GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

NH-16, Chaitanya Knowledge City, Rajahmundry

I YEAR I SEMESTER

Sl. No.	Course Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201HB101	BSC	Mathematics-I	3	0	0	3	30	70	100
2	201HB102	HSMC	Communicative English	3	0	0	3	30	70	100
3	201HB103a	BSC	Applied Physics	3	0	0	3	30	70	100
4	201CS104	ESC	Problem Solving & Programming in C	3	0	0	3	30	70	100
5	201EC105	ESC	Introduction to Electronics Engineering	3	0	0	3	30	70	100
6	201HB196	MS	Environmental science	2	0	0	0	100	0	100
7	201HB111a	BSC	Applied Physics Laboratory	0	0	3	1.5	50	50	100
8	201CS112	ESC	Problem Solving & Programming in C Laboratory	0	0	3	1.5	50	50	100
9	201ME113a	ESC	Electronic Engineering Workshop	0	0	3	1.5	50	50	100
TOTAL				17	0	09	19.5	400	500	900
BSC-7.5 ESC-9 HSMC-3										

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

NH-16, Chaitanya Knowledge City, Rajahmundry

I YEAR - II SEM (GRBT20) (4 SEM)

Sl. No.	Course Code	Course Category	Subject Title	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201HB201	BSC	Mathemetics-II	3	0	0	3	30	70	100
2	201HB202	BSC	Engineering Chemistry	3	0	0	3	30	70	100
3	201ME203	ESC	Engineering Graphics	1	0	4	3	30	70	100
4	201CS204b	ESC	Data Structure using C	3	0	0	3	30	70	100
5	201EE205	ESC	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
6	201HB211	BSC	Engineering Chemistry Laboratory	0	0	3	1.5	50	50	100
7	201HB212	HSMC	Communicative English Laboratory	0	0	3	1.5	50	50	100
8	201EE213	ESC	Basic Electrical and Electronics Engineering Laboratory	0	0	3	1.5	50	50	100
TOTAL				16	0	13	19.5	300	500	800
BSC-7.5 ESC-10.5 HSMC-1.5										

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

NH-16, Chaitanya Knowledge City, Rajahmundry

II YEAR I SEMESTER

Sl. No.	Course Code	Course Category	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201HB301	BSC	Mathematics-III	3	1	0	3	30	70	100
2	201EC302	PCC	Electronic Devices and Circuits	3	1	0	3	30	70	100
3	201EC303	PCC	Network Analysis	3	1	0	3	30	70	100
4	201EC304	PCC	Switching Theory and Logic Design	3	1	0	3	30	70	100
5	201EC305	PCC	Signals and Systems	3	1	0	3	30	70	100
6	201CS311	PCC	Programming with Java Lab	0	0	3	1.5	50	50	100
7	201EC312	PCC	Electronic Devices and Circuits Lab	0	0	3	1.5	50	50	100
8	201EE313	PCC	Network Analysis Lab	0	0	3	1.5	50	50	100
9	201HB381	SOC	English for career	1	0	2	2	-	-	-
TOTAL				16	5	11	21.5	300	500	800
BSC 3	PCC 16.5	SOC 2								

II YEAR II SEMESTER

Sl. No.	Course Code	Course Category	Subject Title	Periods per week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201EC401	PCC	Electronic Circuit Analysis	3	1	0	3	30	70	100
2	201EC402	PCC	Analog Communications	3	1	0	3	30	70	100
3	201EC403	ESC	Random Variable and Stochastic Process	3	1	0	3	30	70	100
4	201EC404	PCC	Electromagnetic Waves And Transmission Lines	3	1	0	3	30	70	100
5	201EC405	HSS	Managerial Economics And Financial Analysis	3	1	0	3	30	70	100
6	201EC411	PCC	Electronic Circuit Analysis Lab	0	0	3	1.5	50	50	100
7	201EC412	PCC	Analog Communication Lab	0	0	3	1.5	50	50	100
8	201EC413	PCC	Switching Theory and Logic Design Lab	0	0	3	1.5	50	50	100
9	201CS481A	SOC	Programming with Python Lab	0	1	2	2	-	50	50
10	201CE491	MC	Constitution of India	2	0	0	-	30	70	100
			TOTAL	17	6	11	21.5	330	620	950
HSS 3	PCC 13.5	ESC 3	SOC 2							

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

NH-16, Chaitanya Knowledge City, Rajahmundry

III YEAR - I SEMESTER COURSE STRUCTURE (GRBT20)

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201EC501	PC	Linear and Digital IC Applications	3	1	0	3	30	70	100
2	201EC502	PC	Digital Communications	3	1	0	3	30	70	100
3	201EC503	PC	Antenna and Wave Propagation	3	1	0	3	30	70	100
4	201EC564A	PE	**Professional Elective-1** **a.** Electronic Measurements and Instrumentation	3	1	0	3	30	70	100
	201EC564B		**b.** Control Systems							
	201EC564C		c. Computer Architecture & Organization							
	201EC564D		d. Artifical Neural Networks							
5	201CE565a	OE	**Open Elective – 1** a. Environmental pollution & control	3	1	0	3	30	70	100
	201EE565a		b. Fundamentals of Utilization of Electrical Energy							
	201ME565a		c. Robotics							
	201EC565a		d. Microprocessor and its interfacing							
	201CS565a		e. Foundations of operating systems							
	201PT565a		f. Fundamentals of Petroleum Engineering							
	201MM565a		g. Elements of Mining Technology							
	201AM565a		h. Basic automobile Engineering							
	201MB565a		i. Principles of Management							
6	201HB591	MC	Quantitative Aptitude and Reasoning	2	0	0	-	30	70	100
7	201EC511	PC	Linear and Digital IC Applications Lab	0	0	3	1.5	50	50	100
8	201EC512	PC	Digital Communications Lab	0	0	3	1.5	50	50	100
9	201EC581	SOC	Analog and Digital Circuit Design UsingMultisim	1	0	2	2	-	50	50
10	201EC531		Internship (Mandatory) after second year(to be evaluated during V semester	0	0	0	1.5	100	-	100
			Total				21.5	380	570	950
Honors / Minor courses (The hours distribution can be 3-0-2or 3-1-0 also)				4	0	0	4			

HOD.ECE

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

NH-16, Chaitanya Knowledge City, Rajahmundry

III YEAR – II SEMESTER COURSE STRUCTURE (GRBT20)

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	201EC601	PC	Microprocessors and Microcontrollers	3	1	0	3	30	70	100
2	201EC602	PC	Digital Signal Processing	3	1	0	3	30	70	100
3	201EC603	PC	Microwave & Optical CommunicationEngineering	3	1	0	3	30	70	100
4	201EC664A	PE	**Professional Elective-2** Radar Engineering	3	1	0	3	30	70	100
	201EC664B		Mobile & Cellular Communication							
	201EC664C		Digital Image Processing							
	201EC664D		VLSI Design							
5	201CE665a	OE	**Open Elective – 2** **a.** Solid Waste Management	3	1	0	3	30	70	100
	201EE665b		**b.** Concepts of power system engineering							
	201ME665c		c. Introduction to MEMS							
	201EC665d		d. IoT and its Applications							
	201CS665e		e. Fundamentals of Databases							
	201PT665f		f. Basic Concepts in petroleum drilling Engineering							
	201MM665g		g. Open Pit Slope analysis and design							
	201AM665h		h. Hybrid and electric vehicles							
	201MB665i		i. Operations Management							
6	201MB691	MC	IPR and Patents	2	0	0	-	30	70	100
7	201EC611	PC	Microwave & Optical CommunicationEngineering Lab	0	0	3	1.5	50	50	100
8	201EC612	PC	Microprocessors and Microcontrollers Lab	0	0	3	1.5	50	50	100
9	201EC613	PC	Digital Signal Processing Lab	0	0	3	1.5	50	50	100
10	201EC681	SAC	ARM based / Arduino based Programming	0	1	2	2	-	50	50
TOTAL							21.5	330	620	950
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0also)				4	0	0	4			
Internship (Mandatory) 2 Months during summer vacation										

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR - I SEMESTER COURSE STRUCTURE (GRBT20)

S. No.	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1	PE	**Professional Elective – 3** Wireless Sensor Networks Software Defined Radio Cognitive Radio Information Theory and Coding	3	1	0	3	30	70	100
2	PE	**Professional Elective – 4** Embedded System Design Real time operating systems Digital Signal Processors and Architecture Soft Computing Techniques	3	1	0	3	30	70	100
3	PE	**Professional Elective – 5** Internet of Things and Cloud Computing Digital IC Design using CMOS Computer Networks Pattern Recognition & Machine Learning	3	1	0	3	30	70	100
4	OE	**Open Elective – 3**	3	0	0	3	30	70	100
5	OE	**Open Elective – 4**	3	0	0	3	30	70	100
6	HSSE	UHV – 2	3	0	0	3	30	70	100
7	SAC	VLSI Lab	1	0	2	2	-	50	100
8	Industrial Internship	Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)	0	0	0	3	100	-	100
TOTAL						**23**	**280**	**470**	**750**
Honors / Minor courses (The hours distribution can be 3-0-2 or 3-1-0			**4**	**0**	**0**	**4**			

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR - II SEMESTER COURSE STRUCTURE (GRBT20)

S. No.	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1	Major Project	Project Project work, seminar and internship in Industry	0	0	4	12	60	140	200
		Total				12	60	140	200

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

LIST OF OPEN ELECTIVE SUBJECTS (GRBT20)

III B.Tech – I Sem	III B.Tech – II Sem
1. Fundamentals of Utilization of Electrical Energy 2. Robotics 3. Microprocessors and Microcontrollers (ECE) 4. Fundamentals of Petroleum Engineering 5. Elements of Mining Technology 6. Basic Automobile Engineering 7. Environmental Pollution & Control	1. Concepts of Power System Engineering 2. Introduction to MEMS 3. IoT and its Applications (ECE) 4. Basic Concepts in Drilling Engineering 5. Open Pit Slope Analysis and Design 6. Hybrid and Electric Vehicles 7. Solid Waste Management

IV B.Tech - I Sem	IV B.Tech - I Sem
1) Fundamentals of Smart Grid Technologies 2) Nano Technology and its Applications 3) Embedded Systems (ECE) 4) Introduction to Petroleum Production Engineering 5) Dimensional Stone Mining 6) Modern Vehicle Technology 7) Global Environmental Problems & Policies	1) Basics of Electrical Measurements and Instrumentation 2) Introduction to Operations Research 3) Digital Image Processing (ECE) 4) Basic concepts in petroleum reservoir engineering 5) Remote Sensing & GIS in Mining 6) Alternative Energy Resources for Automotives 7) Urban Transportation Planning

Regulation GR17-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. (I Semester)			
Course Code XXXXXXX	MATHEMATICS - I (ALL BRANCHES)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Types of matrices, Differentiation and Integration.		3	0	0	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-	
CO1:	Transform the knowledge of solving system of linear equations using matrices.
CO2:	Evaluate nature of the Quadratic form.
CO3:	Acquire the knowledge maxima and minima of function of several variables
CO4:	Evaluate multiple integrals and their applications
CO5:	Understand and apply vector derivatives and vector integration theorems.

Syllabus:

Unit I: Matrix Operations and Solving Systems of Linear Equations **10 hrs**

Rank of a matrix by echelon form, solving system of linear homogeneous and non-homogeneous equations – Gauss elimination method, Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

Unit II: Quadratic forms **8 hrs**

Quadratic forms and nature of the Quadratic forms, reduction of Quadratic form to canonical form by diagonalisation and orthogonal transformation.

Unit III: Partial differentiation and Applications **10 hrs**

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 and Applications **10 hrs**

Evaluation of double integrals (Cartesian and polar coordinates) and triple integrals, change of variables, change of order of integration, Finding areas and volumes.

UNIT V: Vector Calculus **10 hrs**

Scalar and vector point functions, Curl, Gradient and Divergence, directional derivative, Irrotational and Solenoidal vector fields, Line integral, Work done, Area, Surface and volume integrals, Greens, Stokes and Gauss Divergence theorems (without proof).

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 Publicatiobns, 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/

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	2	2	-	-	-	-	-	-	-	1
CO2	3	2	2	2	-	-	-	-	-	-	-	1
CO3	3	2	2	2	-	-	-	-	-	-	-	1
	3	2	2	2	-	-	-	-	-	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Semester			
Course Code	COMMUNICATIVE ENGLISH-1 (Common to all Branches)				
Teaching	Total Contacthours-48	L	T	P	C
Prerequisite(s): Learner should be equipped with basic language and communication skills like Reading, Writing, Listening and Speaking		3	0	0	3

Course Objectives: This course aims to

- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.
- Impart effective strategies for good writing, to summarize information and practice writing essays.
- Improve communication in both professional and social life
- Demonstrate Language efficiency in career building
- 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	
CO1:	Develop effective reading strategies
CO2:	Demonstrate writing skills that are required for professional development and use graphic elements for communication
CO3:	Apply grammatical skills and vocabulary effectively in speech and writing
CO4:	Display language efficacy in tune with subjective knowledge
CO 5:	Use required language along with contextual vocabulary and grammar structures

UNIT-I

READING: Detailed Study: 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 Study:** "Deliverance" by Prem chand from **Individual Society,** Pearson Publications **GRAMMAR:** Verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural forms. Simple question forms – Wh-questions; Word order in sentences. **VOCABULARY: Technical Vocabulary (GRE Model)-20 words.** Content words and function words; Word forms **WRITING SKILLS:** Paragraph Writing-Beginnings and endings of paragraphs - introducing a topic- structure and types of paragraph.

UNIT-II

READING: Detailed Study: 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 Study:** "Bosom Friend" by Hira Bansode from **Individual Society,** Pearson Publications **GRAMMAR:** Use of articles and zero article; prepositions. **VOCABULARY: Technical Vocabulary (GRE Model)-20 words.** Linkers. sign posts and transition signals. **WRITINGSKILLS:** Punctuation. Summarizing an oral or written text.

UNIT-III

READING: Detailed Study: 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 Study**"Shakespeare's Sister" by Virginia Woolf from **Individual Society,** Pearson Publications **GRAMMAR:** Tense and aspect; direct and indirect speech, reporting verbs for academic purposes.**VOCABULARY: Technical Vocabulary (GRE Model)-20 words.** Prefixes and Suffixes. **WRITING SKILLS:** Rephrasing what is read; avoiding redundancies and repetitions.

UNIT–IV

READING: Detailed Study: 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-1by Orient Black Swan. **Non-Detailed:**"Telephone Conversation" by Wole Soyinka from **Individual Society,** Pearson Publications **GRAMMAR:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison. **VOCABULARY: Technical Vocabulary (GRE Model)-20 words.** Use of antonyms and homophones. Cloze encounters **WRITINGSKILLS:** Information transfer; describe, compare, contrast, and identifying significance/trends based on information provided in figures/charts/graphs/tables – Sensible writing. Defining and classifying.

