote sensing, space borne remote sensing; image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential; IRS, LANDSAT, SPOT, Advanced sensors and its applications.

UNIT -II

Image analysis

Introduction, elements of visual interpretations, digital image processing- image pre-processing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT -III

Geographic Information System

Introduction, key components, application areas of GIS, map projections.

Data entry and preparation

Spatial data input, raster data models, vector data models.

UNIT -IV

Spatial data analysis

Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT -V

Applications of Remote sensing and GIS

Land cover and land use pattern, forestry, geology, geomorphology and mining operations.

Text books

1. Bhatta B, Remote sensing and GIS, Oxford University Press, 2008.
2. Narayan LRA, Remote Sensing and its Applications, Universities Press, 2012.

Reference Books

1. Lilles and, T.M, R.W. Kiefer and J.W. Chipman, *Remote Sensing and Image Interpretation*, Wiley India Pvt. Ltd., New Delhi, 2013.
2. Chor Pang Lo and A K W Yeung, *Concepts and Techniques of Geographical Information System*, Prentice Hall (India), 2006.
3. Kand Tsung Chang, *Introduction to Geographic Information Systems*, McGraw Hill Higher Education, 2009.
4. George Joseph, *Fundamentals of Remote Sensing*, Universities Press, 2013.
5. Demers, M.N, *Fundamentals of Geographic Information Systems*, Wiley India Pvt. Ltd, 2013.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	POWER ELECTRONICS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Electronic devices & circuits		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To understand and acquire knowledge about various power semiconductor devices
2. To prepare the students to analyze and design different power converter circuits.
3. Understand, simulate and design single-phase and three-phase thyristor converter
4. Learn basic magnetic concepts, analyze transformer-isolated switch-mode power supplies and design high-frequency inductors and transform

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Demonstrate the characteristics of various power semiconductor devices
C02:	Analyse different electrical parameters of single phase AC-DC converters and semi converters for different loads and to evaluate the converters performance.
C03:	Analyse different electrical parameters of three phase AC-DC converters, 3-phase controlled rectifiers, DC-DC converters for different loads and to evaluate the converters performance.
C04:	Understand the working of AC-AC voltage regulators, inverters and application of PWM techniques for voltage and harmonic mitigation.

UNIT-I:

Power Semi-Conductor Devices: Thyristors– static characteristics of Silicon controlled rectifiers (SCR's) and TRIAC Turn on and turn off Methods–Dynamic characteristics of SCR– Snubber circuit design– Basic requirements of Gating circuits for SCR – series and parallel operation of SCR Characteristics of power MOSFET and Power IGBT– Basic theory of operation of SCR– Static characteristics- gate driving circuits.

UNIT-II:

AC-DC Single-Phase Converters: 1-phase half wave controlled rectifiers – R - load and RL - load with and without freewheeling Diode – 1-phase full wave controlled rectifiers – center tapped configuration and bridge Configuration- R - load and RL - load with and without freewheeling diode – continuous and Discontinuous conduction – single phase semi converter– Effect of source inductance in 1-phase fully controlled bridge Rectifier with continuous conduction.

UNIT-III:

AC-DC 3-Phase Converters and AC-AC voltage regulators : 3-phase half wave and Full wave uncontrolled rectifier – 3-phase half wave controlled Rectifier with R and RL - load – 3-phase fully controlled rectifier with R and RL - load – 3-phase Semi controlled rectifier with R and RL - load- 1-phase AC-AC regulator - phase angle control and integrated cycle control with R and RL - load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R - load only

UNIT-IV:

DC-DC Converters: Analysis of Buck, boost, buck-boost converters in Continuous Conduction Mode (CCM) and Discontinuous conduction Modes (DCM) – Output voltage equations using volt-sec balance in CCM & DCM, output voltage ripple & inductor current, ripple for CCM only – Principle of operation of forward and fly back converters in CCM.

UNIT – V:

DC-AC Converters: 1- Phase half-bridge and full bridge inverters with R and RL - loads – 3-phase

square wave Inverters – 120° conduction and 180° conduction modes of operation – PWM inverters – Quasi-square wave pulse width modulation – Sinusoidal pulse width modulation – Prevention of shoot through fault in Voltage Source Inverter (VSI) – Current Source Inverter (CSI) – Introduction to Auto Sequential Commutated Current Source Inverter (ASCCSI).

Text Books

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: converters, applications & design -by Ned Mohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
3. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

Reference Books

1. Power Electronics – Devices, Converters and Applications”, by Vedam Subramanyam Revised 2nd edition, New Age Publications
2. Power electronics By M D Singh and K B Khanchandani by TMH publication 2 edition.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	MICROPROCESSORS & MICRO CONTROLLERS AND APPLICATIONS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Switching theory and logic design		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To develop an in-depth understanding of the operation of microprocessor
2. To develop an in-depth understanding of the operation of microcontrollers,
3. To understand machine language programming
4. To understand interfacing techniques

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Do assembly language programming.
C02:	Do interfacing design of peripherals like I/O, A/D, D/A, timer etc.
C03:	Develop systems using different microcontrollers
C04:	learn hardware and software interaction and integration

UNIT-I

Introduction to Microprocessor Architecture

Introduction and evolution of Microprocessors– Architecture of 8086– Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286– 80386 and 80486 and Pentium.

UNIT-II

Minimum and Maximum Mode Operations

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086

Control signal interfacing–Read and write cycle timing diagrams Assembly Directives–Macro's

UNIT-III

I/O Interface

Static memory interfacing with 8086– 8255 PPI– Architecture of 8255–Modes of operation–

Interfacing I/O devices to 8086 using 8255- Stepper motor interfacing–DMA controller (8257)–

Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–

Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller

(8279)– Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

UNIT-IV

Introduction to 8051 Micro Controller

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication. Addressing modes and

Instruction set of 8051

UNIT-V

Cyber physical systems and industrial applications of 8051

Applications of Micro Controllers– Interfacing 8051 to LED's–Push button– Relay's and Latch

Connections– Keyboard Interfacing– Interfacing Seven Segment Display–ADC and DAC

Interfacing

Text Books

1. Microprocessors and Interfacing, Dpouglas V Hall, Mc–Graw Hill, 2nd Edition.
2. Kenneth J Ayala, “The 8051 Micro Controller Architecture, Programming and Applications”, Thomson Publishers, 2nd Edition.
3. Ray and Burchandi, “Advanced Micro Processors and Interfacing”, Tata McGraw–Hill.

Reference Books

1. R.S. Kaler, “ A Text book of Microprocessors and Micro Controllers”, I.K. International Publishing House Pvt. Ltd.
2. Ajay V. Deshmukh, “Microcontrollers – Theory and Applications”, Tata McGraw–Hill Companies –2005.
3. Ajit Pal, “Microcontrollers – Principles and Applications”, PHI Learning Pvt Ltd, 2011.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	SWITCHGEAR & PROTECTION				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Systems- I		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To understand the need of protection of electric equipment and their protection schemes
2. To understand operations & characteristics of various electromagnetic and static relays.
3. To understand the operations of various types of circuit breakers and their ratings
4. To understand the unit protection and over voltage protection of different apparatus in power system

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF ₆ gas type.
C02:	to understand the working principle and constructional features of different types of electromagnetic protective relays
C03:	Knowledge of faults that is observed to occur in high power generator and transformers and protective schemes used for all protections.
C04:	Understand about static relays and various types of protective schemes used for feeders and bus bar protection

UNIT-I

Circuit Breakers: Elementary principles of arc interruption– Restrike Voltage and Recovery voltages– Restrike phenomenon– Average and Max. RRRV– Current chopping and Resistance switching– Miniature Circuit Breaker(MCB)– Introduction to oil circuit breakers– Description and operation of AirBlast, Vacuum and SF6 circuit breakers– CB ratings and specifications– Auto reclosing

UNIT-II

Electromagnetic Protection: Principle of operation and construction of attracted armature– Balanced beam– induction disc and induction cup relays– Relays classification– Instantaneous– DMT and IDMT types– Applications of relays: Over current/under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

UNIT-III

Generator Protection: Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

Transformer Protection: Protection of transformers: Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

UNIT-IV

Feeder and Bus bar Protection: Over current– Carrier current and three zone distance relay using impedance relays–Translay relay–Protection of bus bars– Differential protection.

Static and Digital Relays: Static relay components– Static over current relay– Static distance relay– Micro processor based digital relays.

UNIT-V

Protection against over voltage and grounding: Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lightning arresters– Insulation coordination– BIL– impulse ratio– Standard impulse test wave– volt~time characteristics– Grounded and ungrounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

Text Books

1. Protection and SwitchGear by BhaveshBhalja, R.P. Maheshwari, NileshG. Chothani, Oxford University Press, 2013
2. Power system protection- Static Relays with microprocessor applications. by T.S. Madhava Rao, TMH
3. Electrical Power System Protection by C. CHRISTOPOULOS and A. Wright, Springer publications

Reference Books

1. Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, TMH Publications.
2. Fundamentals of Power System Protection by Paithankar and S.R. Bhide, PHI, 2003.
3. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓									✓		
C02											✓	
C03		✓										
C04			✓	✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	POWER SYSTEM ANALYSIS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic Knowledge On Mathematics, Electric Circuit Theory		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. Solve power flow problems by application of the Newton method
2. Represent elements of a power system including generators, transmission lines, and transformers.
3. Understand the functioning of a synchronous machine and represent it with simple models.
4. Generate the elements of the impedance matrix from the elements of the admittance matrix without a matrix inversion.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Draw an impedance diagram and SLD for a power system network and form a Y_{bus} matrix for a power system network with or without mutual couplings.
C02:	find out the load flow solution of a power system network using different types of load flow methods.
C03:	formulate the Zbus for a power system network.
C04:	find out the fault currents for all types faults with a view to provide data for the design of protective devices

UNIT –I:

Graph Theory Concepts: Per Unit Quantities–Single line diagram– Impedance diagram of a power system–Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y–bus matrix by singular transformation and direct inspection methods.

UNIT –II:

Power Flow Studies : Necessity of power flow studies – Derivation of static power flow equations – Power flow solution methods: Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach – Numerical Problems (3–bus system only.)

UNIT –III:

Z–Bus formulation: Formation of Z–Bus: Partial network– Algorithms for the Modification of Z_{bus} Matrix under addition of link and branch (Derivations and Numerical Problems).– Modification of Z–Bus for the changes in network (Problems).

UNIT – IV:

Symmetrical Fault Analysis: Transients on a Transmission line-Short circuit of synchronous machine(on no-load) - 3– Phase short circuit currents and reactances of synchronous machine– Short circuit MVA calculations -Series reactors – selection of reactors.

Symmetrical Components & Unsymmetrical Fault analysis

Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances – Synchronous generator – Transmission line and transformers – Sequence networks –Various types of faults LG– LL– LLG on unloaded alternator–unsymmetrical faults on power system.

UNIT – V:

Power System Stability Analysis: Elementary concepts of Steady state, Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance–Synchronizing Power Coefficient – Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion Methods to improve steady state and transient stability.

11.11.2020

Text Books

1. Electrical Power Systems by P.S.R.Murthy, B.S.Publications
2. Modern Power system Analysis – by I.J.Nagrath&D.P.Kothari: Tata McGraw–Hill Publishing Company, 2nd edition.
3. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J. Overbye – CengageLearning publications.

Reference Books

1. Power System Analysis by B.R.Gupta, Wheeler Publications.
2. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
3. Power System Analysis by HadiSaadat – TMH Edition.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04			✓	✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	MICROPROCESSORS & MICRO CONTROLLERS AND APPLICATIONS LAB				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisite(s): MPMC		0	0	3	1.5

Course Objectives:

The objectives of the course are to make the student learn about

1. To Study the Architecture of 8085 & 8086 microprocessor.
2. To Learn the design aspects of I/O and Memory Interfacing circuits
3. Study the Architecture of 8051 microcontroller
4. To Understand the concepts related to I/O and memory interfacing

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Do assembly language programming.
C02:	Do interfacing design of peripherals like I/O, A/D, D/A, timer etc.
C03:	Develop systems using different microcontrollers
C04:	learn hardware and software interaction and integration

All the experiments are to be done compulsorily

1. Unsigned arithmetic operation
2. Arithmetic operation – Multi byte addition and subtraction
3. ASCII – Arithmetic operation
4. Multiplication and division – Signed
5. Logic operations – Shift and rotate
6. Converting packed BCD to unpacked BCD, BCD to ASCII conversion

7. By using string operation and Instruction prefix: Move block, Reverse string, Length of the string, String comparison
8. String manipulations: Sorting
9. String manipulations: Inserting and Deleting
10. Dos/BIOS programming: Reading keyboard (Buffered with and without echo)
11. Interfacing 8255–PPI
12. Programs using special instructions like swap, bit/byte, set/reset etc
13. Programs based on short, page, absolute addressing
14. Interfacing 8259 – Interrupt Controller
15. Interfacing 8279 – Keyboard Display
16. Stepper motor control using 8253/8255
17. Reading and Writing on a parallel port
18. Timer in different modes
19. Serial communication implementation.
20. Understanding three memory areas of 00 – FF (Programs using above areas). Using external interrupts

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	POWER ELECTRONICS LAB				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisite(s): Power Electronics		0	0	3	1.5

Course Objectives:

The objectives of the course are to make the student learn about

1. To make the students to design triggering circuits of SCR
2. To introduce power electronics components from which the characteristics of SCR, TRIAC, IGBT and MOSFET are obtained.
3. To perform the experiments on various converters
4. To perform commutation techniques

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	know the characteristics of various power electronic devices and analyze firing circuit and commutation circuits of SCR
C02:	analyze the performance of single-phase and three-phase full-wave bridge converters, single-phase dual converter with both resistive and inductive loads
C03:	Understand the operation of AC voltage controller and cyclo converter with resistive and inductive loads.
C04:	Understand the working of Buck converter, Boost converter, single-phase bridge inverter and PWM inverter.

All the experiments are to be done compulsorily

1. Experimental study of input output Characteristics of SCR,
2. Experimental study of input output Characteristics of MOSFET
3. Experimental study of input output Characteristics of IGBT
4. Experimental study of different types of Gate firing circuits for SCR's- half wave triggering
5. Experimental study of different types of Gate firing circuits for SCR's- full wave triggering
6. Experimental study of different types of Gate firing circuits for SCR's-UJT
7. Experimental study of Single -Phase Half controlled converter with RL load
8. Experimental study of Single -Phase Half controlled converter with RL load
9. Experimental study of Single -Phase fully controlled bridge converter with R load
10. Experimental study of Single -Phase fully controlled bridge converter with RL load
11. Experimental study of Single -Phase AC Voltage Controller with R load
12. Experimental study of Single -Phase AC Voltage Controller with RL load
13. Experimental study of Single -Phase Cyclo-converter with R and RL loads
14. Experimental study of Single -Phase Bridge Inverter with R and RL Loads
15. Experimental study of Single -Phase dual converter with RL loads
16. Experimental study of Three -Phase half controlled bridge converter with RL load.
17. Experimental study of Three- Phase full converter with RL-load.
18. Experimental study of DC-DC buck converter.
19. Experimental study of DC-DC boost converter.
20. Experimental study of Single -phase PWM inverter.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I OR II Sem			
Course Code	SOFT SKILLS				
Teaching	Total contact hours -39	L	T	P	C
Prerequisite(s): Learner should be equipped with Functional Grammatical skills and interactive ability		-	-	3	1.5

Course Objective: This course aims

- To achieve proficiency in formal English usage
- To improve both written and spoken communication in connection with professional needs
- To make them industry ready in terms of grooming, speaking in in-formal occasions

Course Outcomes

On Completion of the course, the students will be able to-	
C01:	Understand the necessity to improve four language skills
C02:	Acquire knowledge about public speaking ability
C03:	Strengthen their grammatical skills in the language
C04:	Improve necessary vocabulary and academic writing skills
C05:	Improve academic writing skills

Syllabus:

Unit-1

Technical Communication: Report writing: Importance, structure, drafting of reports, Types of reports-formal-informal reports-Business Writing: Sales letters, notices, agenda and minutes of the meeting-Information Transfer

Unit-2

Communication Practice -Debating and Role Playing-Meaning-Do's and don'ts-Voice modulation-fluency-Keep it short and sweet-formal discussions-summarizing techniques- Group discussion-do's and don'ts -JAM sessions

Unit-3

Grammar In Use-Tense and aspect-Verb patterns-usage of progressive tense- Types and kinds of sentences -Question tags-Usage of Auxiliaries- Common errors

Unit-4

Vocabulary Building-Affixes- synonyms and antonyms-Phrasal verbs-Homonyms-Eponyms-Idioms-verbal Analogies-one word substitutes-Collocations

Unit-5

(a)Occupational competency- Interview skills- self introduction-performance management planning-strategic planning-Negotiation techniques-visual communication- - delegation-filling personal information-C.V.preparation-Mock Interviews

(b) LSRW Skills-Selected lessons from UNLOCK-2 published by Cambridge University Press, mobile etiquette, table manners, dressing style

Prescribed Text Books: UNLOCK SERIES from Cambridge University Press

Unlock Book-2: Reading and Writing

Listening and Speaking

Web references: <https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

CO-PO Mapping:

(1: Slight [Low];

2: Moderate [Medium];

3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	-	-	-	-	2	3	2	-	-	-	-
C02	-	-	-	-	-	3	3	3	-	-	-	1
C03	-	-	-	-	-	2	3	3	-	-	-	-
C04	-	-	-	-	--	3	3	3	-	-	-	1
C05	-	-	-	-	-	2	2	2	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	ELECTRICAL DISTRIBUTION SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	TRANSIENTS POWER SYSTEMS II	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn the basic concepts in distribution systems
2. To learn the design of substations and feeders
3. To learn the calculations of voltage drop in distribution lines
4. To learn the operation of various protective and coordinating equipment

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Understand the various factors of distribution system.
C02:	Design the substation and feeders.
C03:	Determine the voltage drop and power loss.
CO4	Understand the operation of various protective and coordinating equipment

Syllabus:

UNIT-I: General Concepts

Introduction to distribution systems, Load modeling and characteristics – Coincidence factor – Contribution factor loss factor – Relationship between the load factor and loss factor – Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT-II: Substations

Location of substations: Rating of distribution substation – Service area within primary feeders – Benefits derived through optimal location of substations.

Distribution Feeders: Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system. (CO2)

UNIT-III: System Analysis

Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines – Manual methods of solution for radial networks – Three phase balanced primary lines.