UNIT – V

READING: Detailed Study: 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. **Non-Detailed:** "Still I Rise" by Maya Angelou from **Individual Society,** Pearson Publications. **GRAMMAR:** Reading comprehension- framing right answers and editing the given text. **VOCABULARY: Technical Vocabulary (GRE Model)-20 words.** Idioms and Phrases. **WRITING SKILLS:** Writing structured essays on specific topics using suitable claims and evidences.

Text Books:

1. **Detailed Study:** ENGLISH ALL ROUND: Communication Skills for Under Graduate Learners- Published by Orient Black swan Pvt Ltd
2. **Non-detailed Study: Individual Society,** Pearson Publications

Reference books:

1. **Pathways: Listening, Speaking and Critical Thinking-1** byRebecca Tarver Chase, Becky Tarver and Henley, ELT; 2nd Edition, 2018.
2. **InfoTech English** by Maruthi Publications.

WEB REFERENCES:

1. https://www.englishclub.com/
2. http://www.world-english.org/
3. 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
CO1	-	-	-	-	-	2	3	2	-	-	-	-
CO2	-	-	-	-	-	3	3	3	-	-	-	1
CO3	-	-	-	-	-	2	3	3	-	-	-	-
CO4	-	-	-	-	-	3	2	3	-	-	-	3
CO5	-	-	-	-	-	3	3	2	-	-	-	--

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	APPLIED PHYSICS (For All Circuital Branches like ECE, EEE, CSE, CSE (AI & ML), CSE (Cyber Security) etc)				
Teaching	Total Contact Hours – 48h	L	T	P	C
		3	0	0	3

Course Objective

Physics Curriculum is re-oriented to the needs of all the branches of graduate engineering courses that serve as a transit to understand 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
CO2:	To demonstrate the concept on the absorption and spontaneous and stimulated emission in two level system and the conditions for laser amplification and explain the working principle of optical fibers and its classification based on refractive index profile and mode of propagation with their applications. To explain the concept of dielectric constant and polarization in dielectric materials and summarize Gauss's law in the presence of dielectrics. and classify the magnetic materials based on susceptibility and their temperature dependence.
CO3:	To study the Schrödinger equation for standard systems with both analytical and numerical methods, and then interpret the results. And to explain the physical states of elementary particles and atoms in different systems based on quantum mechanics
CO4:	To classify the energy bands of semiconductors and outline the properties of n-type and p-type semiconductors

Syllabus:

UNIT –I

WAVE OPTICS **10h**

INTERFERENCE: Introduction - Principle of Superposition- Interference in thin films (reflected light) - Newton's Rings – Engineering Applications

DIFFRACTION: Introduction – Types of Diffractions – Fraunhofer Single slit Diffraction (Quantitative) – Double Slit - N slits/Grating (Qualitatively) – Grating Formula – Rayleigh's Criterion - Resolving power of grating

POLARIZATION: Introduction - Types of Polarization (plane, circular, elliptical) – Experimental Production of polarized light by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates

UNIT –II **8h**

Laser

Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Pumping schemes – Population inversion – Three level system and meta stable state - Ruby Laser – He-Ne laser - Applications of lasers.

Fiber Optics

Introduction - Principle and structure of Optical Fibers - Acceptance angle - Numerical Aperture - Classification of optical fibers based on Refractive index profile and modes – Applications of the optical fibers

UNIT –III **10h**

DIELECTRICS PROPERTIES

Introduction - Electric polarization - Dielectric polarizability, Susceptibility and Dielectric constant- Types of dielectric polarizations – Electronic, Ionic, Orientational & Space (Qualitatively) – Internal Field (or) Local field in solids - Claussius-Mosotti equation – Ferroelectrics (Qualitatively)

MAGNETIC PROPERTIES

Introduction - Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials (Dia, Para, Ferro/Ferri/Antiferro) with regard to temperature and field - Weiss ferromagnetic domain theory (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites

UNIT –IV **10h**

QUANTUM MECHANICS:

Introduction to matter waves – Davison and Germer Experiment - Heisenberg's Uncertainty Principle – Pauli's exclusion principle – Wave Function - Schrodinger Time Independent and Time Dependent wave equations - Particle in a box

FREE ELECTRON THEORY:

Classical free electron theory –Meris and Demerits - Density of states – Fermi Energy - Fermi Distribution Function – Quantum free electron theory – Electrical Conductivity

UNIT –V **10h**

Band Theory of Solids:

Introduction - Bloch's theorem (Qualitatively) – Kronig Penny model – Origin of Energy Bands – Effective mass & band gap – Demarcation of band gap for metals, insulators, semiconductors – Concept of Hole

Semiconductor Physics:

Introduction – Density of carriers in Intrinsic and Extrinsic Semiconductors-Drift, Diffusion & Mobility - Einstein's equation – Hall effect

Text books

1. M. R. Srinivasan, "Engineering Physics", New Age International Publishers, 2011.
2. D. Thirupathi Naidu, M. Veeranjaneyulu, "Engineering Physics", Techno Series, 2019.
3. P. K. Palanisamy, "Applied Physics", Sci-tech Publications.
4. A.J.Decker, "Solid State Physics", Mac Millan.
5. M. N. Avadhanlu, P. G. Kshirasagar "A Text book of Engineering Physics", S. Chand Publications, 2017.

Reference Books

1. Principles of Physics by Resnick, Halliday, and Walker, Printice Hall Publications
2. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc GrawHill ,2008
3. S.M.Sze "Semiconductor devices-Physics and Technology"-Wiley,2008
4. H. K. Malik and A. K. Singh "Engineering Physics", McGraw Hill Publishing Company Ltd, 2018.

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	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (Ist Semester)			
Course Code	INTRODUCTION TO ELECTRONICS ENGINEERING				
Teaching	Total Contact Hours -	L	T	P	C
Prerequisites: Basics of electronics		3	-	-	3

- To understand the efficacy of Electronic principles which are pervasive in engineering applications
- To familiarize tthe students of Electronics and Communication Engineering with the fundamental concepts of semiconductor devices, electronic circuits and communication systems

Course Outcomes:

On Completion of the course, students will be able to	
CO1:	To understand the basic knowledge of elements of circuits
CO2:	To understand the knowledge of semiconductor devices and their principle of operation
CO3:	To understand functions of communication system and different modulation technologies, definition of signals and classification of signals and its generation.
CO4:	To understand the working of CRO and its functionality.

UNIT-1

Introduction to Electronics Engineering: Overview, scope and objective of studying Electronics Engineering, Evolution and Impact of Electronics in industries and in society, Familiarization of Resistors, Capacitors, Inductors, Transformers and Electro mechanical components.

UNIT-2

Introduction to semiconductor devices: Band structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors

UNIT-3

Fundamentals to signals

Classification of signals, Elementary signals - Continuous Time (CT) signals, Discrete Time (DT) signals, Basic operations on signals

Signal Generators: Types of generators and their operation: The sine wave generator, Audio oscillator, Function generators, Pulse generators, AF signal generator, RF generators

UNIT-4

Introduction to Communication Systems: Elements of a communication system - transmitter and receiver; transmission - basic concepts of amplitude and frequency modulation, Examples of telecommunication systems - telephone, radio, television, mobile communication and satellite communication

UNIT-5

Electronic Dynamics and CRO

Motion of charged particles in electric and magnetic fields. Simple problems involving like Electric and Magnetic field only. Electrostatic and magnetic focusing. Principles of CRT, Deflection sensitivity (Electrostatic and magnetic deflection) Applications of CRO: Voltage current and frequency measurements.

Text Books

[1] David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008

[2] D.P. Kothari, I. J. Nagrath, "Basic Electronics", McGraw Hill Education (India) Private Limited, 2014.

[3] S Salivahanan, N Suresh Kumar Basic Electronics and Devices ,McGraw Hill Education (India) Private Limited,2018

[4] Boylstead R.L., Nashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

[5] Millman J., Halkias C.C., Jit S., "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition

[6] Kennedy G., Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

[7] Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition

Web-Resources:

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	3	-	-	-	-	-	-	2	-	-	3	-
CO2	3	-	-	-	-	-	2	-	-	-	2	-
CO3	3	-	-	-	-	-	2	-	-	1	-	-
CO4	2	-	-	-	-	-	2	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I Sem.			
Course Code	PROBLEM SOLVING & PROGRAMMING IN C CSE & ECE				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Logical Ability		3	0	0	3

Course Objective(s):

- To provide exposure to problem solving through programming.
- To train the student to the basic concepts of C-programming language.
- The course involves a lab component which is designed to give the student hands-on experience with the concepts.

Course Outcomes:

After successful completion of this course, a student 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 Computer Programming: Computer Languages: Machine level, Assembly level and High-level language.

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

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, ReemaThareja, OXFORD.

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	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-										

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	APPLIED PHYSICS LABORATORY (For All Circuital Branches like ECE, EEE, CSE, CSE (AI & ML), CSE (Cyber Security) etc)				
Teaching	Total contact hours- 48	L	T	P	C
		0	0	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 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. Determination of wavelength by plane diffraction grating method
3. Resolving power of a grating
4. Magnetic field along the axis of a circular coil carrying current
5. To determine the energy gap of a semiconductor
6. Measurement of resistance with varying temperature
7. To determine the V-I characteristics of P-N Junction diode
8. To determine the V-I characteristics Zener diode
9. To determine the resistivity of semiconductor by Four probe method
10. To determine the carrier concentration and Hall coefficient

Additional Experiments

1. Determine the thickness of the fiber using wedge shape method
2. To verify the laws of vibration using sonometer
3. To determine the acceleration due to gravity using compound pendulum
4. Rigidity modulus of material of a wire-dynamic method (torsion pendulum)
5. Moment of inertia by Flywheel

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

ELECTRONIC ENGINEERING WORKSHOP
I Year – I Sem
LIST OF EXPERIMENTS

1. Drawing of Electronic circuit diagrams using IEEE Symbols
2. Identification of electronic Components with specification (Active and Passive Components)
3. Calculations by using Multimeters, ammeter, voltmeter
4. Generation of different waveforms using Function Generators
5. Study of Power Supply
6. Study of CRO, measurements and generation of Lissajous patterns
7. Testing of Electronic Components (Resistors, Capacitors, Diode, Transistors)
8. Soldering Practice
9. PCB Layout and Design
10. Design of LED Blinking Circuit
11. Study of Rectifiers (Half wave)
12. Study of Rectifiers (Full Wave – Centre Tap)
13. Study of Op-Amps
14. Implementations of Logic Gates
15. Implementation of Boolean Laws
16. Implementation of Demorgan's Theorem.

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I Sem.			
Course Code	PROBLEM SOLVING & PROGRAMMING IN C LAB CSE & ECE				
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):

- To provide exposure to problem solving through programming.
- To train the student to the basic concepts of C-programming language.
- The course involves a lab component which is designed to give the student hands-on experience with the concepts.

Course Outcome(s):

After successful completion of this course, a student 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.

Programs:

1. Write a C Program to
   a) Calculate the area of triangle using the formula
      Area = (s (s-a) (s-b) (s-c)) 1/2, where s= (a+b+c)/2
   b) To find the largest of three numbers using ternary operator.
   c) To swap two numbers without using a temporary variable.

2. Write a C program that perform the following operations:
   a) Reading and writing a complex number
   b) Addition of two complex numbers

3. Write a C program to
   a) 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.
   b) Find the roots of a quadratic equation
   c) 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)

4. Write a C Program to print the following patterns
   a) Floyd's triangle
   b) Pyramid
   c) 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

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	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech I SEM			
CourseCode	ENVIRONMENTAL SCIENCE (Common to All Branches)				
Teaching	Totalcontacthours–32h	L	T	P	C
Prerequisite(s): KnowledgeofEnvironment Science		2	0	0	0

Course Objective: To bring in the students an awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and study the causes for pollution due to the day-to-day activities of human life, to save earth from the interventions by the engineers.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
CO2:	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
CO3:	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
CO4:	Recognize the interconnectedness of human dependence on the earth's ecosystems
CO5:	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

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:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. 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-sports 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

Definition, Cause, effects and control measures of:Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, 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

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

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 ErachBharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.AzeemUnnisa, 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 byJ.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)

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. (II Semester)			
Course Code XXXXXXX	MATHEMATICS - II (ALL BRANCHES)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Fundamentals of differentiation and interation.		3	0	0	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-	
CO1:	Solve first order differential equations.
CO2:	Solve higher order differential equations with constant coefficients.
CO3:	Apply the knowledge of approximating and find the roots of polynomial and transcendental equation in practical engineering problems.
CO4:	Understand numerical differentiation and integration.
CO5:	Apply the Knowledge of different algorithms for approximating the solution of ordinary differential equations in practical Engineering problems.

Syllabus:

UNIT I: Mean value theorems, First Order differential equations & Applications **10 hrs**

Rolle's theorem, Lagrange's mean value theorem, Cauchy mean value theorem.
Formation of differential equation, Solutions of Exact and Reducible to exact, Linear and Bernoulli differential equations. Applications: Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

UNIT II: Higher Order Differential Equations and Applications **10 hrs**

Solutions of higher order differential equations with constant coefficients. Solutions of Non-homogeneous equations of higher order with constant coefficients with RHS term of the form $e^{ax}, sinax, cosax,$ Polynomials in $x, e^{ax}V(x), xV(x)$. Method of variation of parameters. Applications: Mass spring system and L-C-R Circuit problems.

Unit III: Solutions of Algebraic, Transcendental Equations and Interpolation **8 hrs**

Introduction, Bisection method, Regula-Falsi method and Newton-Raphson method.
Interpolation: Newton's Forward and backward formulae, Lagrange's interpolation.

UNIT IV: Numerical Differentiation and Integration **10 hrs**

Numerical differentiation: Forward and backward difference formulae. Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rule.

UNIT V: Numerical Solution of Ordinary Differential Equations **10 hrs**

Solutions of ordinary differential equations- Taylor's series, Euler method, Modified Euler method, Runge-Kutta method (Second and fourth order) for first initial value problems.

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. Michael Greenberg. Advanced Engineering Mathematics, 2/e, Pearson, 2018
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-I, S.Chand Publicatiobns, 2016.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

Web Links:

1. https://nptel.ac.in/courses/111108081/
2. https://nptel.ac.in/courses/111105093/

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	2	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	1
CO4	3	3	3	2	-	-	-	-	-	-	-	1
CO5	3	3	2	2	-	-	-	-	-	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech II SEM			
Course Code	ENGINEERING CHEMISTRY (Common to All Branches)				
Teaching	Total contact hours–48h	L	T	P	C
Prerequisite(s): Knowledge of theoretical and experimental concepts from Intermediate level, Application of Chemistry theory and calculations required for the course.		3	0	0	3

Course Objective:

To acquaint the students with soft and hard water types and softening methods, to introduce the basic concepts of electrochemical cells and photovoltaic cells and to familiarize the students with engineering materials, their properties and applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the removal techniques of hardness of water
CO2	Distinguish the fuel cells and batteries
CO3	Identify different control techniques of corrosion
CO4	Understand the concepts of plastics and rubbers
CO5	Analyze the importance of nano materials

Syllabus

UNIT –I

WATER TECHNOLOGY

Hardness of water, Determination of hardness by EDTA Method - Boiler troubles - scale and sludge-priming and foaming (reasons and its preventions), specifications for drinking water by World Health Organization (WHO) standards, municipal water treatment or portable water treatment, softening of water - Lime soda process, zeolite and ion-exchange processes, Desalination of brackish water, reverse osmosis (RO) and electro dialysis.