UNIT-IV: Protection

Objectives of distribution system protection – Types of common faults and procedure for fault calculations – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionalizers and circuit breakers.

Coordination: Coordination of protective devices: General coordination procedure, fuse-fuse, recloser-fuse, circuit breaker-fuse, circuit breaker-recloser, recloser-recloser

UNIT-V: Compensation for Power Factor Improvement

Capacitive compensation for power-factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location.

Voltage Control: Equipment for voltage control – Effect of series capacitors– Effect of AVB/AVR – Line drop compensation.

Text Books:

1. “Electric Power Distribution system, Engineering” – by Turan Gonen, McGraw–hill Book Company.

Reference Books:

1. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo, CRC press.
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing Company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V. Kamaraju, Right Publishers.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], 4 : No Correlation)

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	ADVANCED POWER ELECTRONIC CONVERTERS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Electronics		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn about the multi-level inverters.
2. To learn about the choppers.
3. To learn about the switched mode rectifiers.
4. To learn about the boost converters and resonant converters.

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Analyze and design Load Commutated CSI and PWM CSI.
C02:	Demonstrate the working of series Inverters.
C03:	Recommend the Switched Mode Rectifiers and APFC for any application.
C04:	Explain the resonant mode converters and their operation and control.

Syllabus:

UNIT-I: Multi-Level Inverters

Multi-Level Inverters of Diode Clamped Type and Flying Capacitor Type and suitable modulation strategies - Multi-level inverters of Cascade Type Special Inverter Topologies - Current Source Inverter, Ideal Single Phase CSI operation, analysis and waveforms - Analysis of Single Phase Capacitor Commutated CSI, Series Inverters, Analysis of Series Inverters, Modified Series Inverter, Three Phase Series Inverter.

UNIT-II: Choppers

D.C. chopper circuits, Type-A, B, C, D and E configurations, Analysis of Type-A chopper with R-L load, Voltage and current commutated Choppers, AC Choppers, Application of AC and DC choppers.

UNIT-III: Switched Mode Rectifiers

Operation of Single/Three Phase bilateral Bridges in Rectifier Mode. Control Principles, Control of the DC Side Voltage, Voltage Control Loop, The inner Current Control Loop. Single phase and three phases boost type APFC and control, three phase utility interfaces and control.

UNIT-IV: Boost Converters

Single Phase and 3 Phase Boost type APFC - DCM, BCM, CCM design and control strategies, Single Phase and 3 Phase bidirectional converters in rectifier mode - control of DC voltage - control of Input Current. Hysteresis control in Single Phase and 3 Phase - Frequency control in hysteresis, Constant switching frequency control methods.

UNIT-V: Resonant Converters

Introduction to Resonant Converters, Classification of Resonant Converters, Basic Resonant Circuit Concepts, Load Resonant Converter. Resonant Switch Converter, Zero Voltage Switching Clamped Voltage Topologies, Resonant DC Link Inverters with Zero Voltage Switching, High Frequency Link Integral Half Cycle Converter, Resonant converters for induction heating.

Text Books:

1. Ned Mohan "Power electronics: converters, applications, and design" John Wiley and Sons, 2006.
2. Bin Wu , "High-Power Converters And Ac Drives", IEEE Press, A John Wiley & Sons, Inc., Publication
3. Rashid "Power Electronics" Prentice Hall India 2007.
4. G.K.Dubey "Thyristorised Power Controllers" Wiley Eastern Ltd., 2005, 06.

Reference Books:

1. Dewan & Straughen "Power Semiconductor Circuits" John Wiley & Sons., 1975.
2. G.K. Dubey & C.R. Kasaravada "Power Electronics & Drives" Tata McGraw Hill., 1993.
3. IETE Press Book Power Electronics Tata McGraw Hill, 2003.
4. Cyril W Lander "Power Electronics" McGraw Hill., 2005
5. B. K Bose "Modern Power Electronics and AC Drives" Pearson Education (Asia)., 2007
6. Abraham I Pressman "Switching Power Supply Design" McGraw Hill Publishing Company. 2001.
7. Daniel M Mitchell "DC-DC Switching Regulator Analysis" McGraw Hill Publishing Company.- 1988.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], 4 : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	P011	P012
C01	✓											
C02			✓									
C03					✓							
C04					✓							

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	MODERN CONTROL THEORY				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Control Systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To explain the concepts of basic and modern control system for the real time analysis and design of control systems.
2. To explain and apply concepts of state variables analysis.
3. To study and analyze non linear systems.
4. To analyze the concept of stability of nonlinear systems and categorization.

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Understand the concepts of state variable analysis.
C02:	Apply the knowledge of basic and modern control system for the real time analysis and design of control systems.
C03:	Analyze the concept of stability of nonlinear systems and optimal control
C04	To understand and analyze non linear systems.

Syllabus:

UNIT-I: Mathematical Preliminaries

Fields, Vectors and Vector Spaces – Linear combinations and Bases – Linear Transformations and Matrices – Scalar Product and Norms – Eigen-values, Eigen Vectors and a Canonical form representation of Linear operators – The concept of state – State Equations for Dynamic systems – Time invariance and Linearity – Non-uniqueness of state model – State diagrams for Continuous-Time State models.

UNIT-II: State Variable Analysis

Linear Continuous time models for Physical systems– Existence and Uniqueness of Solutions to Continuous-Time State Equations – Solutions of Linear Time Invariant Continuous-Time State Equations – State transition matrix and its properties. General concept of controllability – General concept of Observability – Controllability tests for Continuous-Time Invariant Systems – Observability tests for Continuous-Time Invariant Systems – Controllability and Observability of State Model in Jordan Canonical form – Controllability and Observability Canonical forms of State model.

UNIT-III: Non Linear Systems

Introduction – Non Linear Systems – Types of Non-Linearities – Saturation – Dead-Zone – Backlash – Jump Phenomenon etc;– Singular Points – Introduction to Linearization of nonlinear systems, Properties of Non-Linear systems – Describing function–describing function analysis of nonlinear systems – Stability analysis of Non-Linear systems through describing functions. Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT-IV: Stability Analysis

Stability in the sense of Lyapunov, Lyapunov's stability, and Lyapunov's instability theorems – Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method Generation of Lyapunov functions – Variable gradient method – Krasovskii's method. State feedback controller design through Pole Assignment – State observers: Full order and Reduced order.

UNIT-V: Optimal Control

Introduction to optimal control – Formulation of optimal control problems – calculus of variations – fundamental concepts, functional, variation of functional – fundamental theorem of theorem of Calculus of variations – boundary conditions – constrained minimization – formulation using Hamiltonian method – Linear Quadratic regulator.

Text Books:

1. Modern Control System Theory by M. Gopal – New Age International -1984.
2. Control System Engineering, Nagrath and Gopal – New Age International – Fourth Edition

Reference Books:

1. Optimal control by Kirck, Dover Publications.
2. Advanced Control Theory A. Nagoor Kani, RBA Publications, 1999.
3. Modern Control Engineering by Ogata. K – Prentice Hall – 1997

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01	✓				✓							
C02			✓				✓					
C03									✓			
C04									✓			

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	WIND ENERGY SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): RESS		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To know the historical background of wind energy.
2. To learn the nature and characteristics of wind.
3. To learn the design of wind turbine blades.
4. To learn the design procedure of wind farms.
5. To learn various control strategies

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Know the historical aspects of wind power plants.
C02:	Understand the characteristics of wind
C03:	Able to design wind turbine blades
C04:	Able to design wind farms

Syllabus:

UNIT-I: Introduction

Historical developments, latest developments, state of art of wind energy technology, turbine rating, cost of energy, wind power plant economics, installation and operation costs, decommissioning, Indian scenario and worldwide developments, present status and future trends.

UNIT-II: Nature and Characteristics of Wind

Nature of atmospheric winds; wind resource characteristics and assessment; anemometry; wind statistics; speed frequency distribution, effect of height, wind rose, Weibull distribution, atmospheric turbulence, gust wind speed, effect of topography.

UNIT-III: Design of Wind Turbine

Design of wind turbine blade; effect of stall and blade pitch on coefficient of power VS tip speed ratio and cut-out wind speeds, blade materials, design characteristics, multiple stream tube theory, vortex wake structure; tip losses; rotational sampling, wind turbine design programs, aerodynamic loads, tower shadow, wind shear, blade coning, gyroscopic, transient and extreme loads.

UNIT-IV: Control Strategies

Pitch control, yaw control, Electrical and Mechanical aerodynamic braking, teeter mechanism. Wind turbine dynamics with DC and AC generators: induction and synchronous generators, variable speed operation, effect of wind turbulence. Power electronics Converter and Inverter interfaces for wind energy utilization system for isolated and grid connected system.

UNIT-V: Design of Wind Farms

Wind farm electrical design, planning of wind farms, special application for developing countries, maintenance and operation, wind farm management, site selection. Environmental

assessment; noise, visual impact etc. Instrumentation, data loggers, remote monitoring and control.

Text Books:

1. Paul Gipe, Wind Energy Comes of Age, John Wiley & Sons Inc.
2. Ahmed: Wind Energy Theory and Practice, PHI, Eastern Economy Edition, 2012.
3. L.L. Freris, Wind Energy Conversion System, Printice Hall

Reference Books:

1. Tony Burton et al, Wind energy Hand Book, John Wiley & Sons Inc.
2. Directory, Indian Wind Power 2004, CECL, Bhopal.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	P011	P012
C01	✓											
C02			✓									
C03					✓							
C04					✓							

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Basic knowledge on transmission systems	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To learn various types of FACTS controllers
2. To learn the operation of VSC and CSC
3. To learn about reactive power compensation methods
4. To learn combined controllers

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Learn the basics of power flow control in transmission lines by using FACTS controllers.
C02:	Explain the operation and control of voltage source converter.
C03:	Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
C04:	Learn the method of shunt compensation by using static VAR compensators.

Syllabus:

UNIT-I: Introduction to FACTS

Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high power devices – Voltage and current rating – Losses and speed of switching – Parameter trade-off devices.

UNIT-II: Voltage Source and Current Source Converters

Concept of voltage source converter (VSC) – Single phase bridge converter – Square-wave voltage harmonics for a single-phase bridge converter – Three-phase full wave bridge converter– Three-phase current source converter – Comparison of current source converter with voltage source converter.

UNIT-III: Compensation Methods

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 – Thyristor Controlled Reactor (TCR) and Thyristor Switched Reactor (TSR).

UNIT-IV: Shunt Compensators

Thyristor Switched Capacitor (TSC) – Thyristor controlled Reactor (TCR). Static VAR compensator (SVC) and Static Compensator (STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

UNIT-V: Series Compensators

Static series compensators: Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

Combined Controllers: Schematic and basic operating principles of unified power flow controller (UPFC) and Interline power flow controller (IPFC).

Text Books:

1. “Understanding FACTS” N.G. Hingorani and L. Guygi, IEEE Press. Indian Edition is available:—Standard Publications, 2001.
2. “Flexible ac transmission system (FACTS)” Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.

Reference Books:

1. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R. Mohan Mathur and Rajiv K. Varma, Wiley.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlafion)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01	✓											
C02			✓									
C03					✓							
C04					✓							

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	HIGH VOLTAGE ENGINEERING				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Power Systems-II, Switchgear & Protection	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To get a fair knowledge about the generation of high voltages and currents
2. Understand the generation and measurement of high voltages and currents.
3. Understand the concept of solid, liquid and gaseous dielectrics.
4. Gain knowledge in testing of high voltage equipments.

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Understand theory of breakdown and withstand phenomena of all types of dielectric Materials.
C02:	Acquaint with the techniques of generation of AC,DC and Impulse voltages
C03:	Know the techniques of testing various equipment's used in HV engineering.
C04:	Transient voltages and their propagation characteristics

Syllabus:

UNIT-I

Introduction to High Voltage Technology: Electric Field Stresses – Uniform and non-uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT-II

Break down phenomenon in gaseous, liquid and solid insulation: Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown – Breakdown of solid dielectrics in practice – Breakdown in composite dielectrics used in practice.

UNIT-III

Generation of High voltages and High currents: Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages – Generation of impulse currents – Tripping and control of impulse generators.

Measurement of high voltages and High currents: Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

UNIT-IV

Non-destructive testing of material and electrical apparatus: Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

UNIT-V

High voltage testing of electrical apparatus: Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

Text Books:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition.
2. High Voltage Engineering : Fundamentals by E.Kuffel, W.S. Zaengl, J. Kuffel by Elsevier, 2nd Edition.
3. High Voltage Engineering and Technology by Ryan, IET Publishers.

Reference Books:

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals(P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New.Age International (P) Limited, 1995.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04			✓					✓				

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	ADAPTIVE CONTROL SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Control Systems	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To study adaptive control system fundamentals.
2. To study about deterministic self-tuning regulators.
3. To study stochastic and predictive self-tuning regulators.
4. To understand model – reference adaptive system.

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Development adaptive control system fundamentals.
C02:	Deterministic self-tuning regulators.
C03:	Design of stochastic and predictive self-tuning regulators.
C04:	Understanding of model – reference adaptive system.

Syllabus:

UNIT-I: INTRODUCTION

Development of adaptive control problem-The role of Index performance (IP) in adaptive systems- Parametric models of dynamical systems - Adaptive Schemes- The adaptive Control Problem- Applications. Gain scheduling: The principle - Design of gain scheduling controllers- Nonlinear transformations -application of gain scheduling - Auto-tuning techniques- Methods based on Relay feedback.

UNIT-II: DETERMINISTIC SELF-TUNING REGULATORS

Pole Placement design - Indirect Self-tuning regulators - Continuous time self tuners direct self-tuning regulators – Disturbances with known characteristics.

UNIT-III: STOCHASTIC AND PREDICTIVE SELF-TUNING REGULATORS

Design of minimum variance controller - Design of moving average controller - stochastic self-tuning regulators - Unification of direct self tuning regulators - Linear Quadratic STR - Adaptive Predictive Control.

UNIT-IV: MODEL – REFERENCE ADAPTIVE SYSTEM

MIT rule – Determination of adaptation gain - Lyapunov theory –Design of MRAS using Lyapunov theory – Relations between MRAS and STR- Case Study.

UNIT-V: PROPERTIES OF ADAPTIVE SYSTEMS

Nonlinear dynamics, Analysis of Indirect discrete time self-tuners, Stability of direct discrete time algorithms, Averaging, Application of averaging techniques, averaging in stochastic systems, robust adaptive controllers.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	OPERATION OF RESTRUCTURED POWER SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Power Systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To study the need for restructuring of Power Systems, discuss different market models, different stakeholders and market power
2. To learn and generalize the functioning and planning activities of ISO.
3. To study about transmission open access pricing issues and congestion management.
4. To study ancillary services and understand reactive power as ancillary service and management through synchronous generator

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Understand the need of restructuring of power systems and to discuss different markets
C02:	Understand the transfer capability issues and methodologies
C03:	Understand the electricity pricing and forecasting
C04:	Understand the Ancillary services management

Syllabus

Unit - I

Over view of key issues in electric utilities Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal/Intra zonal Congestion

Unit - II

OASIS: Open Access Same-Time Information System Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

Unit - III

Electricity Pricing: Introduction – Electricity price volatility electricity price indexes – Challenges to electricity pricing – Construction of forward price curves – Short-time price forecasting

Unit - IV

Power system operation in competitive environment: Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a Genco.

Unit - V

Ancillary Services Management: Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.

Text Books:

1. Kankar Bhattacharya, Math H.J. Boller, Jaap E.Daalder, 'Operation of Restructured Power System' Klum,er Academic Publisher – 2001
2. Mohammad Shahidehpour, and Muwaffaq alomoush, – “Restructured electrical Power systems” Marcel Dekker, Inc. 2001
3. Loi Lei Lai; “Power system Restructuring and Deregulation”, Jhon Wiley & Sons Ltd., England
4. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH.

References:

1. Loi Lei Lai; “Power system Restructuring and Deregulation”, John Wiley & Sons Ltd., England.
2. <http://nptel.iitm.ac.in>

Web-Resources:

1. www.electrical4u.com
2. www.nptel.com

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓										
C02		✓										
C03			✓									
C04			✓					✓				

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS Common to all Branches (Open Elective)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Basic knowledge of Economics and accounts		3	-	-	3

Course Objective:

The objective of this course is

- 1.To acquaint the students regarding various accounting concepts and its application in managerial decision making.
- 2.To enable the students to analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.
- 3.To introduce prospective managers of new ventures to prepare and analyse financial statements.
- 4.To enable the students understand how organizations make important investment and financing decisions

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Analyze the scope of managerial economics
CO2	Analyze various aspects of managerial economics, production & cost analysis, markets & pricing strategies
CO3	Develop an ability to identify, formulate, and solve engineering problems by applying the subject knowledge of Managerial economics.
CO4	Apply capital budgeting, financial analysis techniques in evaluating various investment opportunities
CO5	Enhance their capabilities in the interpretation of balance sheets are followed in industries, organizations & institutes.

Syllabus:

UNIT -I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT -II

Production and Cost Analyses:

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.

UNIT -III

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features, Introduction to e-commerce – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT -IV

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle – Capital Budgeting Techniques.(simple problems)

UNIT -V

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Subsidiary books- Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

Text books:

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis',
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial

Reference Books:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand. 2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.

4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Cengage Publications, New Delhi – 2011
9. Analysis, Ravindra Publication.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' :
No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	3	-	-	-	-	-	-
CO2	-	-	-	-	2	2	-	-	1	-	-	2
CO3	-	-	2	-	2	3	3	-	-	-	-	2
CO4	-	-	3	-	-	-	-	-	3	-	-	3
CO5	-	-	3	-	3	-	-	-	3	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	ORGANISATIONAL BEHAVIOUR (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
		3	-	-	3

Course Objective:

The main objective of Organizational Behavior is to understand the human interactions in an organization, find what is driving it and influence it for getting better results in attaining business goals.

Course Outcomes:

By studying this course students are able to -	
CO1:	Understand the basic concepts in organizational behavior.
CO2:	Protect the cause and effect relationship of the people in a work place.
CO3:	Understand the group behaviour and its impact on work performance and organization.
CO4:	Understand the managerial strategies in achieving the goals of organizations.
CO5:	Improve the results- performance outcome through human behaviour and organizational behaviour can aid them in their pursuit of the goals.

UNIT-I

Focus and Purpose: Definition, need and importance of organizational behavior – Nature and scope – Frame work – Organizational behavior models.