UNIT – II

ENERGY SOURCES AND APPLICATIONS

Electrode potential, determination of single electrode potential –Nernst's equation, reference electrodes, hydrogen and calomel electrodes – electrochemical series and its applications – primary cell, dry or Leclanche cell – secondary cell, lead acid storage cell, nickel-cadmium cell – lithium ion batteries (Lithium-MnO_2) – fuel cell, hydrogen-oxygen fuel cell, Solar cell and its applications.

UNIT – III

CORROSION ENGINEERING

Corrosion: Definition – theories of corrosion, chemical and electro chemical corrosion – pitting corrosion, differential aemtion corrosion, passivity, factors affecting corrosion – nature of the metal and nature of the environment.

Corrosion Controlling Methods: Sacrificial and Impressed current cathodic protection, Metallic coatings (anodic, cathodic), applying of metallic coatings - galvanizing and tinning, metal cladding, electroplating, organic surface coatings, paints (constituents and their functions).

UNIT – IV

POLYMERS

Introduction to polymers and monomers,polymerization and its types,mechanism of addition polymerization, compounding and fabrication of plastics, differences between thermoplastic and thermo setting resins, Preparation, properties and uses of Urea-Formaldehye, PVC andpolyethylene, Natural Rubber-vulcanization of rubber, Preparation, properties and uses of BUNA-S and BUNA-N Rubber, conducting polymers and its applications.

UNIT – V

NANO MATERIALS

Introduction to Nano materials, Nano structured materials-nano rods,nano sheets, Quantum dots,Methods of preparationsbybottom up and top-down approaches -ball milling,sol-gel methods, Characterization of nanoparticles by XRD, SEM andTEM (includes basic principle of TEM), Applications of nanomaterials.

Text Books:

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakasham, (2014).

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. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010)
4. V. Raghavan, A Material Science and Engineering, Prentice-Hall India Ltd, (2004).
5. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).

Weblinks

1. www.btechguru.com/courses--nptel--chemistry-and-biochemistry-video-lecture--che.html
2. www.chem.tufts.edu

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	-	-	2	-	-	2
CO2	3	3	3	2	3	3	-	-	3	-	-	3
CO3	3	3	2	2	2	2	-	-	2	-	2	2
CO4	3	3	3	2	2	3	-	-	2	-	-	3
CO5	3	3	3	2	3	3	-	-	3	-	-	3

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2nd Semester)			
Course Code	**Engineering Graphics (Common to EEE, ECE and CSE)**				
Teaching	Total contact hours- 60	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.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech II SEM.			
CourseCode	DATA STRUCTURES USING C				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics and C Language		1	0	4	3

Course Objective(s):

- Be familiar with basic techniques of algorithm analysis.
- Be familiar with writing recursive methods
- Be familiar with several sub-quadratic sorting algorithms including quick sort and merge sort
- Master the implementation of data structures such as stacks and queues.
- Master the implementation of linked data structures such as linked lists , graphs and binary trees
- Comprehensive knowledge of data structures and ability to implement the same inSoftware applications

Course Outcome(s):

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

CO-1: To be able to choose appropriate data structure as applied to specified problem definition.

CO-2: To be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

CO-3: To be able to apply concepts learned in various domains like DBMS, compiler construction.

CO-4: To be able to use linear and non-linear data structures like stacks, queues, linked list etc.

UNIT-1

Data structure- Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence.

Preliminaries of algorithm, Algorithm analysis and complexity.

Searching Techniques: Linear Search, Binary Search and Fibonacci Search.

Sorting Techniques: Insertion sort, selection sort, exchange-bubble sort, quick sort and merge sort Algorithms.

UNIT-2

Stacks: Basic Stack Operations, Representation of a Stack using Arrays,

Applications of Stack: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

UNIT-3

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of QueueOperations using Stack.

Applications of Queues: Circular Queues, De-queue, PriorityQueues.

UNIT-4

Linked Lists: Introduction, single linked list, representation of a linked list in memory,Operations on a single linked list, reversing a single linked list, Circular linked listand Double linked list.

UNIT-5

Trees-Binary Trees, terminology, representation and traversals-pre, post & in order traversals.

Graphs- terminology, representation and traversals (BFS&DFS).

Text Books

1. Data Structures with C, Seymour Lipscutz, Schaum's Outlines, TMH-special 2nd Edition
2. Data structures using C, 2nd Edition, ReemaThareja, Oxford higher education.

Reference Books

1. Data structures: A Pseudo code Approach with C, 2nd edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning
2. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.
3. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
4. Data Structures using C, A.M.Tanenbaum, Y. Langsam, M.J.Augenstein, Pearson.

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	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common for Mech, CE, AME, PET, MM, ECE, EEE)**				
Teaching	Total contact hours-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-	
CO1:	Analyze the various electrical networks
CO2:	Understand the operation of DC machines,3-point starter and conduct the Swinburne's Test.
CO3:	Analyze the performance of transformer, operation of 3-phase alternator and 3-phase induction motors.
CO4:	Analyze the operation of half Wave, full wave rectifiers, op-amps.
CO5:	Explain the single stage CE amplifier and concept of feedback amplifier.

Syllabus:

UNIT –I Introduction to Electrical Circuits

Basic definitions, Electrical circuit elements (R, L and C), Ohm's Law, Series & Parallel circuits, Kirchhoff's Laws, Simple problems.

UNIT- II DC Generator

Generator-Principle of Operation, Construction, EMF equation, Classification, O.C.C, internal and external characteristics of shunt generator, Applications.

UNIT- III DC Motor

Motor-principle of operation, Torque equation, Classification Speed Control Methods, Operation of 3 point starter, Applications.

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.

Regulation GRBT-20	Godavari Institute of Engineering and Technology (Autonomous)	I B.Tech II SEM			
CourseCode	ENGINEERING CHEMISTRY LABORATORY (Common to All Branches)				
Teaching	Total contact hours - 45	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 Urea-Formaldehyde resin
9. Estimation of active chlorine content in Bleaching powder
10. Estimation of sodium hydroxide with HCl

Demonstration Experiments

1. Determination of viscosity of a liquid
2. Determination of surface tension of a liquid

3. Estimation of vitamin-C

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).

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	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

Text books:

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
3. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
4. Electrical Technology by Surinder Pal Bali, Pearson Publications.
5. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group

Reference Books:

1. Basic Electrical Engineering by M.S.Naidu and S.Ka1nakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2th edition
3. Basic Electrical Engineering by Nagsarlcar, 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
CO1	2	3	2	1	3	-	-	2	-	1	-	1
CO2	2	3	-	-	3	-	-	2	3	-	-	1
CO3	2	3	-	-	3	-	-	2	3	-	-	1
CO4	2	1	2	-	3	-	-	2	2	-	-	1
CO5	2	1	-	-	3	-	-	2	-	1	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. IISemester			
Course Code	COMMUNICATIVE ENGLISH LAB				
Teaching hours	TotalContacthours–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		0 -	0	3	1.5

Course Objectives: This 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
- Improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Explore the important language needs of the learner
- Build Language efficacy in both speaking and listening context

Course Outcomes: On Completion of the course, the students will be able to

CO1:	Learn to communicate in English
CO2:	Comprehend native speaker's accent.
CO3:	Speak appropriately in real life situations
CO4:	Display public speaking skills in the required context
CO5:	Handle different communicative situations

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

Approval of External BOS:

Listening: Listening to audio texts, framing question in order to find out the gist of the unknown 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:** Asking for Clarifications, Inviting others, Expressing Sympathy, Congratulating, Apologizing, Advising, Suggesting, Agreeing and Disagreeing.

UNIT 4: LANGUAGE APPPLICATOIN

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: INTERPRETATIONS

Listening: TED Talks – understanding the summary. **Speaking:** Formal oral presentations on topics from academic contexts and technical back ground. Giving formal explanations.

Lab Manual: INTERACT by Orient Black Swan

SOFTWARE: Cambridge –UNLOCK-2, English In Mind, Pronunciation Power, English grammar in Use

Reference Books:

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

WEB RESOURCES:

1. https://www.usingenglish.com/comprehension
2. https://www.englishclub.com/reading/short-stories.htm
3. https://www.english-online.com

(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	-	-	-	3
CO2	-	-	-	-	-	2	3	2	-	-	-	1
CO3	-	-	-	-	-	3	2	3	-	-	-	1
CO4	-	-	-	-	-	3	2	2	-	-	-	2
CO5	-	-	-	-	-	2	2	2	-	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech			
Course Code	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (Common for Mech, CE, AME, PET, MM, ECE, EEE)**				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisite(s): Basics of Physics		0	0	3	1.5

Course Objectives:

1. To verify the Kirchhoff's laws & Ohm's law
2. To calculate the efficiencies of transformers, DC motors, Three-phase Induction Motor
3. To plot the characteristics of PN junction diode & operational amplifier
4. To plot the characteristics of Transistor

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze the various electrical networks
C02:	Understand the operation or DC machines,3 -point starter and conduct the Swinburne's Test.
C03:	Analyze the performance oi 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.

List of Experiments:

1. Verification of Kirchhoff's laws
2. Verification of Ohm's laws
3. Study of various wiring components (wires, switches, fuses, sockets, plugs, Lamp holders, lamps etc. their uses and ratings)
4. Measurement of current, voltage, power in R-L-C series circuit excited by single phase supply
5. Verification of voltage & current relations in Star & delta connections
6. Swinburne's test on a DC shunt machine.
7. Transistor common base characteristics
8. Speed control of D.C. Shunt motor by Armature Voltage control and Field flux control method
9. Efficiency and regulation of a single phase transformer by direct loading method.
10. Brake test on a three phase induction motor
11. PN junction Diode characteristics a). Forward bias b).Reverse bias. (Cut in voltage & Resistance calculations)
12. Zener diode characteristics
13. Half wave rectifier
14. Full wave Rectifier
15. Transistor common emitter characteristics.

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	1	3	-		2		1		1
CO2	2	3			3			2	3			1
CO3	2	3	-		3			2	3			1
CO4	2	1	2		3			2	2			1
CO5	2	1			3			2		1		1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	**ELECTRONIC DEVICES AND CIRCUITS**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisite(s):Knowledge of engineering physics related to semiconductors		3	1	-	3

Course Objective:

1. To introduce components such as diodes, BJTs and FETs
2. To know the applications of components.
3. To know the switching characteristics of components
4. To give understanding of various types of amplifier circuits.
5. 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:	Understand the characteristics of various electronic components.
CO2:	Know the construction, working principle of rectifiers with and without filters
CO3:	Understand the utilization of components.
CO4:	Understand the biasing techniques
CO5:	Gain knowledge of small signal low frequency transistor amplifier models

Syllabus:

UNIT-I: REVIEW OF SEMICONDUCTOR PHYSICS

Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

JUNCTION DIODE CHARACTERISTICS

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

UNIT-II: DIODES AND APPLICATIONS

Diode – Diode Equation, Diode Resistance and Capacitance, Diode Applications.

Rectifiers - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT-III: BIPOLAR JUNCTION TRANSISTOR

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations and their Characteristics, Transistor as a switch, Ebers-Moll model of a transistor, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Voltage Divider Bias, Stability, Stability factors,(S,S',S'') and Compensation Techniques.

UNIT- IV: JUNCTION FIELD EFFECT TRANSISTOR & SPECIAL PURPOSE DEVICES

Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Biasing of FET.

SPECIAL PURPOSE DEVICES: Zener Diode - Characteristics, Voltage Regulator. Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, LED, Photo Diode.

UNIT-V: SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER MODELS

BJT: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors in CE Amplifier.

FET: Small Signal Model, Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers. MOSFET Characteristics in Enhancement and Depletion mode

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition, 2007

2.Electronic Devices and Circuits-K. Lal Kishore, BS Publications, Fourth Edition, 2016.
3.Electronics devices & circuit theory- Robert L. Boylestad and Loui Nashelsky, Pearson/Prentice hall, tenth edition,2009

References:

1.Integrated Electronics-J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition,2009
2.Electronic Devices and Integrated Circuits – B.P. Singh, Rekha , Pearson publications,
3.Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, 4th Edition,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
CO1	3	2	1	--	3	--	1	---	1	--	1	3
CO2	1	1	2	--	3	--	--	---	2	1	-	3
CO3	3	2	3	1	3	1	2	1	--	--	1	1
CO4	3	1	3	2	1	--	--	---	---	1	1	---
CO5	--	1	1	--	3	2	3	1	3	---	---	1

Regulation	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3rd semester)			
Course Code	**NETWORK ANALYSIS**				
Teaching	Total contact hours – 50	L	T	P	C
Prerequisites: Knowledge of Engineering Physics and Basic electronic engineering.		3	1	-	3

Course Objectives:

1. Familiarize with the fundamentals of electrical circuits and basic electrical laws.
2. Familiarize with various analysis techniques for AC circuits.
3. Understand different types of theorems
4. Understand the concept of two port network and their relations.
5. Study the concept of transient and steady state analysis.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze the basic concepts of circuits and different models of laws
CO2:	Apply the outputs of different elements in complex RLC circuits and get the response
CO3:	Apply the rules of different dot notation and solve the coupled network output, understand the concept of resonance and hence design the circuits under resonance.
CO4:	Understand and apply the different theorems in circuits, evaluating the values of two-port networks parameters by the basic concepts of two-port networks.
CO5:	Understand the concept of transient circuits and apply the concept for problem solving

Syllabus:

UNIT-I BASIC CIRCUIT FUNDAMENTALS

Network elements classification, Energy sources - Independent and dependent sources, Source transformation, Kirchhoff's laws, Mesh analysis and Nodal analysis .

AC Fundamentals : Definitions of terms associated with periodic functions: Time period, Angular velocity and freqency, RMS value, Average value, Form factor and peak factor-numerical problems, Phase angle, Phasor representation, Addition and subtraction of phasor, mathematical representation of sinusoidal quantities, explanation with relevant theory, numerical problems. Principal of Duality with examples.

Network Topology: Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule.