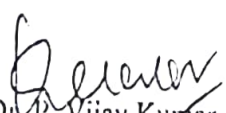
UNIT-II

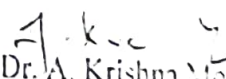
Individual Behavior: Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behavior modification. Misbehavior – Types – Management Intervention. Emotions – Emotional Labor – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

UNIT-III

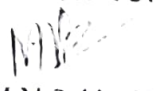
Group Behavior: Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building – Interpersonal relations – Communication – Control.

Dr. P R K Raju
(Director-DMS)


Dr. P. Vijay Kumar
(V C Nominee)


Dr. A. Krishna Mohan
(Director-SMS, JNTUK)


Dr. V V V Seshagiri Rao
(Industry Expert)


Dr. M. V. Subba Rao
(BOS Chairman)

UNIT-IV

Leadership and Power: Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

UNIT-V

Dynamics of Organizational Behavior: Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives – Organizational effectiveness.

TEXT BOOKS

1. Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCES

1. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organizational Behavior, 2nd Edition, Oxford Higher Education, 2004.
3. Mc Shane & Von Glinov, Organizational Behavior, 4th Edition, Tata Mc Graw Hill, 2007.
4. Hellrigel, Slocum and Woodman, Organizational Behavior, Cengage Learning, 11th Edition 2007.
5. Ivancevich, Konopaske & Maheson, Organizational Behavior & Management, 7th edition, Tata McGraw Hill, 2008.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	✓	-	-	-	✓	-	-	-	✓	-	✓
CO2	-	-	✓	-	-	✓	-	-	✓	-	-	✓
CO3	✓	-	✓	-	✓	✓	-	-	-	-	-	-
CO4	-	-	✓	-	-	✓	-	-	✓	-	-	✓
CO5	-	-	✓	-	✓	-	-	✓	-	-	-	✓

GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	HUMAN RESOURCE MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
		3	-	-	3

Course Objective:

To equip the students with basic concepts of Human Resource Management and the various functions of HRM including Industrial Relations in the liberalized, socialism environment.

Course Outcomes:

On Completion of the course, the students	
CO1:	Integrated perspective on role of HRM in modern business. Ability to plan human resources and implement techniques of job design
CO2:	Can conduct job analysis and scientific recruitment and selection process for the higher productivity
CO3:	Can get competency to recruit, train, and appraise the performance of employees
CO4:	Can learn rational design of compensation and salary administration
CO5:	Are able to handle employee issues and evaluate the new trends in HRM

UNIT -I

HRM: Significance - Definition and Functions - evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department -aligning HR strategy with organizational strategy - HRM -changing , global perspective challenges, environment - crosscultural problems - emerging trends in HRM.

UNIT -II

Investment perspectives of HRM: HR Planning - Demand and Supply forecasting - Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques - Training and Development - Methods and techniques- Job design , evaluation and Analysis - Management development - HRD concepts.

UNIT -III

Performance Appraisal: Importance - Methods - Traditional and Modern methods - Latest trends in performance appraisal - Career Development and Counseling- Compensation - Concepts and Principles Influencing Factors- Current Trends in Compensation- Methods of Payments in detail - Incentives rewards compensation mechanisms.

UNIT -IV

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame WorkDeterminants of Payment of Wages- Wage Differentials - Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures.

UNIT -V

Managing Industrial Relations: Trade Unions - Employee Participation Schemes- Collective Bargaining- Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms - Managing work place stress. Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. K Aswathappa: "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "Human Resource Management and Industrial Relations", Himalaya Publishing House, Mumbai.
3. Mathis, Jackson, Tripathy: "Human. Resource Management: Asouth-Asian Perspective", Cengage Learning, New Delhi, 2013.
4. Subba Rao P: "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
5. MadhurimaLall, Sakina QasimZasidi: "Human Resource Management", Excel Books, New Delhi, 2010

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	✓	-	-	-	✓	-	-	-	✓	-	✓
CO2	-	-	✓	-	✓	✓	-	-	✓	-	-	-
CO3	✓	-	✓	-	✓	✓	-	-	-	-	-	-
CO4	-	-	✓	-	-	✓	-	-	✓	-	-	✓
CO5	-	-	✓	-	✓	-	-	✓	-	-	-	✓

CRBT15	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	ENTREPRENEURSHIP SKILLS FOR ENGINEERS (Open Elective)				
Teaching	Totalcontacthours-18	L	T	P	C
		3	-	-	3

Course Objectives:

To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

Course Outcomes:

On Completion of the course, the students	
CO1:	Can know the importance of entrepreneurship in economic developments, ethics and its social responsibility
CO2:	Can understand the business plan its scope, implementation in marketing and Launching.
CO3:	Can able to know the finance resources, motivating, marketing and internet advertising.
CO4:	Can understand the problems related to selection of layout.
CO5:	Can know the production techniques, inventory and quality control in global aspects.

UNIT-I:

Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur, The Entrepreneurial decision process, Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs, Opportunities for Entrepreneurs in India and abroad, Women as Entrepreneur, Creating and Starting the Venture, Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and developmentprocess.

UNIT-II:

The Business Plan Nature and scope of Business plan, Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities.

UNIT-III:

Financing and managing the new venture, Sources of capital, venture capital, angel investment, Record keeping, recruitment, motivating and leading teams, and financial controls. Marketing and sales controls. E-commerce and Entrepreneurship, Internet advertising.

UNIT- IV:

New venture Expansion Strategies and Issues, Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits. Choosing location and layout, Issues related to Selection of layout.

UNIT V:

Production and Marketing Management Thrust of production management, Selection of production Techniques, plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing. Global aspects of Entrepreneurship.

Text Books:

2. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5th Edition
3. Dollinger: Entrepreneurship, 4/e, Pearson, 2004.

References:

1. Vasant Desai: Dynamics of Entrepreneurial Development and management, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Robert J. Calvin: Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola: The Entrepreneurial Connection, TMH, 2001.
5. Bolton & Thompson: Entrepreneurs- Talent, Temperament, Technique, Butterworth Heinemann, 2001.
6. Agarwal: Indian Economy, WishwaPrakashan 2005.
7. Dutt & Sundaram: Indian Economy. S. Chand, 2005.
8. Srivastava: Industrial Relations & Labour Laws, Vikas, 2005.
9. Aruna Kaulgud: Entrepreneurship Management by. Vikas publishing house, 2003.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High] '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	-	-	-	1	-	-	3	1	-	3
CO2	-	-	-	-	-	2	-	-	-	1	-	1
CO3	-	-	-	-	-	2	3	2	2	2	1	2
CO4	-	-	-	1	-	-	2	-	1	1	2	2
CO5	-	-	-	-	-	3	2	-	-	3	1	2

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	Principles Of Management (Open Elective)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s):	Knowledge of General Management	4	0	0	4

Course Objectives:

The course is to give a basic perspective of Management. This will form foundation to study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Management.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain the knowledge of basic concepts, tested principles emerging ideas, evolving theories and latest techniques.
CO2	Understand the importance of critical decisions that ensure growth and sustainability of the organization.
CO3	Understand theoretical aspects and its application to modern management practice
CO4	Demonstrate critical thinking when presented with managerial issues and problems
CO5	Understand the importance of Professional Management for effective utilization of resources in organizations.

UNIT I

Introduction to Management: Nature and scope of Management, Functions of Management Management as a Science, Art and Profession - Management & Administration - Principles of Management- Managerial roles: Mintzberg Model - Contributions of F.W.Taylor and Henry Fayol

UNIT II

Planning: Planning premises, types of plans and Planning process, Decision making meaning and importance- types of decision- steps in decision making. Forecasting techniques.

UNIT III

Organization: Structure, types of organizations, principles of organizing, Authority and span of control, delegation and decentralization, Line and staff relationship.

UNIT VI

Directing& Controlling: Nature and scope, Leadership- styles of Leadership; Co-ordination- types of interdependence. Controlling: Process of controlling- making controlling effective, -techniques of controlling.

UNIT – V

Contemporary issues – (Brief Study) Quality circle-Total Quality Management - Business Process Reengineering (BPR)- Six sigma.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Harold Koontz, Heinz Weihrich, A.R. Aryasri, Principles of Management, TMH, 2010.
2. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
3. Kumar, Rao, Chhaalil "Introduction to Management Science" Cengage Publications, New Delhi
4. V.S.P.Rao, Management Text and Cases, Excel, Second Edition, 2012.
5. K.Anbuvelan, Principles of Management, University Science Press, 2013.
6. K.Aswathappa " Organisational Behaviour-Text, Cases and Games", Himalaya Publishing House, New Delhi, 2008.
7. Steven L Mc Shane, Mary Ann Von Glinow, Radha R Sharma: "Organisational Behaviour", TMH Education, New Delhi, 2008

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	-	-	-	-	-	-	-	-	-	1	-
C02	-	-	2	-	-	3	-	3	-	1	-	-
C03	3	-	-	1	-	-	3	3	-	-	1	-
C04	-	-	2	-	-	3	-	-	-	-	1	-
C05	-	-	2	-	2	-	-	3	1	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B Tech. (Electrical Engineering)			
Cours. Code	Financial Management for Engineers (Open Elective)				
Teaching	Total contact hours - 8	L	T	P	C
		4	0	0	4

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	The students would be able to understand and define basic terminology used in finance and accounts
CO2:	The students would be able to prepare & appraise Financial Statements and evaluate a company in the light of different measurement systems.
CO3:	The students would be able to analyse the risk and return of alternative sources of financing.
CO4:	Estimate cash flows from a project, including operating, net working capital, and capital spending.
CO5:	To estimate the required return on projects of differing risk, to estimate the cash flows from an investment project, calculate the appropriate discount rate, and determine the value added from the project, and make a recommendation to accept or reject the project.