UNIT- II STEADY STATE ANALYSIS OF AC CIRCUITS

Response to sinusoidal excitation - Impedance concept,series R,L,C circuits numerical problems. Complex impedance and phasor notation for R,L,C, Star-Delta conversion, numerical problems.Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, anti resonance at all frequencies.

Coupled Circuits : Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

UNIT-III NETWORK THEOREMS and RESONANCE

Thevenin's, Norton's, Superposition, Milliman's, Reciprocity, Compensation, Substitution, Max Power Transfer, Tellegens- dependent and independent sources- both with DC & AC excitation. **Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth ofparallel resonance, general case-resistance present in both branches

UNIT- IV TWO-PORT NETWORKS

Z-parameters, Y-parameters, h-parameters ,Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks

UNIT- V TRANSIENTS

First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation,

Text Books:

1. Hayt W. H., Kemmerly J. E. and Durbin S. M., "Engineering Circuit Analysis", 6th Ed., TataMcGraw-Hill Publishing Company Ltd.,2008.
2. M.E. Van Valkenburg, "Network Synthesis," PHI 2007.
3. A. Chakrabarti , Circuit Theory- Analysis and Synthesis, Dhanpat Rai & Co.

References:

1. Circuits and Networks by A.Sudhakar and Shyammohan S palli 5th edition TataMcGraw-Hill Publishing Company Ltd.,2008.
2. Network Analysis – N C Jagan, C Lakshminarayana

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)

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	**SWITCHING THEORY AND LOGIC DESIGN**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisite(s): Set theory and number system		3	1	-	3

Course Objective:

1. To learn basic techniques of various number system to understand the switching systems.
2. To understand common forms of number representation in digital electronic Circuits
3. To design combinational logic circuits, sequential logic circuits
4. To impart to student the concepts of sequential circuits, enabling them to analyse Sequential systems in terms of state machines
5. To implement synchronous state machines using flip-flops.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand number systems, binary addition and subtraction, 2's complement representation and operations and understand the different binary codes
CO2:	Explain switching algebra theorems and apply them for logic functions
CO3:	Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map and Tabulation method.
CO4:	Analyse the design procedures of Combinational logic circuits
CO5:	Analyse the design procedures of sequential logic circuits

State diagram and state equation and Conversion of flip-flops. Design of asynchronous and synchronous counters, Johnson and ring counters, Shift register

Unit-V Sequential circuits-II

Introduction to state machines, State diagrams, State tables and state equations, Finite statemachines: Analysis of clocked sequential circuits, Reduction of state tables, state diagrams and state assignments, Design procedure, Mealy and Moore models, Mealy to Moore conversion and vice-versa

Text books:

1. Digital Design, M. Morris Mano, Prentice Hall; 3 edition (August 1, 2001).

2. Switching and Finite automata theory – ZviKohavi, Tata McGraw – Hill, 1978, 2/e.

Reference Books:

1. Fundamentals of Logic Design – Charles H. Roth Jr, Jaico Publishers.

2. Fundamentals of Digital Circuits, Anand Kumar A, PHI; 2nd edition (8 June 2012).

Web Links:

1. http://www.ni.com/example/14493/en/

2. http://nptel.ac.in/courses/117106086/2

CO-PO Mapping

1: Slight (Low) 2:Moderate(Medium) 3:Substantial(High) -: No correlation

Course Code :Switching Theory and Logic Design													
Course Designed by			Department of Electronics and Communication										
	Program Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Course Outcomes	CO 1	3	3	2	3	2	1	-	-	-	-	-	3
	CO 2	3	3	2	3	1	2	-	-	-	-	-	3
	CO 3	3	3	3	3	1	1	-	-	-	-	-	3
	CO4	3	3	3	2	2	1	-	-	-	-	-	3
	CO5	3	3	3	3	3	1	-	-	-	-	-	3

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	**SIGNALS AND SYSTEMS**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisite(s): Knowledge of Mathematics-I.		3	1	-	3

Course Objective:

1. To study about signals and systems and its properties.
2. To analyze the spectral characteristics of signals using Fourier series and Fourier transforms.
3. To understand the Concepts of convolution and correlation with respect to LTI systems.
4. To know various transform techniques to analyze the signals and systems.
5. To introduce the concept of sampling process.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Differentiate the various classifications of signals and systems.
CO2:	Analyze the frequency domain representation of signals using Fourier concepts.
CO3:	Analyze the Convolution and Correlation with respect to LTI systems.
CO4:	Apply z-transforms to analyze signals and Systems.
CO5:	Know the sampling process and various types of sampling techniques

Syllabus:

Unit- I INTRODUCTION TO SIGNALS AND SYSTEMS:

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling.

Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Related problems.

Unit-II FOURIER SERIES AND FOURIER TRANSFORM:

Representation of Fourier series in both Trigonometric and Exponential forms and its relationship, Deriving Fourier transform from Fourier series, Fourier transform of standard, Fourier transform of arbitrary and Fourier transform of periodic signals, Magnitude and Phase response, properties of Fourier transforms.

Unit-III ANALYSIS OF LINEAR SYSTEM:

Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV)system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time

Unit –IV CORRELATION:

Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

SAMPLING THEOREM: Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling, Related problems.

UNIT–V: Z–TRANSFORM:

Concept of Z-Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms. Revision of Laplace Transform ,ROC for various signals Distinction between Laplace, Fourier and Z transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications,2003.

2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI,2nd Edn,1997 3. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2ndEdition,2007

REFERENCE BOOKS:

1. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press,2015

2. Signals and Systems – T K Rawat , Oxford University press,2011

3. Signals and Systems – P. Ramakrishna Rao and Shankar Prakriya, McGraw Hill Education; 2nd edition 2017.

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	1	1	-	-	-	-	-	-
CO2	3	2	2	2	2	1	-	-	-	-	-	-
CO3	3	2	2	2	1	2	-	-	-	-	-	-
CO4	2	2	2	2	2	2	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (III Semester)			
Course Code XXXXX	**MATHEMATICS-III** (Common to ECE, EEE, AME, MECH, PET, MM, CE)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Derivatives, integration and complex number To familiarize the transform techniques and complex variables.		3	0	0	3

Course Objective:

- To familiarize the techniques in partial differential equations 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-	
CO1:	Apply the knowledge of Beta and Gamma function.
CO2:	Apply the knowledge of Laplace Transforms.
CO3:	Evaluate Fourier series for different functions. Understand properties of Fourier transformation apply for different function.
CO4:	Solve first order partial differential equations.
CO5:	Solve high order partial differential equations with constant coefficients.

Syllabus:

Unit I: Beta and Gamma function **8hrs**

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

Unit II: Laplace Transforms **10 hrs**

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 and Fourier Transforms **10 hrs**

Dirichlet's conditions, Fourier series, functions of any period, odd and even functions - half range series. Fourier integrals, Fourier cosine and sine integrals, Fourier transform, sine and cosine transform.

Unit IV: First Order Partial Differential Equations **10 hrs**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions. Solutions of first order linear (Lagrange) partial differential equation and nonlinear (Standard types) equations.

Unit V: Higher Order Partial Differential Equations **10hrs**

Solutions of linear partial differential equations with constant coefficients. RHS term of the type $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$. Method of separation of variables. Solutions of one dimensional wave, Heat and two-dimensional Laplace equation.

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/

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	-	-	-	-	-	-	-	1
CO2	3	3	3	1	-	-	-	-	-	-	-	1
CO3	3	3	3	1	-	-	-	-	-	-	-	1
CO4	2	3	3	1	-	-	-	-	-	-	-	1
CO5	3	3	3	1	-	-	-	-	-	-	-	1

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	II B.Tech I Semester			
Course Code	PROGRAMMING WITH JAVA LAB ECE				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s): Basic understanding of any Programming language and OOPS concepts		0	0	3	1.5

Course Objective(s):

- This course is intended to teach the Java programming language.
- To develop the skills of programming for Object oriented concepts.

Course Outcomes:

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

CO-1: Identify classes, objects, members of a class and the relationship among them needed for a specific problem

CO-2: Implement programs to distinguish different forms of inheritance and Exception Handling mechanism

CO-3: Create packages and to reuse them

CO-4: Develop multithreaded application using synchronization concept.

CO-5: Design GUI based applications using Swings and AWT.

List of Programs:

1. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1.Every subsequent value is the sum of the 2 values preceding it. Write a Java Program that uses both recursive and non-recursive functions to print then n^{th} value of the Fibonacci sequence.
2. a. Write a Java Program that prompts the user for an integer and then prints out all the prime numbers up to that integer.
   b. Write a java program to implement call-by-value and call- by-reference mechanisms.
3. a. Write a Java Program that checks whether a given string is a palindrome or not.
   b. Write a Java Program to check the compatibility for multiplication, if compatible multiply two matrices and find its transpose.
4. Write a Java program to implement constructor overloading and method overloading.
5. Write a Java Program that illustrates how run time polymorphism is achieved.
6. Write a Java Program that illustrates the use of super keyword.
7. Write a Java Program to create and demonstrate packages.
8. Write a Java Program, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
9. Write a Java Program that reads on file name form the user then displays information about whether the file exists, whether the file is readable/ writable, the type of file and the length of the file in bytes and display the content of the using File Input Stream class.
10. Write a Java Program that display the number of characters, lines and words in a text/text file.
11. Write a Java Program to implement a Queue, using user defined Exception Handling (also make use of throw. throws).

12. Write a Java Program demonstrating the life cycle of a thread.
13. Write an Applet that displays the content of a file.
14. Write a Java Program that works as a simple calculator. Use a grid lay out to arrange buttons for the digits and for the +-*?% operations. Add a text field to display the result
15. Write a Java Program for handling mouse events, keyboard events.
16. a. Write a Java Program that allows user to draw lines, rectangles and ovals.
    b. Write a Java Program that lets users create Pie charts. Design your own user interface (with Swings & AWT).

References:

- https://www.tutorialspoint.com/java/index.htm
- https://www.javatpoint.com/
- https://www.geeksforgeeks.org/java/?ref=ghm

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)				IIB.Tech. I Sem (3 semester)			
CourseCode	**Electronic Devices and Circuits Lab** **(Common for ECE and EEE)**							
Teaching	Totalcontacthours-36				L	T	P	C
Prerequisite(s):Knowledge of Engineering physics related to semiconductor, mathematics like trigonometry, integration etc.					-	-	3	2

CO5	2	2	2	2	2	3	-	-	-	-	-	-

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. BJ T Characteristics (CE Configuration)

Part A: Input Characteristics

Part B: Output Characteristics

5. BJ T 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. UJ T Characteristics

9. Transistor Biasing

10. CRO Operation and its Measurements using lissajous figures

11. BJT-CE Amplifier

12. Emitter Follower-CC Amplifier

13. FET-CS Amplifier

14. LED Characteristics

15. LDR Characteristics

16. Photo Diode Characteristics

17. 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.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	2	1	--	3	--	1	---	1	--	1	3
CO2	1	1	2	--	3	--	--	---	2	1	-	3
CO3	3	2	3	1	3	1	2	1	--	--	1	1
CO4	3	1	3	2	1	--	--	---	---	1	1	---
CO5	--	1	1	--	3	2	3	1	3	---	---	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 semester)			
Course Code	**NETWORK ANALYSIS LAB**				
Teaching	Total contact hours-36	L	T	P	C
Prerequisite(s):Knowledge of Engineering Mathematics, Network analysis		-	-	3	2

Course Objective:

1. To Observe the working nature of different electrical measuring equipments
2. To Verify different theorems in networks.
3. To Observe the pattern of series and parallel resonance.
4. To Calculate different parameters of the given two-port networks

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the working nature of different electrical measuring equipment
CO2:	Verify the working of different theorems like Norton's ,Thevinen's Etc.
CO3:	Observe the concept of parallel and series resonance.
CO4:	Understand the concept of two-port networks and calculate the parameters.

Syllabus:

List of Experiments:

1. Verification of Thevinen's and Norton's theorem.
2. Verification of super position theorem of Maximum power transfer theorem.
3. Verifica[illegible] compensation theorem and reciprocity theorem.

4. Verification of Milliman's theorem.

5. Calculation of Z-parameters.

6. Series and parallel resonance.

7. Determination of self, mutual induction and co-efficient of coupling.

8. Calculation of Y-parameters.

9. Tansmision line parameters and hybrid parameters calculation.

10. Measurement of active power for star and delta connected balanced loads.

11. Measurement of re-active power for star and delta connected balanced loads.

12. Measurement of 3 phases power by 2 watt meter method for unbalanced loads.

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	2	1	1	-	3	2	-	-	-	-	1	-
CO2	3	2	2	2	-	1	-	-	-	-	-	-
CO3	3	2	2	3	-	1	-	-	-	-	-	-
CO4	3	3	2	3	-	1	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	ENGLISH FOR CAREER				
Teaching	Total contact hours	L	T	P	C
Prerequisite(s): Learner should be equipped with Functional Grammatical skills and interactive ability					

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-	
CO1:	Understand the necessity to improve four language skills
CO2:	Acquire knowledge about public speaking ability
CO3:	Strengthen their grammatical skills in the language
CO4:	Improve necessary vocabulary and academic writing skills
CO5:	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
CO1	-	-	-	-	-	2	3	2	-	-	-	-
CO2	-	-	-	-	-	3	3	3	-	-	-	1
CO3	-	-	-	-	-	2	3	3	-	-	-	-
CO4	-	-	-	-	--	3	3	3	-	-	-	1
CO5	-	-	-	-	-	2	2	2	-	-	-	-

2-IV

GRBT 20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4th semester)			
Course Code	**ELECTRONIC CIRCUIT ANALYSIS**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisites: Knowledge of electronic devices and circuits & also solve the		3	1	-	3

Course Objectives:

1. Familiarize the student with the analysis and design of different amplifier circuits (single and multi stage) using BJT and FET's.
2. Small signal equivalent circuit analysis of BJT and FET amplifiers in different configurations is explained.
3. Cascading of single stage amplifiers is discussed and necessary expressions are derived.
4. The concept of feedback is introduced and effect of negative and positive feedback on amplifier characteristics is explained.
5. Different types of Power amplifiers and various tuned amplifier circuits are analyzed.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Knowledge on both single and multistage amplifiers, design and analysis of multi stage amplifiers using BJT and FET.
CO2:	Analysis of small signal low and high frequency transistor amplifier circuits using BJT and FET.
CO3:	The expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
CO4:	Know the classification of the power amplifiers and their efficiency.
CO5:	Analysis of Tuned amplifiers with performance comparison.

UNIT-I

SINGLE STAGE AMPLIFIERS

Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model, Analysis of CE amplifier with emitter resistance and emitter follower, Design of single stage RC coupled Amplifier using BJT.

MULTISTAGE AMPLIFIERS

Analysis of Cascaded RC coupled BJT amplifiers, Cascode Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier.