Unit I

Introduction to Financial Accounting, Book keeping & Recording - Meaning, Scope and importance of Financial Accounting. Financial Accounting - concepts and conventions, classification of accounts, Rules and principles governing Double Entry Book-keeping system. Meaning, Preparation of Journal, Ledger, Cash book & Trial balance. (Practical application on tally)

UNIT II

Financial Statement Preparation, analysis & Interpretation- Preparation of financial statement and Profit & Loss Account, Balance Sheet, Ratio Analysis - classification of various ratios. (Calculation on Excel)

UNIT III

Introduction To Financial Management- Concept of business finance, Goals & objectives of financial management, Sources of financing - LONG TERM: shares, debentures, term loans, lease & hire purchase, retained earnings, public deposits, bonds (Types, features & utility), SHORT TERM: bank finance, commercial paper, trade credit & bills discounting, INTERNAL: Retained earnings.

Unit-IV

Working Capital Management- Concept of working Capital, significance, types. Adequacy of working capital, Factors affecting working capital needs, Financing approaches for working capital, Methods of forecasting working capital requirements, meaning & importance of accounts receivable. (Excel based)

Unit-V

Time Value of Money & Capital Budgeting- Concept of time value of money, Compounding & discounting; Future value of single amount & annuity, present value of single amount & annuity; Practical application of time value technique. Capital budgeting - Nature and significance, techniques of capital budgeting –Pay Back Method, Accounting rate of return, Internal Rate of Return, DCF, Net Present Value and profitability index. (Application on Excel)

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Financial , Cost & Management Accounting by Dr.P.Pariyasamy, HH Publication

Suggested Readings:

1. Financial Management by Khan & Jain, Tata Mcgraw Hill
2. Financial Management by Dr. P.C.Tulsian ,S Chand.
3. Financial Management by Ravi Kishore, Taxmann

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], - : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	2	1	1	-	1	-	1	-	1	2
CO 2	2	2	2	2	1	-	2	1	1	1	-	-
CO 3	3	3	3	3	2	2	-	-	-	-	1	-
CO 4	3	3	2	1	1	1	-	-	-	-	1	2
CO 5	3	3	3	1	-	-	-	2	2	-	-	2

GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	OPERATIONS MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s):		3	-	-	3

Course Objective:

Objective: This Course is designed to make student understand the strategic significance of Operation management, to acquaint them with application of discipline to deal with real life business problem.

Course Outcomes:

On Completion of the course, the students	
CO1:	Are able to understand the basic concepts in operations and production activities.
CO2:	Can identify factors influencing plant location and plant layout.
CO3:	Can identify the production process and execute the customer order timely.
CO4:	Can manage the materials, manpower effectively by using appropriate inventory and time study techniques.
CO5:	Can improve the productivity by using effective quality control standards and techniques.

Introduction to Operation Management: Nature & Scope of Operation/ Production Management, Relationship with other functional areas, Recent trend in Operation Management, Manufacturing & Theory of Constraint, Types of Production System, Just in Time (JIT) & lean system.

UNIT -II:Product Design & Process Selection: Stages in Product Design process, Value Analysis, Facility location & Layout: Types, Characteristics, Advantages and Disadvantages, Work measurement, Job design.

UNIT- III:Forecasting & Capacity Planning: Methods of Forecasting, Overview of Operation Planning, Aggregate Production Planning, Production strategies, Capacity Requirement Planning, MRP, Scheduling, Supply Chain Management, Purchase Management, Inventory Management. Unit- IV: Productivity: Factors, Affecting Productivity – Job Design – Process Flow Charts – Methods Study – Work Measurement – Engineering and Behavioral Approaches.

UNIT -V:Quality Management: Quality- Definition, Dimension, Cost of Quality, Quality Circles-Continuous improvement (Kaizen), ISO (9000&14000 Series),
Statistical Quality Control: Variable & Attribute, Process Control, Control Charts - Acceptance Sampling Operating Characteristic Curve (AQL, LTPD, Alpha & Beta risk),
Total Quality Management (TQM).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References: 1. Krajewski&Ritzman (2004). Operation Management -Strategy and Analysis. Prentice Hall of India.
 2. PannerSelvem, Production and Operation Management, Prentice Hall of India.
 3. Chunnawals, Production & Operation Management Himalaya, Mumbai
 4. Charry, S.N (2005). Production and Operation Management- Concepts, Methods Strategy. John Willy& Sons Asia Pvt Limited.
 5. K Aswathappa& Sridhar Bhatt, Production & Operations Management, Himalaya, Mumbai.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]
 '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	-	-	-	3	-	-	-	1	-	2
CO2	-	-	3	-	2	-	-	-	1	-	1	2
CO3	-	-	2	-	1	3	2	-	-	-	3	-
CO4	2	-	3	-	-	2	-	-	1	-	-	2
CO5	3	-	2	-	3	-	-	-	-	-	-	3

Regulation RBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	DIGITAL MARKETING (Open Elective)				
Teaching	Totalcontacthours-63	L	T	P	C
		3	-	-	3

Course Objective:

The objective of this course is to understand the importance of digital marketing and its applications.

Course Outcomes:

On Completion of the course, the students	
CO1:	Would be able to learn about model approach of Marketing.
CO2:	Would be able to learn various methods and channels of digital marketing
CO3:	Would be introduced to Digital Marketing planning execution
CO4:	Get concept of SEO's is introduced for the benefit of students aspiring startups
CO5:	Can learn advertising strategies of Digital Marketing have been introduced

Syllabus:

UNIT - I:

Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

UNIT - II:

Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels.

UNIT - II:

Marketing in the Digital Era: Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

UNIT - III:

Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

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UNIT - IV:

Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

UNIT - V:

Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention.

Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Suggested Readings:

1. Michael Miller, B2B Digital Marketing, 1e, Pearson, 2014.
2. Vandana Ahuja, Digital marketing, Oxford University Press 2015
3. Michael R Solomon, Tracy Tuten, Social Media Marketing, Pearson, 1e, 2015.
4. Judy Strauss & Raymond Frost, E-Marketing, Pearson, 2016
5. Richard Gay, Alan Charles worth and Rita Esen, Online marketing – A customer led approach
6. Oxford University Press 2007.
7. Arup Varma, Pawan S. Budhwar, Angelo S. De Nisi, Digital Marketing, Wiley, 2016.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High]
'-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	-	-	-	✓	-	-	-	✓	-	✓
CO2	-	-	✓	-	✓	✓	-	-	✓	-	-	✓
CO3	-	-	✓	-	✓	✓	✓	-	-	-	-	
CO4	✓	-	✓	-	-	✓	-	-	✓	-	-	✓
CO5	✓	-	✓	-	✓	-	-	-	-	-	-	✓

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	TOTAL QUALITY MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-64	L	T	P	C
Pre-requisites/Exposure :Exposure of Supply Chain and Operations		4	0	0	4

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	To realize the importance of significance of quality.
CO2:	Manage quality improvement teams
CO3:	Identify requirements of quality improvement programs
CO4:	Develop a thinking towards Quality systems and Thinking.
CO5:	Acknowledge the strategic value of leading practices and therefore their implementation • Efficiently designing the effective performance measurement system.

OBJECTIVES: To facilitate the understanding of Quality Management principles and process.

UNIT-I

INTRODUCTION: Introduction – Need for quality – Evolution of quality – Definitions of quality – Dimensions of product and service quality – Basic concepts of TQM – TQM Framework – Contributions of Deming, Juran and Crosby – Barriers to TQM – Quality statements – Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention – Costs of quality.

UNIT-II

TQM PRINCIPLES: Leadership – Strategic quality planning, Quality Councils – Employee involvement – Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDCA cycle, 5S, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT-III

TQM TOOLS AND TECHNIQUES: The seven traditional tools of quality – New management tools – Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT-IV

TQM TOOLS AND TECHNIQUES II: Control Charts – Process Capability – Concepts of Six Sigma – Quality Function Development (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures.

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UNIT-V

QUALITY SYSTEMS: Need for ISO 9000 – ISO 9001-2008 Quality System – Elements, Documentation, Quality Auditing – QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors. **TOTAL: 45 PERIODS OUTCOMES :** x The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXTBOOK:

1. Dale H. Besterfield, et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint 2006.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

CO- PO Mapping

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High] '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	3	-	-	-	3	-	-	-	1	-	2
CO 2	3	-	-	-	2	-	-	-	1	-	1	2
CO 3	-	-	2	-	1	3	2	-	-	-	3	-
CO 4	2	-	3	-	-	2	-	-	1	-	-	2
CO 5	3	-	2	-	3	-	-	-	-	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	HVDC TRANSMISSION				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Power Electronics	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To introduce students with the concept of HVDC Transmission system.
2. To familiarize the students with the HVDC converters and their control system.
3. To expose the students to the harmonics and faults occur in the system and their prevention.
4. To learn the control strategies used in HVDC transmission system

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Understand the advantages of DC transmission over ac transmission
C02:	Understand the operation of Line Commutated Converters and Voltage Source Converters.
C03:	Understand the control strategies used in HVDC transmission system.
C04:	Understand the improvement of power system stability using an HVDC system.