UNIT-II HIGH FREQUENCY RESPONSE OF AMPLIFIERS

Frequency response of BJT Amplifier, Analysis at low and high frequencies, Miller's theorem and its dual, Effect of coupling and bypass capacitors. The Hybrid pi model - Common Emitter Transistor Model, CE Short Circuit current gain, current gain with resistive load, Single stage CE transistor Amplifier Response, Gain - Bandwidth Product, Emitter follower at high frequencies.

MOS AMPLIFIERS: Basic Concepts, MOS Small signal model, Common source amplifier with resistive load.

UNIT–III FEEDBACK AMPLIFIERS

Concepts of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative examples.

OSCILLATORS

Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge and crystal Oscillators, Stability of Oscillators

UNIT–IV POWER AMPLIFIERS

Classification, Class A Power amplifiers, Transformer Coupled Class A Audio Power amplifier, Efficiency of class A amplifier, Class B Power amplifier, Efficiency of class B power Amplifier, class B Push pull power Amplifier, Complementary Symmetry Class B Push Pull power Amplifier, Distortion of Power Amplifiers, Thermal Stability and Heat sinks

UNIT–V TUNED AMPLIFIERS

SINGLE TUNED AMPLIFIERS

Introduction, Q Factor, classification of small signal tuned amplifiers, single tuned capacitance coupled amplifier, tapped single tuned capacitance coupled amplifier, single tuned inductively coupled amplifier, and Effect of Cascading Single tuned Amplifiers on bandwidth.

DOUBLE TUNED AMPLIFIERS: Introduction, double tuned amplifier, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, and Stability of tuned amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits Theory-Robert L. Boylestad, Louis Nashelsky (2006), 9th edition, Pearson/Prentice Hall, India.
2. Electronic Devices and Circuits -J.Millman, C.C. Halkias & S.Jit, TMH, 4th Edition,2015.

REFERENCES:

1. Integrated Electronics Analog & Digital Circuits and Systems (Jacob Millman, C. Halkies & C.D.Parikh, TMH, 2nd Edition,2010.
2. Microelectronics-Jacob Millman, Arvin Grabel (2003), 2nd edition, Tata McGraw Hill, New Delhi

Web Links:

1. www.electronics-tutorials.ws/
2. www.nptel.com
3. 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	2	3	1	2	1	-	-	-	-	-	-
CO2	2	3	2	1	2	2	-	-	-	-	-	-
CO3	2	1	2	3	3	-	-	-	-	-	-	-
CO4	1	3	2	3	1	2	-	-	-	-	-	-
CO5	3	3	2	2	3	1	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
CourseCode	**ANALOG COMMUNICATIONS**				
Teaching	Total contact hours–53	L	T	P	C
Prerequisites: Knowledge of Communication with in analog signals with relevant mathematical expressions		3	-	-	3

Course Objectives:

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Understand the concept of noise and detection of signals in presence of noise.
4. Understand different types of radio transmitters and receivers.
5. Study the concept of sampling and pulse modulation techniques.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the concept of communication systems, and analyze the mathematical expressions for AM modulation and demodulation.
CO2:	Relate the different modulation and demodulation techniques and analyze the noise calculations.
CO3:	Analyze generation and detection of FM signals in both time and frequency domains and its noise calculations.
CO4:	Explain various issues in AM and FM transmitters and receivers
CO5:	Sample analog signals and pulse modulation techniques.

Syllabus:

UNIT- I AMPLITUDE MODULATION

Introduction to communication system, Multiplexing, Frequency division multiplexing, Modulation, Need for modulation, Amplitude modulation:definition, time domain and frequency domain description, Single tone AM modulation, Power relations in AM waves, Generation of AM waves, Square law modulator, Switching modulator, Detection of AM waves; Square law detector, Envelope detector, Noise in analog communication system, Figure of merit of AM system

UNIT- II DSB& SSB MODULATION

Double side band suppressed carrier modulators,Balanced modulators, Ring modulator, Coherent detection of DSB-SC modulated waves, COSTAS Loop, SSB:Frequency and Phase discrimination method of SSB, Demodulation of SSB,Generation of VSB, Detection of VSB, Figure of meritof DSB & SSB system

UNIT- III ANGLE MODULATION

Frequency Modulation: Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow band FM, Wide band FM, Generation of FM waves, Direct FM, Detection of FM waves: Balanced frequency discriminator, zero crossing detector, Phase locked loop, Comparison of FM & AM, figure of merit of FM, Threshold effect in angle modulation system, Pre-emphasis & de-emphasis.

UNIT-IV TRANSMITTERS& RECEIVERS

RADIO TRANSMITTER: Classification of transmitter, AM transmitter, Effect of feedback on performance of AM transmitter, FM transmitter; Variable reactance type and Indirect FM transmitter, Frequency stability in FM transmitter.

RADIO RECEIVER: Tuned radio frequency receiver, Super–heterodyne receiver,RF characteristics, AGC, Amplitude limiting.

UNIT- V PULSE MODULATION

Sampling: Nyquist rate and sampling theorem, Time division multiplexing, Types of pulsemodulation, PAM (Single polarity, double polarity), PAM Demodulation, PWM: Generation &demodulation of PWM, PPM, Generation and demodulation of PPM, TDMVs FDM.

Text Books:

1. H Taub& D. Schilling, GautamSahe, "Principles of Communication Systems," TMH, 2007 3rd Edition.
2. B.P. Lathi, "Communication Systems," BS Publication, 2006.
3. Electronics & Communication System – George Kennedy andBernard Davis, TMH 2004.

References:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
2. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

3. Communication Systems– R.P. Singh, SP Sapre, Second EditionTMH, 2007.

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)

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4th semester)			
Course Code	**RANDOM VARIABLES AND STOCHASTIC PROCESSES**				
Teaching	Total contact hours-50	L	T	P	C
Prerequisites: Mathematics basics like integral and differential calculus		3	1	-	3

Course Objectives:

1. To give students an introduction to elementary probability theory so that they can use the concepts of statistical analysis.
2. To teach students how to apply sums and integrals to compute probabilities, means and expectations.
3. To mathematically model the random process with the help of probability theory Concepts.
4. To introduce the importance of random variables, probability distribution and stochastic processes.
5. To analyze the LTI systems with input as a random process.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand probabilities and able to solve using an appropriate sample space.
CO2:	Compute various operations like expectations from probability density functions (pdfs) and probability distribution functions
CO3:	Perform Likelihood ratio tests from pdf for statistical engineering problems.
CO4:	Mean and covariance functions for simple random variables. Understand Auto-correlation and cross correlation properties between two random variables.
CO5:	Explain the concept of random process, differentiate between stochastic and Ergodic processes and power density spectrum of a random process with random inputs.

Syllabus:

UNIT I: PROBABILITY AND RANDOM VARIABLE:

THE RANDOM VARIABLE: Concepts of probability, random experiments, sample space, events and nature of events Probability, Types Of Axioms, Random Variable- Properties, Types of Distribution Functions – Probability Mass Function, Probability Density Function, -Properties, Binomial, Poisson, Uniform, Normal, Exponential and Rayleigh distributions and their properties,

UNIT II

OPERATIONS ON SINGLE & MULTIPLE RANDOM VARIABLE – EXPECTATIONS
Introduction, Expected Value of a Random Variable, Function of a Random variable, Moments about the origin, Central Moments, Variance , Transformations of a Random Variable: Monotonic Transformations of a Continuous Random Variable, Non-Monotonic Transformations of a Continuous Random Variable, Introduction to the concept of multiple random variables, concepts of conditional and unconditional joint distribution and density functions-related properties, Transformations of multiple random variables, Linear transformation of Gaussian Random Variables.

UNIT III

RANDOM PROCESSES IN THE TIME DOMAIN
Introduction to the concept of Random Process-Temporal characteristics, Classification of Random Processes, Deterministic and Non-deterministic random processes, Definitions of Distribution and Density Functions of a Random Process, Concepts of Stationary and Statistical Independence of Random Processes, Classification of Stationary Random Processes (First order, Second order, Wide-sense and Strict-sense Stationary Processes). Autocorrelation function and its properties, Cross correlation function and its properties, Covariance function. Concept of Time Averages and Ergodicity.

UNIT IV

RANDOM PROCESSES IN THE FREQUENCY DOMAIN

Introduction to the concept of Random Process-Spectral characteristics, The Power Spectrum and its properties, Relation between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its properties, Relation between Cross-Power Spectrum and Cross-correlation Function.

UNIT V

LINEAR SYSTEMS WITH RANDOM INPUTS

Introduction to Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-Squared value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output. Concepts of Band pass, Band-Limited and Narrowband Processes – properties. Concepts of thermal noise.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles- Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha, PHI, 4th Edition, 2002

REFERENCES:

1.An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook,1968.

2. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015 .

V. Web Links:

www.nptel.ac.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	3	2	3	1	2	-	-	-	-	-	-	-
CO2	3	2	2	2	1	-	-	-	-	-	-	-
CO3	2	1	2	3	2	-	-	-	-	-	-	-
CO4	1	3	1	3	2	-	-	-	-	-	-	-
CO5	3	2	2	2	1	2	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4th semester)			
Course Code	**ELECTROMAGNETIC WAVES AND TRANSMISSION LINES**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisites: Knowledge of Electromagnetic waves and Transmission lines		3	1	-	3

Course Objective:

1. To introduce the concept of Vectors and their applications in free space
2. To impart the knowledge of electric and magnetic fields in real time applications.
3. To introduce the fundamental theory of electromagnetic waves in transmission lines and their practical applications.
4. To study the propagation characteristics of electromagnetic wave in bounded and unbounded media.
5. To calculate various line parameters by conventional and graphical methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	understand how EM waves will propagate in free space and their characteristics at the boundary between media.
CO2:	learn Maxwell's equations to understand boundary conditions of time varying fields.
CO3:	Analyze electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media
CO4:	Analyzes reflection and refraction of electromagnetic waves propagated in normal and oblique incidences
CO5:	learn parameters and transmission lines

UNIT I ELECTROSTATICS

Review of Coordinate system, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions ,Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy density , Convection and Conduction Currents, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance.

UNIT-II MAGNETOSTATICS

Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials,Forces due to Magnetic Fields

Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces. Related Problems.

Unit -III MAXWELL'S EQUATION

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Polarization, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem

Unit -IV TRANSMISSION LINES – I

Types, Parameters, Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.

UNIT -V TRANSMISSION LINES – II

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Impedance Transformations ,$\lambda/8$,$\lambda/4$ and $\lambda/2$ Lines –. Smith Chart – Construction and Applications, Single Stub Matching, Illustrative Problems.

Textbooks

1. Principles Of Electromagnetics Matthew N.O. Sadiku, Oxford Univ. Press, 4th ed., 2009.
2. Engineering Electromagnetics, W. H. Hayt Jr., McGraw Hill – New York.
3. EM Waves and Radiating Systems, E. C. Jordan, PHI, 1997.

References

1. Electromagnetic Field Theory and Transmission Lines, Gottapu Sasibhushana Rao, Wiley India Pvt.Ltd. , New Delhi, 1st Ed.,2012.
2. Electromagnetics with Applications, Kraus and Fleisch, McGraw Hill, 1999.

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	2	-	1	2	-	-	-	2	-	2
CO2	1	-	-	-	3	1	-	-	-	-	3	2
CO3	2	1	1	-	2	2	-	-	1	1	-	1
CO4	-	-	2	1	1	-	-	-	-	-	1	-
CO5	1	-	-	-	3	1	-	-	-	-	3	2

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

Regulation **GRBT-20**	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech II-I Year			
Course Code	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to all Branches)**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):	Basic Knowledge of Economics and Accounts	3	0	0	3

Course Objective:

1. To understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting.
2. To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
3. To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organizations and the concept of Business Cycles.
4. To learn different Accounting Systems, preparation of Financial Statements and uses of different tools for performance evaluation.
5. To understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Course Outcomes:

On Completion of the course, the learner will be able to-	
CO1:	Estimate the Demand and demand elasticity's for a product
CO2:	Understand the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO3:	Understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO4:	Prepare Financial Statements and the usage of various Accounting tools for Analysis.
CO5:	Evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

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:

Theories of Production and Cost Analysis:

Theories of 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 costconcepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs, Cost

–Volume-Profit analysis-Determination of Breakeven point(problems)- Managerial significance andlimitations of Breakeven point.

Unit III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features

– Price and Output Determination- Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Forms of Business organizations

- Sole Trader, Partnership- Joint Stock Company – State/Public Enterprises.

Unit IV:

Introduction to Accounting & Financial Analysis:

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis.

Unit V:

Capital and Capital Budgeting: Capital Budgeting:

Meaning of Capital-CapitalizationMeaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text books:

1. Digital Communication - Simon Haykin, Jon Wiley,2005.
2. Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana, 3rd Edition, Tata McGraw Hill,2008.
3. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley,2005.

Reference Books:

1. Digital Communications - John G. Proakis, Masoud Salehi, 5th Edition, McGraw-Hill, 2008.
2. Digital Communications - Ian A. Glover, Peter M. Grant, Pearson Edu.,2008.
3. Communication Systems - B.P. Lathi, BS Publication,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
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4th semester)			
Course Code	**ELECTRONIC CIRCUIT ANALYSIS LAB**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisites: Knowledge of BJT & FET Amplifiers		0	0	3	1.5

Course Objectives:

1. Understand the design of Small Signal Transistor Amplifier models.
2. .Understand the concepts feedbackamplifiers and oscillators
3. Understand the concepts of multistage amplifier and differential amplifier using BJT
4. Understand the design of different types of power amplifiers
5. Understand the design of different types of tuned amplifiers

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Perform analysis and design of Small Signal Transistor Amplifier models.
CO2:	Design and analysis of feedback amplifiers and oscillators
CO3:	Demonstrate the knowledge of multistage amplifier and differential amplifier using BJT.
CO4:	Design and analysis of different types of power amplifiers
CO5:	Design different types of tuned amplifiers for real time applications

Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Determination of fTofa given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator

6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Boots trapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

Equipment required: Software:
i. Multisim/Equivalent Industrial Standard Licensed simulation software tool.
ii. Computer Systems with required specifications

Hardware Required:
1. Regulated Power supplies
2. Analog/Digital Storage Oscillo scopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

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	1	2	1	-	-	-	-	-	-
CO2	2	3	2	1	2	2	1	-	-	-	-	-
CO3	2	1	2	3	3	2	3	-	-	-	-	-
CO4	1	3	2	3	1	2	3	-	-	-	-	-
CO5	3	3	2	2	3	1	1	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**ANALOG COMMUNICATION LAB**				
Teaching	Total contact hours-36	L	T	P	C
Prerequisite(s):Knowledge of Communication with analog signals		-	-	3	1.5

Course Objective:

1. To Observe the working nature of different communication systems
2. To Observe the different AM techniques.
3. To Observe the different FM techniques and requirements of Emphasis techniques
4. To Observe the different Sampling of analog signals
5. To Observe the Simulation process

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify and describe different Amplitude modulation techniques
CO2:	Identify and applying Emphasis techniques in analog systems
CO3:	Sample analog signals
CO4:	Analyze different discrete pulse modulation techniques
CO5:	Understand and Simulate the different codes using MATLAB

Syllabus:

List of Experiments:

PART A: List of Experiments based on Hardware

1. Amplitude modulation- Modulation & Demodulation
2. AM-DSB SC- Modulation & Demodulation
3. Spectrum Analysis of Modulated signal using Spectrum Analyzer
4. Diode Detector
5. Pre-emphasis & De-emphasis
6. Frequency Modulation & Demodulation
7. AGC Circuits
8. Sampling Theorem

9. Pulse Amplitude Modulation & Demodulation.
10. Pulse Width Modulation (PWM)- Modulation & Demodulation
11. Pulse Position Modulation (PPM)- Modulation & Demodulation
12. Phase locked loop (PLL)
13. Characteristics of Mixer

PART B: List of Experiments based on MATLAB Software

1. Amplitude modulation- Modulation & Demodulation
2. AM-DSB SC- Modulation & Demodulation
3. Diode Detector
4. Pre-emphasis & De-emphasis
5. Frequency Modulation & Demodulation
6. Sampling Theorem
7. Characteristics of Mixer
8. Pulse Amplitude Modulation & Demodulation.
9. Pulse Width Modulation (PWM)- Modulation & Demodulation
10. Pulse Position Modulation (PPM)- Modulation & Demodulation

PART C: Equipment required for Laboratory

1. Bread boards.
2. Active & Passive Electronic Components
3. Regulated Power supplies
4. Analog/Digital Storage Oscilloscopes
5. Analog/Digital Function Generators
6. Digital Multimeters
7. Trainer Kits

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	2	3	3	-	-	-	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	-	2	2	-	-	3	-	-	-	-	-	-
CO5	-	-	3	1	-	3	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**Switching Theory & Logic Devices Laboratory**				
Teaching	Total contact hours-36	L	T	P	C
Prerequisite(s):Knowledge of Logic gates & Flip-,flops		-	-	3	1.5

Course Objective:

1. Understand the concepts of logic gates
2. Understand Different Combinational circuits
3. Understand the different standard sequential circuits
4. Understand the verification of Truth tables of Flip-Flops
5. Understand the complex sequential circuits

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Verification of logic gates
CO2:	Design and verification of Combination Circuits
CO3:	Verification of truth tables of Flip-Flops.
CO4:	Verification of Shift Registers operation.
CO5:	Design of various Counter.

List of Experiments: (Minimum of Twelve Experiments has to be performed)

1. Verification of truth tables of Logic gates
   Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive OR
   (vi) Exclusive NOR
2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit
3. Verification of functional table of 3 to 8 line Decoder/De-multiplexer
4. 4 variable logic function verification using 8 to1 multiplexer.
5. Design full adder circuit and verify its functional table.
6. Verification of functional tables of

(i) JK Edge triggered Flip–Flop (ii) JK Master Slav Flip–Flop (iii) DFlip-Flop

7. Design a four bit ring counter using D Flip–Flops/JK Flip Flop and verify output

8. Design a four bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output

9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.

10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T- Flip-Flops and Test it with a low frequency clock and Sketch the output wave forms.

11. Design MOD–8 synchronous counter using T Flip- Flop and verify the result and Sketch the output wave forms.

12. (a) Draw the circuit diagram of a single bit comparator and test the output

(b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.

ADD on Experiments:

1. Design BCD Adder Circuit and Test the Same using Relevant IC

2. Design Excess-3 to 9-Complement convertor using only four Full Adders and test the Circuit.

3. Design an Experimental model to demonstrate the operation of 74154 De-Multiplexer using LEDs for outputs.

CO-PO Mapping:

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

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)				
Course Code	**PROGRAMMING WITH PYTHON** Common to ME, ECE, MINING, PETROLEUM & AME				
Practice	Total contact hours: 48	L	T	P	C
Prerequisite(s): Knowledge of any programming language		0	1	2	2

Course Objective(s):

- This course is intended to teach adequate knowledge on different data structures technique.
- To develop solutions for problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

Course Outcome(s):

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

CO-1: To learn and understand Python programming basics and paradigm

CO-2: Handle different data structures.

CO-3: Understand the use of control statements, function overloading, operator overloading in real time application

CO-4: Implement files using various file operations.

CO-5: Apply knowledge to handle exception handling and database connectivity

List of Programs:

1. Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2. Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3. Write a program that uses a for loop to print the numbers 8, 11, 14, 17, 20, . . . , 83,86,89.
4. Write a program that asks the user for their name and how many times to print it. The program should print the user's name, the specified number of times.
5. Use a for loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

```
*
**
***
****
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6. Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
7. Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters abcde and ABCDE the program should print out AaBbCcDdEe.

8. Write a program that generates a list of 20 random numbers between 1 and 100 and perform the following.
   (a) Print the list.
   (b) Print the average of the elements in the list.
   (c) Print the largest and smallest values in the list.
   (d) Print the second largest and second smallest entries in the list
   (e) Print how many even numbers are in the list.

9. Write a program that asks the user for an integer and creates a list that consists of the factors of that integer.

10. Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become[1,2,3,4,0].

11. Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimeters, centimeters, meters, or kilometers. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements, itis much shorter with lists and it is also easier to add new conversions if you use lists.

12. Write a function called sum digits that is given an integer num and returns the sum of the digits of num.

13. Write a function called number_of_factors that takes an integer and returns how many factors the number has.

14. Write a function called is_sorted that is given a list and returns True if the list is sorted and False otherwise.

15. Write a function called primes that is given a number n and returns a list of the first n primes. Let the default value of n be 100.

Textbooks

1. Wesley J. Chun "Core Python Programming" Prentice Hall
2. Head First Python, 2nd Edition

Reference Books

1. Mark Lutz "Programming Python, 4th Edit O'ReillyMedia
2. David Beazley and Brian K. Jones"Pvthon Cokboo'Reillv

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (3rd semester)			
Course Code	CONSTITUTION OF INDIA				
Teaching	Total contact hours - 32	L	T	P	C
Prerequisite(s):Basic knowledge on Indian Constitution and administrative systems		2	-	-	0

Course Objective:

a. *Impart the role of constitution and human rights*
b. *Aware of the Central administrative system and National policies.*
c. *Aware of the State administrative system and State policies.*
d. *Aware of the Local administrative system and policies.*
e. *Role of Electoral system in India*

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	List out the fundamental Rights and Duties
CO2	Explain the Union Government and Administrative system
CO3	Explain the State Government and Administrative system
CO4	Explain the Local Administrative system
CO5	Write the role of Election commission

Syllabus:

UNIT –I:

Introduction: 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

UNIT –III:

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

UNIT –IV:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,

Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, 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 and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

Text books:

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap

Reference Books:

1. 'Indian Constitution' by D.D. Basu
2. 'Indian Administration' by Avasti and Avasti

.

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- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th Semester)			
Course Code	**LINEAR & DIGITAL IC ALPPLICATIONS**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Electronic Devices & Circuits, Switching Theory and Logic, Electronic Circuit Analysis.		3	0	-	3

Course Objectives:

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non - linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL.
4. To teach the theory of ADC and DAC.
5. To understand and implement the working of basic digital circuits.

On Completion of the course, students will be able to	
CO1:	Understand the internal operation of Op-Amp and its specifications.
CO2:	Analyze and design linear and nonlinear applications using Op-Amp.
CO3:	Operate 555 timers in different modes like bistable, monostable and astable operations and study their applications.
CO4:	Understand the conversion process of ADC and DAC in digital electronics.
CO5:	Explain the differences between CMOS and TTL logic families and study various digital ICs.

UNIT – 1 Operational Amplifier

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, features of 741 Op-Amp,Modes of Operation Inverting, NonInverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger.

Voltage Regulators: Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators

UNIT – 2 Op-Amp, IC-555 & IC 565 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer - Functional Diagram, Monostable, and Astable Operations, Applications, IC565 PLL – Block Schematic, Description of

Individual Blocks, Applications.

UNIT – 3 Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC,R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT – 4 Digital Integrated Circuits

Classification of Integrated Circuits, Comparison of Various Logic Families Combinational Logic ICs – Specifications and Applications of TTL-74XX & Code Converters, Decoders, Demultiplexers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT – 5 Sequential Logic ICs and Memories

Familiarity with commonly available 74XX CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Text Books:

1. Op-amps & linear ICs- Ramakanth AGayakwad, PHI,2003.
2. Digital Fundamentals-Floyd and Jain, Pearson education, 8th edition2005.
3. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2ndEd.,2003.

Reference Books:

1. OpAmpsandLinearIntegratedCircuits-ConceptsandApplicationsJamesM.Fiore,CengageLearning/Jaico, 2009.
2. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson,2009.
3. Linear Integrated Circuits and Applications –Salivahanan.
4. Modern Digital Electronics – RP Jain – 4/e – MC GRAW HILL EDUCATION,2010.

Web Links:

1. https://nptel.ac.in/courses/117107094/
2. https://nptel.ac.in/content/storage2/courses/117108107/Lecture%2035.pdf
3. https://nptel.ac.in/courses/117106086/

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	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	2	-	-	-	-	2	-	-
CO5	3	2	-	-	-	-	-	-	-	2	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th Semester)			
Course Code	**DIGITAL COMMUNICATIONS**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Knowledge of Signals & Systems, Random Variables and Stochastic Process		3	0	-	3

Course Objectives:

1. To understand the building blocks of digital communication system.
2. To understand the pulse digital modulation systems such as PCM, DPCM and DM.
3. To analyze the performance of various digital modulation techniques in terms of probability of error.
4. To understand the concept of entropy and need for source coding.
5. To understand linear block codes, cyclic codes and convolution codes.

On Completion of the course, students will be able to	
CO1:	Explain the conventional digital communication system.
CO2:	Discuss the pulse digital modulation schemes such as PCM, DPCM and DM.
CO3:	Evaluate the performance of various digital modulation techniques in terms of probability of error.
CO4:	Analyze the performance of digital communication system in the presence of noise
CO5:	Compute and analyze block codes, cyclic codes and convolution codes.

UNIT – 1

PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM), Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems

UNIT II: DIGITAL MODULATION TECHNIQUES:

Introduction,ASK,FSK,PSK,DPSK,DEPSK,QPSK,M-aryPSK,ASK,FSK,similarity of BFSK and BPSK.

UNIT III:

DATA TRANSMISSION: Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK,calculation of error probability of ASK,BPSK,BFSK,QPSK

UNIT IV:

INFORMATION THEORY: Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties, Information rate, Mutual information and its properties

SOURCE CODING: Introductions, Advantages, Shannon's theorem, Shanon- Fanocoding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth–S/N trade off.

UNIT V:

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

CONVOLUTION CODES: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram de coding using Viterbi algorithm.

Text books:

1. Digital Communication - Simon Haykin, Jon Wiley,2005.
2. Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana, 3rd Edition, Tata McGraw Hill,2008.
3. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley,2005.

Reference Books:

1. Digital Communications - John G. Proakis, Masoud Salehi, 5th Edition, McGraw-Hill, 2008.
2. Digital Communications - Ian A. Glover, Peter M. Grant, Pearson Edu.,2008.
3. Communication Systems - B.P. Lathi, BS Publication,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
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th Semester)			
CourseCode	Antenna and Wave Propagation				
Teaching	Total Contact Hours – 50	L	T	P	C
Prerequisites: Knowledge of electro magnetic waves transmission lines and different types of antenna and wave propagation		3	0	-	3

Course Objectives:

1. To understand the applications of electromagnetic waves in frees pace.
2. To introduce working principles of various antenna types.
3. To discuss major applications of antennas with an emphasis on how antennas are employed.
4. To understand the concept of radiation mechanism parameters, current distribution and antenna arrays in various antennas.
5. To understand the concept of wave propagation in various layers and losses due to earth effects

On Completion of the course, students will be able to	
CO1:	Acquire knowledge of basic antenna parameters.
CO2:	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro-strip antennas.
CO3:	Analyze the field patterns radiated by various types of antennas.
CO4:	Understand the working and characteristics of antenna arrays.
CO5:	Compute several antenna parameters to assess antenna's performance.

UNIT – 1 Antenna Fundamentals:

Antenna Parameters-Radiation Patterns and Mechanism, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam widths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Illustrated problems.

Thin Linear Wire Antennas: Potential function and electromagnetic field: Heuristic Approach, Maxwell Equation approach, Potential function for time periodic fields, Radiation from an oscillating Dipole and alternating current element.

UNIT – 2 Antenna Arrays

Two element arrays – different cases, Principle of Pattern Multiplication, N element

Uniform Linear Arrays – Broadside, End fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays, Directivity Relations (no derivations).Related Problems. Binomial Arrays.

UNIT – 3 Non-Resonant Radiators

Introduction, Traveling wave radiators – Basic concepts, Long wire antennas – Field strength calculations and Patterns, MicroStrip Antennas Introduction, Features,Advantages and Limitations. Rectangular Patch Antennas–Geometry and Parameters, Impact of different parameters on characteristics. Broadband Antennas: Helical Antennas – Significance, Geometry, Basic properties. Design considerations for mono-filer helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

UNIT – 4 VHF, UHF and Microwave Antennas

Reflector Antennas: Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds.

Horn Antennas– Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT –5 WAVE PROPAGATION

Concepts of Propagation – Frequency ranges and types of propagations. Friis Free Space Equation, Reflection of radio waves from plane surface of earth, Reflection coefficient for horizontal and vertical polarization, Ground Wave Propagation–Field strength,Attenuation Characteristic for vertical and Horizontal polarized wave,Sky Wave Propagation Formation of Ionospheric Layers and their Characteristics,Mechanism of Reflection and Refraction, Critical Frequency, MUF Calculations for flat and spherical earth cases.

Text books:

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH,2003.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition,2000.
3. Antennas and Wave Propagation – K.D. Prasad, SatyaPrakashan, Tech India Publications.

Reference Books:

1. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition,2001.
2. TransmissionandPropagation– E.V.D.GlazierandH.R.L.Lamont,TheServicesTextBookofRadio,vol.5, Standard Publishers Distributors,Delhi.
3. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th Edition,1955.
4. Antennas and Wave Propagation-G.S.N Raju, PearsonEducation.

Web Links:

1. NPTEL onlinecourses.
2. MOOCS online courses byJNTUK

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	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 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 Objectives:

The objective of this course is:

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

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 – IV

Hazardous Waste: Characterization - Nuclear waste – Biomedical wastes – Electronic wastes - Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

Unit – V

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Course Outcomes

After completion of the course, a successful student is able to

1. Identify the air pollutant control devices
2. Have knowledge on the NAAQ standards and air emission standards
3. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.

4. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
5. Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
6. Appreciate the importance of sustainable development while planning a project or executing an activity.

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elesevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

References:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.
3. Environmental Engineering by Gerard Kiley, Tata McGraw Hill.

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	-	-	-	2	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (OPEN ELECTIVE-I)			
Course Code	FUNDAMENTALS OF 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 understand selection of drives for industrial application.
2. To understand the heating and welding methods for industrial applications.
3. To understand the concepts of Electrolysis processes and illumination engineering.
4. To identify the various types of Industrial loads
5. To understand electric traction system and drives.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify most appropriate heating or welding techniques for suitable applications
CO2:	understand various level of luminosity produced by different illuminating sources
CO3:	Identify a suitable motor for electric drives and industrial applications
CO4:	Identify the various types of Industrial loads
CO5:	Understand electric traction system and drives.

UNIT – I

Electric Heating: Advantages and methods of electric heating–Resistance heating, induction heating and dielectric heating.

UNIT – II

Electric Welding: Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

UNIT – III

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

UNIT – IV

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 – V

Electric Traction: 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.

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai& Sons.

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY

((AUTONOMOUS)

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2021-22)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Robotics (Open Elective-I)**				
Teaching	Total contact hours–45	L	T	P	C
Prerequisite(s): Engineering Mathematics		3	0	0	3

Course Objectives:

Students undergoing this course will be able to:

- Acquire the basic knowledge of robots, their autonomy, representation and applications.
- Study various types of drives and end effectors used in the industrial robots.
- To study the principles of various types of sensor and machine vision systems used in robots.
- Understand the forward and inverse kinematics in 2D plane, differential motion, path and trajectory planning.
- Understand the programming of robots, factors affecting the implementation, safety and economics of the robots in industries.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the fundamentals of robotics, their anatomy, applications in various fields.
CO2:	Summarize various types of drives and end effectors used in the industrial robots.
CO3:	Outline the principles of various types of sensor and machine vision systems used in robots.
CO4:	Explain the forward and inverse kinematics in 2D plane, differential motion, path and trajectory planning.
CO5:	Interpret the programming of robots, factors affecting the implementation, safety and economics of the robots in industries.

Syllabus:

UNIT-I

FUNDAMENTALS OF ROBOT: Robot - Definition - Robot Anatomy - Coordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Applications of robots in various fields. Function line diagram representation of robot arms, common types of arms. Components, number of degrees of freedom.

UNIT-II

ROBOT DRIVE SYSTEMS AND END EFFECTORS: Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers,

Pneumatic and Hydraulic- Grippers, Magnetic Grippers,Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT- III

SENSORS AND MACHINE VISION: Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors – Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications-Inspection, Identification, Visual Serving and Navigation.

UNIT-I V

TWO-DIMENSIONAL KINEMATICS, DYNAMICS AND TRAJECTORY PLANNING: Translation, Rotation, Homogeneous representation, Forward Kinematics, Inverse Kinematics and Difference; Forward kinematics and inverse kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Jacobians, Velocity and Forces-Manipulator Dynamics, Path and Trajectory planning.

UNIT-V

ROBOT PROGRAMMING: Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.
IMPLEMENTATION AND ROBOT ECONOMICS:RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

Text Books:

1. Robotic Engineering - An Integrated Approach, Klafter R.D., Chmielewski T.A and Negin M., Prentice Hall.
2. Industrial Robotics -Technology Programming and Applications, Groover M.P., McGraw Hill.

References:

1. Introduction to Robotics Mechanics and Control, J J Craig, Pearson Education, 2008.
2. Robotics Technology and Flexible Automation, S R Deb, Tata McGraw Hill Book Company.
3. Robotics for Engineers, Y Koren, McGraw Hill Book Company.
4. Robotics Control, Sensing, Vision and Intelligence, K S Fu, R C Gonzalz, and C S G Lee, McGraw Hill Book Company.
5. Robotics and Image Processing, P A Janakiraman, Tata McGraw Hill.
6. Robotics and Industrial Automation, R K Rajput, S.Chand and Company.
7. Industrial Robots and Computer Integrated Manufacturing, Surender Kumar, Oxford and IBH Publishing Co. Pvt. Ltd.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 semester)			
CourseCode	**Microprocessor and Its Interfacing Open Elective**				
Teaching	Totalcontacthours-45	L	T	P	C
Prerequisite(s): Knowledge of Computer Architectures and Switching Theory& Logic Design		3	-	-	3

COURSE OBJECTIVES:

The student will be able to

1. Learn 8086 Architecture, Register Organization, Different addressing modes and concepts of Memory Interfacing
2. Understand the basic concepts of 8086 programming and Interfacing.
3. Learn basic concepts of 8086 microprocessor with real world.
4. Learn architecture of AVR Microcontroller, Importance of Bit addressability, function of Special registers and basic concepts of Assembly Language program
5. Learn the concepts of Embedded C Programming and Interfacing of AVR Microcontroller with real world through different device.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand architectural difference between Microprocessor and Microcontroller and its need for development of products and product development procedure
CO2	Discuss the concepts of programming in Assembly Language
CO3	Apply the concepts of Interfacing of 8086 microprocessor with outside world.
CO4	Understand the architecture of AVR microcontroller
CO5	Analyze concepts of Input/output port Interfacing of microcontroller and apply the concept of interfacing AVR micro controller with outside.

UNIT I

8086 MICROPROCESSORS: Architecture 8086 details and Pin diagrams, register organization of 8086, Signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, Minimum mode, Maximum mode of 8086 system and timings diagrams.

UNIT II

PROGRAMMING WITH 8086 MICROPROCESSOR and INTERFACING: Addressing mode of 8086, Instruction set of 8086, Assembly language programming,Introduction to stack, stack structure of 8086, interrupts and interrupt service routines, interrupt cycle of 8086, non-mask able interrupt and mask able interrupts, interrupt programming.

UNIT III

8086 INTERFACING

Architecture of 8255, PIO 8255 modes of operation of 8255, Stepper motor interfacing, Seven Segment Display Interfacing.Intel 8259 Priority Interrupt Controller. Intel 8257 DMA

UNIT IV

AVR ARCHITECTURE AND ASSEMBLY LANGUAGE PROGRAMMING: AVR architecture, General Purpose Registers and Special Purpose Registers, Status Registers, Program Counter and Stack Pointer and Stack Memory organization, Addressing Modes, Assembly Language Instruction Set, Delay Calculation and Directives, Bit-Addressability, Look-Up Table and processing, Macros.

UNIT V

Embedded C Programming: Compiler, Cross-Compilers, Intel and Motorola Hex file, Object File, Basics of Embedded C and C data types for AVR, I/O Programming in Embedded C, Delay calculation in Embedded C. LED interfacing and blinking, AVR Serial Port Programming, AVR Interrupt Programming. Interfacing Push-Buttons.

TEXT BOOKS:

1. Ray and Burchandi, "**Advanced Microprocessors and Interfacing**", Tata McGraw–Hill
2. M.A.Mazidi,S.Naimi and S.Naimi,"**The AVR Microcontroller and Embedded Systems Using Assembly and C**", 1st Edition Pearson Publications, 2013.

REFERENCES:

1. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers"Oxford University Press, 2010.
2. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.
3. Dhananjay V. Gadre ,"Programming and Customizing The AVR Microcontroller ", TATA McGraw Hill publications, 2012.

CO-PO mapping:

1: Slight (Low) 2:Moderate(Medium) 3:Substantial(High) -: No correlation

Course Code :		**Microprocessor and Microcontroller**											
Course Designed by		Department of Electronics and Communication											
	Program Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Course Outcomes	CO 1	3	3	3	2	-	-	-	-	-	-	-	3
	CO 2	3	3	3	1	-	-	-	-	-	-	-	3
	CO 3	1	3	3	2	-	-	-	-	-	-	-	3
	CO 4	3	3	3	2	-	-	-	-	-	-	-	3
	CO 5	3	3	3	1	-	-	-	-	-	-	-	3
Category		**General Humanities**		**Basic Sciences**		**Engineering Sciences And Technical**			**Professional Subjects**				
						✓							
Mode of Evaluation : Quiz, Assignment, Seminar, Written Examination													

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	III B.Tech I Semester			
Course Code 201CS504	**FOUNDATIONS OF OPERATING SYSTEMS** Open Elective-1: CSE, CSE (AI/ML), CSE (Cyber Security)				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s): Computer Organization and Architecture		3	0	0	3

Course Objective(s):

1. To make aware of different types of Operating System and their services.
2. To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
3. To know virtual memory concepts.
4. To learn secondary memory management

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: Analyze theory and implementation of processes, resource control (Concurrency etc.), physical and virtual memory, scheduling, I/O and files

CO-4: Illustrate Memory Management Techniques and Page Replacement Algorithms.

CO-5: Demonstrate Mass Storage Structures and Disk structure

UNIT-1

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

UNIT-2

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