Syllabus:

UNIT 1: DC Transmission Technology:

Comparison of AC and DC Transmission (Economics, Technical Performance and Reliability). Application of DC Transmission. Types of HVDC Systems. Components of a HVDC system. Line Commutated Converter and Voltage Source Converter based systems. Line Commutated Converters (LCCs): Six pulse converter, Analysis neglecting commutation overlap, harmonics, Twelve Pulse Converters. Inverter Operation. Effect of Commutation Overlap. Expressions for average DC voltage, AC current, Reactive power absorbed by the converters. Effect of Commutation Failure, Misfire and Current Extinction in LCC links

UNIT 2: Analysis of Voltage Source Converters:

Voltage Source Converters (VSCs): Two and Three-level VSCs. PWM schemes: Selective Harmonic Elimination, Sinusoidal Pulse Width Modulation. Analysis of a six pulse converter. Equations in the rotating frame. Real and Reactive power control using a VSC.

UNIT 3: Control of HVDC Converters:

Principles of Link Control in a LCC HVDC system. Control Hierarchy, Firing Angle Controls – Phase-Locked Loop, Current and Extinction Angle Control, Starting and Stopping of a Link. Higher level Controllers Power control, Frequency Control, Stability Controllers. Reactive Power Control. Principles of Link Control in a VSC HVDC system: Power flow and DC Voltage Control. Reactive Power Control/AC voltage regulation.

UNIT 4: Components of HVDC systems:

Smoothing Reactors, Reactive Power Sources and Filters in LCC HVDC systems DC line: Corona Effects. Insulators, Transient Over-voltages. DC line faults in LCC systems. DC line faults in VSC systems. DC breakers. Monopolar Operation. Ground Electrodes.

UNIT 5: Stability Enhancement using HVDC Control:

Basic Concepts: Power System Angular, Voltage and Frequency Stability. Power Modulation: basic principles – synchronous and asynchronous links. Voltage Stability Problem in AC/DC systems.

Text/References:

1. K. R. Padiyar, “HVDC Power Transmission Systems”, New Age International Publishers, 2011.
2. J. Arrillaga, “High Voltage Direct Current Transmission”, Peter Peregrinus Ltd., 1983.
3. E. W. Kimbark, “Direct Current Transmission”, Vol.1, Wiley-Interscience, 1971.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓								✓			
C02		✓							✓			
C03				✓								
C04					✓							

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	POWER SYSTEM OPERATION & CONTROL				
Teaching	Total contact hours – 45	L	T	P	C
Prerequisite(s): Power System Analysis		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. Understand the solution methods of economic dispatch and static state estimation and explain the automatic generation control of a multi-area system;
2. Understand the solution methods of economic dispatch and static state estimation and explain the automatic generation control of a multi-area system;
3. Apply the Lagrange's method to the economic dispatch of thermal units;
4. Explain the automatic generation control and carry out a small-signal analysis of a multi-area system;

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Compute optimal scheduling of Generators
C02:	Understand hydrothermal scheduling
C03:	Understand importance of the frequency
C04:	Understand the automatic generation control and carry out a small signal analysis of multi area system

Syllabus:

UNIT-I

Economic Operation of Power Systems: Optimal operation of Generators in Thermal power stations, – Heat rate curve– Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula.

UNIT-II

Hydrothermal Scheduling: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models – Scheduling problems – Short term Hydrothermal scheduling problem.

Unit Commitment: Optimal unit commitment problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming.

UNIT-III

Load Frequency Control (LFC): Modeling of steam turbine – Generator – Mathematical modeling of speed governing system – Transfer function – Modeling of Hydro turbine – Necessity of keeping frequency constant – Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case – Load frequency control of two area system – Uncontrolled case and controlled case – Tie–line bias control.

UNIT-IV

Load Frequency Controllers: Proportional plus Integral control of single area and its block diagram representation – Steady state response – Load Frequency Control and Economic dispatch control.

UNIT-V

Reactive Power Control: Overview of Reactive Power control – Reactive Power compensation in transmission systems – Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Uncompensated and compensated transmission lines: Shunt and series compensation – Need for

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	POWER SYSTEMS LAB				
Teaching	Total contact hours – 30	L	T	P	C
Prerequisite(s): Power Systems-II, Power System Analysis,(MAT LAB)		0	0	3	1.5

Course Objectives:

The objectives of the course are to make the student learn about

1. Analyze the performance of transmission lines and relays
2. Calculate the steady-state power flow in a power system.
3. Analyze different types of short-circuit faults which occur in power systems
4. Analyze Load frequency control of single area and Double area systems

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Understand the parameters of various types of transmission lines and to understand the performance of short, medium, long transmission lines.
C02:	Understand the effects of skin, proximity, Ferranti, corona effects on transmission lines
C03	Understand about Load frequency controls
C04	Understand about the different types of faults identification in transformers and alternators

All the experiments are to be done compulsory

1. Determination of Sequence impedances of three phase alternator by fault analysis
2. Determination of Sequence impedances of three phase transformer
3. Determination of ABCD parameters of Transmission line
4. Dielectric strength of Transformer oil.
5. Calibration of Tong Tester.
6. Load frequency control without controller
7. Load frequency control with controller
8. Load flow study using GS method
9. Economic load dispatch without considering losses
10. Economic load dispatch with considering losses
11. Determination of Sequence impedances of three phase alternator by direct method
12. Load flow study by Fast decoupled method
13. Active power control of synchronous machine connected to infinite bus
14. Reactive power control of synchronous machine connected to infinite bus
15. Voltage control by capacitor compensation and tap changing transformers
16. Study of corona phenomenon
17. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
18. Comparison of different Load flow methods.
19. Economic load dispatch considering losses
20. Transient Stability Analysis

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	ELECTRICAL SIMULATION LAB				
Teaching	Total contact hours -30	L	T	P	C
Prerequisite(s): MAT LAB		0	0	3	1.5

Course Objectives:

The objectives of the course are to make the student learn about

1. To present a problem oriented knowledge of power system analysis methods.
2. To address the underlying concepts & approaches behind analysis of power system network using software tools.
3. To identify & formulate solutions to problems relevant to power system using software tools..
4. To understand Load flow studies

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	simulate control systems & machine models
C02:	CO-2: simulate transmission line models
C03:	CO-3: perform transient analysis of RLC circuit and single machine connected to infinite bus
C04:	Simulate power electronic converters

All the experiments are to be done compulsorily

1. Simulation of step response of RLC circuits
2. Simulation of impulse response of RLC circuits
3. Simulation of transient response of RLC circuits to sinusoidal input
4. Plotting of Bode plots for the transfer functions of systems up to 5th order
5. Plotting of root locus for the transfer functions of systems up to 5th order
6. Plotting of nyquist plots for the transfer functions of systems up to 5th order
7. Integrator circuit using op-amp.
8. Differentiator circuits using op-amp.
9. Simulation of separately excited DC motor using transfer function approach
10. Analysis of three phase circuit representing the generator transmission line and load.
11. Power system load flow using Newton–Raphson technique.
12. Modeling of transformer and simulation of lossy transmission line
13. Transient analysis of single machine connected to infinite bus (SMIB).
14. Simulation of three phase full converter with RL & RLE load
15. Simulation of Boost converter
16. Simulation of single phase inverter with PWM control
17. Simulation of single–phase full converter using RLE loads
18. Simulation of single phase AC voltage controller using RL loads.
19. Simulation of Buck converter
20. Modeling of transformer and simulation of lossless transmission line

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	INTELLECTUAL PROPERTY RIGHTS AND PATENTS				
Teaching	Total contact hours - 32	L	T	P	C
Prerequisite(s):		2	0	0	0

Course Objectives:

The objectives of the course are to make the student learn about

1. To study the rights afforded by Copyright law
2. To study intellectual property law, issues related to paralegal tasks and cyber
3. To understand trademark and trade secret law, Registration process, Rights
4. To know patent law, application process, Rights and limitations

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Examine the legal principles relating to IPR
C02:	Identify the various policies and procedures related to trademarks
C03:	Summarise the principles and subject matter of the copyright law.
C04:	Outline the various policies and procedures related to patents.

Syllabus:

UNIT I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

UNIT II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration– Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

UNIT III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

UNIT IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

UNIT V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security– Employee Access Limitation – Employee Confidentiality Agreement –Trade Secret Law – Unfair Competition –

Trade Secret Litigation – Breach of Contract – Applying State Law.

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime

REFERENCE BOOKS:

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal &Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. PrabhuddhaGanguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd. Iqbal Ali: “Intellectual Property Right” Serials Pub.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
Course Code	INTERNSHIP/MINI PROJECT-II				
Teaching	Total contact hours -	L	T	P	C
Prerequisite(s):		0	0	0	2

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th semester)			
Course Code	SMART GRID				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Basic knowledge on grid operation	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To understand the basic concepts, components and architecture of smart grid
2. To understand the various measurement technologies in smart grid
3. To educate the importance of renewable energy in smart
4. To brief about role of Electric Vehicles in smart grid

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Explain the smart grids components and architecture.
C02:	Describe different measuring methods and sensors used in smart grid
C03:	Summarize various renewable energy technologies.
C04:	Summarize the importance of Electric Vehicles in smart grid

Syllabus:

UNIT-I

The Smart Grid: Introduction, Ageing Assets and Lack of Circuit capacity, Thermal constraints, Operational constraints, security of supply, National Initiatives, Early smart grid initiatives,

Active distribution networks, virtual power plant, Other Initiatives and Demonstrations, Overview of the Technologies Required for the smart grid.

UNIT-II

Communication Technologies: Introduction, Dedicated and shared communication channels, switching Techniques, Circuit Switching, Message Switching, Packet Switching, communication channels, wired communication, optical fiber, Radio communication, Cellular Mobile communication, Layered architecture and protocols, The ISO/OSI Model, TCP/IP IEEE 802 Series, Mobiles Communications, Multi protocol Label Switching, Power line communication, Standards for information Exchange, Standards for smart metering, Modbus, DNP3, IEC61850.

UNIT-III

Information Security for the Smart Grid: Introduction, Encryption and Decryption, Symmetric key encryption, Public key Encryption, Authentication, Authentication based on shared secret key, Authentication based on key distribution center, digital signature, Secret key signature, Public key signature, Message digest, Cyber Security standards, IEEE 1686: IEEE standard for substation intelligent Electronic Devices(IEDs) Cyber security capabilities, IEC 62351: power systems management and Association information exchange-data and communication security.

UNIT-IV

Smart Metering: Introduction, Smart metering- evolution of electricity metering, key components of smart metering, Smart meters: An Overview of the hardware used – signal acquisition, signal conditioning, analogue to digital conversion, computation, input/output and communication. Communication infrastructure and protocols for smart metering- Home area network, Neighborhood area network, data concentrator, meter management system, protocols for communication.

UNIT-V

Demand Side Integration- Services provided by DSI, Implementation of DSI, hardware support, Flexibility delivered by prosumers from the demand side, system support from DSI. Transmission and Distribution Management Systems: Data sources, Energy management system, wide area Applications, Visualization Techniques, Data sources and Associated external systems,

SCADA, customer information system, modeling and analysis Tools, distribution system modeling, Topology analysis, load forecasting, power flow analysis, Fault calculations, state estimation, applications, system monitoring, operation, management Outage management system, Energy storage technologies, Batteries, flow battery, Fuel cell and Hydrogen Electrolyser, Fly wheels, superconducting Magnetic energy storage systems, super capacitors.

Text Books:

1. Smart grid, Janaka Ekanayake, Liyanage, Wu, Akihiko yokoyama, Jenkins, Wiley publications, 2012.

Reference Books:

1. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEE Presss., 2012.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium] 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01										✓		
C02		✓									✓	
C03		✓			✓							
C04			✓			✓						

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th semester)			
Course Code	POWER QUALITY				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Power systems	3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To impart knowledge about the power quality and its assessments.
2. To enable the students to understand how power quality studies are carried out in a distribution system.
3. To enable the students to understand the factors that causes the harmonics and their effect on the power system.
4. To understand the necessity of power quality and its importance in the power system

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Understand the concepts of power quality and voltage imperfections in power systems and power factor improvement
C02:	Know the concepts of harmonic distortion and distributed generation and power quality issues
C03:	Know the power quality monitoring and instrumentation, applications of intelligence systems
C04:	Proper assessment of power quality through different measurement techniques.

Syllabus:

UNIT-I

Introduction: Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long– duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

UNIT-II

Voltage imperfections in power systems: Power quality terms – Voltage sags – Voltage swells and interruptions – Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage protection – Utility capacitor switching transients.

UNIT-III

Voltage Regulation and power factor improvement: Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

UNIT- IV

Harmonic distortion and solutions: Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active filtering – Numerical problems.

UNIT-V

Distributed Generation and Power Quality: Resurgence of distributed generation – DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

PQ Monitoring and Instrumentation: Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

Textbooks:

1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3rd edition.
2. Electric power quality problems –M.H.J. Bollen IEEE series-Wiley india publications, 2011.
3. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.

Reference Books:

1. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
2. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
3. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
4. Power Quality c.shankaran, CRC Press, 2001
5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis).

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium] 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓			✓			✓			✓		
C02		✓			✓			✓			✓	
C03		✓			✓			✓			✓	
C04			✓			✓			✓			✓

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th semester)			
Course Code	NON LINEAR CONTROL SYSTEMS				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Control Systems		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To study about the behaviour of a nonlinear system and about Non linearities.
2. To describe Function Fundamentals & functions of common nonlinearities.
3. To study phase plane analysis.
4. To understand about liapunov stability theory.

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	To study about the behavior of a nonlinear system and about Non linearities.
C02:	To describe Function Fundamentals & functions of common nonlinearities.
C03:	To phase plane analysis.
C04:	To study about liapunov stability theory.

Syllabus:

UNIT-I: INTRODUCTION

Nonlinear system behavior- Common Nonlinearities in control systems- Autonomy - Analysis and design methods of nonlinear control systems.

UNIT-II: DESCRIBING FUNCTION

Describing Function Fundamentals -Describing functions of common nonlinearities – Describing function analysis of nonlinear systems: Existence and stability of limit cycles - Dual input describing function for typical nonlinearities: Relay, hysteresis and polynomial type nonlinearity.

UNIT-III: PHASE PLANE ANALYSIS

Singular points - Construction of phase plane using Isocline, delta and Lienard's methods - Existence of Limit cycles: Poincare index and Bendixon theorems - Stability.

UNIT-IV: LYAPUNOV STABILITY THEORY

Concepts of Stability-Linearization and Local Stability-Lyapunov's Direct Method –Generation of Lyapunov functions: Krasovski's, Lure's and Variable Gradient Method- Popov's stability criterion. Concepts of stability for non autonomous systems. Concepts of passivity formalism in linear systems.

UNIT-V: NONLINEAR CONTROL SYSTEMS DESIGN

Method of feedback linearization-Mathematical tools- Input-state linearization of SISO systems- Input-output linearization of SISO Systems- Basic concepts of variable structure systems - Sliding surfaces- Filippov's construction of equivalent dynamics- Conditions for existence of sliding regions – Case Study- Back stepping method for non-feedback linearizable systems.

Text Books:

1. Jean Jacques Slotine and Weiping Li, “Applied Nonlinear Control”, Prentice Hall Inc., 1991.
2. Zoran Vukic, Ljubomir Kuljaca, Dali Donlagic and Sejid Tesnjak, “Nonlinear Control Systems”, Marcel Dekker Inc, 2003.
3. Horacio J Marquez, “Nonlinear Control Systems: Analysis and Design”, John Wiley & Sons Inc, 2003.

Reference Books:

1. Wilfrid Peruquetti and Jean Pierre Barabot, “Sliding Mode Control in Engineering”, Marcel Dekker Inc, 2002.
2. Gopal M “Digital Control and State Variable Methods”, Tata McGraw- Hill Ltd, New Delhi, 2003.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium] 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01		✓						✓				
C02			✓						✓			
C03			✓						✓			
C04				✓						✓		

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th semester)			
Course Code	ELECTRIC VEHICLES				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To present a comprehensive overview of Electric and Hybrid Electric Vehicles Syllabus.
2. Introduction to Hybrid Electric Vehicles, Conventional Vehicles, Hybrid Electric Drive-trains, Electric.
3. Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet.
4. Motor drives, switched reluctance motor, Energy Storage Requirements in Hybrid and Electric Vehicles.

Course Outcomes:

After successful completion of the course, a successful student will be able to	
C01:	Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources.
C02:	Design and develop basic schemes of electric vehicles and hybrid electric vehicles
C03:	Choose proper energy storage systems for vehicle applications
C04:	Identify various communication protocols and technologies used in vehicle networks

Syllabus:

UNIT-I: Introduction to Hybrid Electric Vehicles

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

UNIT-II: Hybrid Electric Drive-trains

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

UNIT-III: Electric Propulsion unit

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives.

UNIT-IV: Energy Storage

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT-V: Sizing the drive system

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology.

Text Books:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

Reference Books:

1. James Larminie, John Lowry, Electric Vehicle Technology Explained Wiley, 2003.
2. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	<u>P06</u>	P07	P08	P09	P010	PO11	P012
C01	✓											
C02			✓									
C03					✓							
C04					✓							

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th semester)			
Course Code	ENERGY AUDIT, CONSERVATION & MANAGEMENT				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): MEFA, Mathematics		3	0	0	3

Course Objectives:

The objectives of the course are to make the student learn about

1. To provide students with a general awareness on the importance of energy and its conservation,
2. To provide students on its impact on society, various energy sources
3. To provide students on energy conversion processes, energy management
4. To provide energy audit and energy conservation measures.

Course Outcomes:

After successful completion of this course, a student will be able to:	
C01:	Understand the current energy scenario and importance of energy conservation.
C02:	Understand the concepts of energy management.
C03:	Understand the methods of improving energy efficiency in different electrical systems.
C04:	Understand the concepts of different energy efficient devices.

Syllabus:

UNIT 1: Energy Scenario

Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

UNIT 2: Basics of Energy and its various forms

Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT 3: Energy Management & Audit

Definition, energy audit, need, types of energy audit. Energy management (audit) approach- understanding energy costs, bench marking, energy performance, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

UNIT 4: Energy Efficiency in Electrical Systems

Electrical system: Electricity billing, electrical load management and maximum demand control, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th semester)			
Course Code	PROJECT WORK				
Teaching	Total contact hours -	L	T	P	C
Prerequisite(s)		0	0	18	9