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 pagetable, segmentation.

Virtual Memory Management: Virtual memory, demand paging, page-Replacementalgorithms, 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.Dhamdhere, 2nd Edition, TMH
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

Web References:

1. http://nptel.ac.in/courses/106108101 (Prof.P.C.P.Bhatt,IIScBangalore)

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	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	2	-	1	2		-	-	-	-	-	-	-	3	2
CO3	3	3	-	-	3	-	-	-	-	-	-	-	2	2
CO4	1	-	-	2	-	-	-	-	-	-	-	-	3	2
CO5	1	-	2	-	1	-	-	-	-	-	-	-	2	1

2.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code 201PT565	**Fundamentals of Petroleum Engineering** (Open Elective-I)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites		3	0	0	3

Course Objectives

The objectives of this course are to

- Impart knowledge on transition from petroleum science to petroleum engineering.
- Explain the role of petroleum engineers in upstream, midstream and downstream sectors.
- Learn the fundamental concepts of upstream, midstream and downstream sectors.
- Impart Knowledge on the transportation of crude oil & its products and natural gas.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Understand overview of petroleum industry.
CO2:	Understand Exploration and Production of petroleum industry
CO3:	Understand Gathering of Oil & Gas and Storage
CO4:	Understand Midstream of petroleum industry
CO5:	Understand Downstream of petroleum industry

Syllabus

UNIT-I

Introduction

Introduction Petroleum Industry- Upstream Sector – Midstream Processing-Downstream Processing- Indian and World Scenario of Petroleum and Natural Gas- Petroleum Trade-Geopolitics.

UNIT II

Upstream Sector-1

Exploration & Production – Indian and World Scenario of Petroleum and Natural Gas Resources. The Reservoir –Reservoir fluids- Hydrocarbon Phase diagrams- Onshore and Offshore Reservoirs – Reservoir Drives.

UNIT III

Upstream Sector-2

Drilling Rigs- Rig Components-Drill and drill bits- Drilling fluids-Well Completions. Production System: Sketches of Well - Well head- Christmas tree and Casing and various other parts-

Cementing-Safety Systems. Subsea Wells: Drilling & Completion and Production. Artificial Lift: Principles and operation of Rod Pumps –Gas Lift –Electrical submersible pumps. Well Workover and Intervention- Well Stimulation. Basic concepts in Matrix Acidizing and Hydro-fracturing.

UNIT-IV

Gathering of Oil & Gas and Storage

Well tubing-Separation of Reservoir Fluids- Manifolds and Gathering – Production Separators – Gas Treatment and Compression - Oil & Gas Storage, Metering and Export.

Midstream Processing

Transportation of Crude Oil & its Products and Natural Gas- - World and Indian pipeline scenario- Safety aspects of pipelines- Environmental issues.

UNIT V

Downstream Processing

Crude Oil Refining: Classification and Composition – Constituents - Products and their specifications– Pre- treatment of crude oil- Refinery distillation- Safety in refinery operations.

Text Book(s)

1. Oil and Gas Production Handbook: An Introduction to Oil & Gas Production, Havard Devold, ABB ATPA Oil and Gas, 2006.
2. Introduction to Petroleum Engineering, John R. Fanchi and Christiansen, R.L., John Wiley & Sons, 2017.

Reference(s)

1. Petroleum engineering handbook: Howard.B. Bradley,SPE,1987
2. Petroleum engineering hand book: Larry .W.lake, SPE, volume II, 2006.
3. Petroleum engineering handbook: Production operations engineering, volume IV, Joe Dunn Clegg, 2009.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. I Sem. (5th Semester)			
Course Code	Elements of Mining Technology (Open Elective-I)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

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 and blasting used in mining.
5. To elaborate the concept of latest technologies for mining industry.

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 and blasting practice in mines.
CO5:	Understand the application of latest technologies in mining industry

Syllabus

UNIT-I

Introduction to Mining; Types of Mines, Contribution of Mining activities to civilization; Definitions of terms; Status of Mining Industries in the state and in the country; Stages of Mining – Pre-mining, mining, and post-mining – ancillary mining operations; Types of entries to mineral deposits – Shaft, Incline, Decline, 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: percussive, rotary, rotary-percussive; Tools used for drilling; Feed mechanism – Screw feed and hydraulic feed mechanism; Mud flushing –sludge and core, Core recovery methods; 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, and classification of explosives – tools, applicability; Initiation of explosives – fuses – safety fuse, cortexfuse. Detonators – types, composition. Different types of blasting practice in mines; Dangers and precaution measures of blasting, Dealing with misfires.

UNIT-V

Applications of Unmanned Aerial Vehicle, Drones, Remote Sensing and Geographical Information System for mining Industry.

Textbook(s)

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

Reference(s)

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, Lovely Prakashan Publishers,1994.

III Year – I Semester		L	T	P	C
		3	0	0	3

OPEN ELECTIVE-1 BASIC AUTOMOBILE ENGINEERING

Course Objectives:

To make the student able to

- Categorize working of different automobile structures and layouts.
- Distinguish different types of automobile engines and different components in it.
- Correlate different transmission elements and control systems.
- Distinguish the functions of Control systems.
- Integrate Electric Power train Systems in Automobiles.

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:	Demonstrate Automobile Control systems.
CO5:	Illustrate various Eco Friendly Vehicles.

UNIT-I

Introduction to Automobiles:

Functions and characteristics of different types of automobiles and their power sources. Specifications, Performance Parameters, Quality standards, Trends in automobile design.

UNIT-II

Automobile Engines and their Systems:

Engine Specifications with regard to power, speed, torque, no. of cylinders and arrangement, lubrication and cooling etc. Reciprocating Engines, Rotary Engines.

Engine Lubrication systems, Engine cooling system, Engine fuel systems, Engine intake & exhaust systems.

Principles of Ignition system and starting system.

UNIT-III

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.

UNIT-IV

Introduction to Control Systems:

Steering geometry-camber, castor, king pin rake, combined angle toe-in, center point steering. Mechanical, hydraulic, pneumatic & vacuum brakes-brief description.

Rigid axle suspension and independent suspension, Shock absorbers, Different types of springs used in automobile suspension.

UNIT-V

Electric & Hybrid Vehicles:

Principles of Battery Electric Vehicles and its Components, Principles of Hybrid Electric Drive Trains and its Architecture.

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], '-' : No Correlation)

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

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

Regulation GRBT20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech. III – I			
CourseCode	**Principles of Management (Common to all Branches)**				
Teaching	**Total contact hours - 45**	L	T	P	C
Prerequisite(s):Basic Knowledge of Business Environment		3	0	0	3

Course Objectives:

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyse and understand the environment of the organization.
- To help the students to develop cognizance of the importance of management principles.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the concepts related to management and different schools of management thoughts.
CO2:	Apply the concepts of planning for effective management.
CO3:	Identify common organizational structures and the advantages and disadvantages
CO4:	Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities and recognize the importance of employee motivation and how to promote it.
CO5:	Analyze effective application of communication in managerial decisions.

UNIT I

Fundamentals of Management: The concept- meaning, nature and scope, importance of management. principles and functions of management- thoughts of management- managerial roles and skills- levels of management.

UNIT II

Planning&Decision Making: Nature and importance of planning- steps in planning process- Types of plans.Types of decisions – steps in decision making process– decision tree analysis – Management by Objective (MBO).

UNIT III

Organizing: Nature and purpose of organizing- Principles of organizing- Organization structures- line and staff organizations - Delegation of authority- span of control-centralization- decentralization of authority.

UNIT IV

Staffing and Coordination: Importance of staffing, recruitment, selection, training and development concepts - factors in selecting lower, middle and upper-level managers.Need for coordination, Principles and techniques of coordination

UNIT V

Motivation ,Communication and Controlling: Motivation- significance of motivation, theories of motivation, Leading-Leadership styles, theories, Communication- process of communication, types of communication, barriers, overcoming barriers to communication, effective communication and its requirements.Importance of controlling, steps in controlling process, requirements of effective control, tools and techniques of control

References:

1. Harold Koontz, "Essentials of Management", 8th Ed., Tata McGraw- Hill Education, New Delhi,2014
2. Ricky W. Griffin, "Management", Cengage Learning, New Delhi, 2014
3. Heinz Weilrich, Mark V.Cannice& Harold Koontz, Management a Global and Entrepreneurial
4. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
5. Kumar, Rao, Chhaalill "Introduction to Management Science" Cengage Publications, New Delhi
6. V.S.P.Rao, Management Text and Cases, Excel, Second Edition, 2012.
7. K.Anbuvelan, Principles of Management, University Science Press, 2013.

Regulation GRBT- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} Semester)			
CourseCode	**ELECTRONIC MEASUREMENTS & INSTRUMENTATION (Professional Elective – I)**				
Teaching	Total Contact Hours – 50	L	T	P	C
Prerequisites: Knowledge of characteristics of instruments, measurement of physical parameters of transducers, data acquisition and display devices		3	0	-	3

Course Objectives:

1. To understand the static and dynamic characteristics of variousinstruments.
2. To understand the performance characteristics of various signalgenerators.
3. To understand the working and features ofCRO.
4. To understand different types ac bridges andtransducers.
5. To understand the working principle of data acquisition and displaydevices.

On Completion of the course, students will be able to	
CO1:	Describe the fundamental concepts and principles of instrumentation.
CO2:	Understand functioning, specification and application of signal analyzing instruments.
CO3:	Apply the measurement techniques for different types of tests.
CO4:	Explain the operation of various instruments required in measurements.
CO5:	Choose specific instruments for specific measurement function.

UNIT- 1Performance Characteristics of Measuring Instruments

Performance characteristics: Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag;

MeasuringInstruments: DC Voltmeters,D'Arsonval Movement, DC CurrentMeters,AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT– 2 Signal Generators and Analyzers

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator.

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers.

UNIT– 3Oscilloscopes

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT –4Transducers

Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchro's, Special Resistance Thermometers, Piezoelectric Transducers, Magneto Strictive Transducers.

UNIT –5 Bridges

Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge. Measurement of Physical Parameters: Flow Measurement,DisplacementMeters,LiquidlevelMeasurement,MeasurementofHumidityandMoisture,Velocity, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data AcquisitionSystems.

Text books:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill,2004.
2. Modern Electronic Instrumentation and Measurement Techniques -A.D.Helfrick and W.D. Cooper,PHI, 5thEdition, 2002.

Reference Books:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2ndEdition,2003.
2. Electronic Test Instruments, Analog and Digital Measurements - RobertA.Witte,PearsonEducation, 2ndEd., 2004.
3. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005.

Web Links:

1. NPTEL onlinecourses.
2. MOOCS online courses byJNTUK

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	2	-	-	-	-	-	-	2	-	-
CO2	3	2	2	-		-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	2	-		-	-	-	-	2	-	-
CO5	3	2	2	-	-	-	-	-	-	2	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 semester)			
CourseCode	**Control Systems (ECE-Professional Elective)**				
Teaching	Totalcontacthours-50	L	T	P	C
Prerequisite(s): Knowledge of Classification of Signals and Systems, Basic Eletrical machines.		3	-	-	3

CONTROL SYSTEMS

Course objectives

i. To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback.

ii. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis .

iii. To analyze the system in terms of absolute stability and relative stability by different approaches.

iv. To design different control systems for different applications as per given specifications.

v. To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	This course introduces the concepts of feedback and its advantages to various control systems.
CO2	The performance metrics to design the control system in time-domain and frequency domain are introduced
CO3	Understand the Concept of stability and different analysis.
CO4	Control systems for various applications can be designed using in timedomain and frequency domain analysis
CO5	In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced

UNIT-I Mathematical Modelling of Control Systems

Introduction of Control System, Open Loop Control System, Closed loop Control System, Different Examples Mathematical models of Physical Systems Differential equations of physical systems, Transfer functions, Block diagram Algebra, Signal flow graphs with illustrative examples Effects of Feedback Feedback Characteristics and its advantages, Linearizing effect of feedback

UNIT-II Time Response Analysis
Standard test Signals, Time response of first and second order systems, steady state errors and error constants, Effect of adding a zero to a system, Design specifications of second order systems, Performance indices

UNIT-III Stability and Root Locus
Concepts of Stability and Algebraic Criteria The concept of Stability, Necessary Conditions for Stability, Routh-Hurwitz Stability Criterion, Relative stability analysis, The Root Locus Technique Introduction, The Root Locus concepts, Construction of Root Loci.

UNIT-IV Frequency Response Analysis
Introduction, Correlation between time and frequency response, Bode diagrams, Polar Plots, Nyquist Plots, Determination of Phase Margin and Gain margin Nyquist Stability Criterion.Introduction to Design The design problem, Preliminary consideration of classical design, Realization of basic Compensators, Cascade compensation in time domain and frequency domain, Tuning of PID Controllers

UNIT-V State Space Analysis of Continuous Systems
State Variable Analysis and Design Introduction, Concepts of State, State Variables and State models, State models for linear continuous-time systems, State variables and linear discrete-time systems, Solution of state equations and Concepts of Controllability and Observability.

Text Book
i. I.J.Nagarath and M.Gopal, " Control System Engineering," New Age International Publishers, Fifth Edition
ii. Benjamin C. Kuo, FraridGolnaraghi, " Automatic Control Systems," Wiley Student Edition, Eight Edition
Reference Books
1. Katsuhiko Ogata, "Modern Control Engineering," Pearson, Fifth Edition
2. S. Salivahanan, R. Rengaraj, and G. R. Venkata Krishnan, " Control Systems Engineering," Pearson, First Impression .

CO-PO mapping:

1: Slight (Low) 2:Moderate(Medium) 3:Substantial(High) -: No correlation

Course Code :		**Control Systems**											
Course Designed by		Department of Electronics and Communication											
	Program Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Course Outcomes	CO 1	3	3	3	2	-	-	-	-	-	-	-	3
	CO 2	3	3	3	1	-	-	-	-	-	-	-	3
	CO 3	1	3	3	2	-	-	-	-	-	-	-	3
	CO 4	3	3	3	2	-	-	-	-	-	-	-	3
	CO 5	3	3	3	1	-	-	-	-	-	-	-	3
Category		**General Humanities**		**Basic Sciences**		**Engineering Sciences And Technical**			**Professional Subjects**				
						✓							
Mode of Evaluation : Quiz, Assignment, Seminar, Written Examination													

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th Semester)			
CourseCode	**COMUTER ARCHITECTURE & ORGANIZATION (Professional Elective-1)**				
Teaching	Total Contact Hours – 50	L	T	P	C
Prerequisites: Knowledge of Logic Design, Basic computing, Architectural features of Computer, Processing, Memory and I/Oorganization		3	-	-	3

Course Objectives:

1. To understand computer architecture and its organization with operating system functionality
2. To understand central processing unit functionality with micro programmed and hardwired controlling concepts.
3. To familiarize input-output interfacing techniques in computer architecture.
4. To develop design logics of control circuits and arithmetic circuits.
5. To understand pipelining concepts in processor for improving computational speed.

On Completion of the course, students will be able to	
CO1:	Learn Basic operational concepts, computer arithmetic operations and Register Transfer language.
CO2:	Learn the concept of central processing unit, micro programmed control and hard-wired control
CO3:	Learn the concept of Memory management hardware, Input-Output Interface and Input-Output Processor
CO4:	Apply digital logic concepts to design computer arithmetic circuits and control logic circuits
CO5:	Learn the concept of Pipelining

UNIT–1 Basic Structure of Computers and Data Representations

Computertypes,functionalunits,basicoperationalconcepts,busstructures,softwareperformance,multiprocessors and multi computers, Data types, complements, data representation, Fixed point representation, Floating – point representations, Concepts of Operating Systems and Applicationsoftware.

UNIT-2 Register Transfer Language and Micro Operations

RegisterTransferlanguage,RegisterTransfer,Busandmemorytransfer,ArithmeticMicro-

operations,logicmicro operations, shift micro-operations, Arithmetic logic shift unit, Instruction codes, Computer Registers, Computer instructions–Instruction cycle, Memory Reference Instructions, Input- Output Instructions andInterrupts.

UNIT–3 Central Processing Unit and Micro Programmed Control

Stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control, Control memory, Address sequencing, Micro program example, Design of control unit-Hard wired control, Micro programmed control.

UNIT–4 Memory System and Input – Output Organization

Memory organization-RAM, ROM, Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cachememory,CacheCoherence,Virtualmemory,PeripheralDevices,Input-OutputInterface,Asynchronousdata transfer Modes, Priority Interrupt, Direct memory Access, Input–Output Processor (IOP), Serialcommunication.

UNIT–5 Computer Arithmetic and Pipeline

Addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operations. Decimal arithmetic unit, Decimal arithmetic operations, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline.

Text books:

1. Computer System Architecture – M.Moris Mano, 3rdEdition, PHI / Pearson, 2006.
2. Computer Organization – CarlHamacher, ZvonksVranesic, SafwatZaky, V Edition, McGrawHill,2002.

Reference Books:

1. Computer Organization and Architecture – William Stallings Seventh Edition, PHI/Pearson,2006.
2. Computer Architecture and Organization – John P. Hayes, McGraw Hill Internationaleditions,1998.
3. Computer Organization and design D. A. Patterson and J. l. Hennessey, 4thEdition.

Web Links:

1. NPTEL onlinecourses.
2. MOOCS online courses byJNTUK
3. https://nptel.ac.in/courses/122104019/numerical-analysis/Rathish kumar/num1/new3.htm
4. https://www.sanfoundry.com/computerarchitecture-interview-questions-answers/

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	3	-	1	-	-	2	-	1	3	3
CO2	1	3	-	1	2	-	1	-	-	3	-	-
CO3	2	-	2	3	-	2	-	-	3	1	-	1
CO4	3	-	-	1	2	2	1	3	2	1	-	3
CO5	3	-	-	2	-	1	-	2	-	2	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 semester)			
Course Code	**ARTIFICIAL NEURAL NETWORKS** (Professional Elective -I) .				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites:. KNOWLEDGE OF Neural Networks		3	0	-	3

Course Objectives:

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithms
3. To know the issues of various feed forward and feedback neural networks.
4. To explore the Neuro dynamic models for various problems.

On Completion of the course, students will be able to	
CO1:	Upon completing this course, the student will be able to
CO2:	Understand the similarity of Biological networks and Neural networks
CO3:	Perform the training of neural networks using various learning rules.
CO4:	Understanding the concepts of forward and backward propagations.
CO5:	Understand and Construct the Hopfield models

UNIT-1

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks
Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT-2

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT-3

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT-4

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT-5:

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, restricted boltzmen machine.

TEXT BOOKS:

Neural Networks a Comprehensive Foundations, Simon S Haykin, PHI Ed.,.
Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

REFERENCE BOOKS:

Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
Neural Networks -James A Freeman David M S Kapura Pearson Ed., 2004.
Artificial Neural Networks – B. Vegnanarayana Prentice Hall of India P Ltd 2005

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	2	-	-	-	-	-	-	2	-	-
CO2	3		2	-	2	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	2	-	-	-	-	2	-	-
CO5	3		-	-	2	-	-	-	-	2	-	-

Regulation GRBT- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th Semester)			
CourseCode	**LINEAR AND DIGITAL ICAPPLICATIONS LAB**				
Teaching	Total Contact Hours – 36	L	T	P	C
Prerequisites: Basic Knowledge of Electronic Devices and Circuits&Pulse and Digital Circuits, Switching theory and logic design.		0	0	3	1.5

Course Objectives:

1. To understand the basics of operational amplifier and its various applications.
2. To design Amplifiers, Active Filters and Oscillators usingIC's.
3. To design and draw the internal structure of the digital integrated circutis.
4. To design basic digital building blocks such as multiplexers, selectors, and shift registers.

On Completion of the course, students will be able to	
CO1:	Design and implementation of Filter circuits using IC 741
CO2:	Analyze the functionality of Multivibrator circuits using IC 555
CO3:	Design and implementation of Oscillator circuits using IC 741
CO4:	Designbasic digital building blocks such as multiplexers, selectors, and shift registers.
CO5:	Specify digital circuit timing: setup and hold times and logic propagation delays.

List of experiments

LINEAR IC EXPERIMENTS:

1. OPAMP application-Adder, Subtractor, ComparatorCircuits
2. Integrator and Differentiator Circuits using IC741
3. Active Filters Applications-LPF, HPF(firstorder)
4. IC 741 Oscillator Circuits-Phase shifting and Wien BridgeOscillator
5. Function Generator using OPAMP's
6. IC 555 Timers- Monostable and Astable OperationCircuit.
7. Schmitt Trigger Circuit-using IC741
8. IC 565- PLLApplications.

DIGITAL IC EXPERIMENTS

1. Decoders -74138

2Multiplexer-74151 & 2x1 De-multiplexer-

741553.Bit Comparator-7485

4.Flip-Flop IC's-7474,7476

5.IC Counter -7490 & 7493

6.Shift Register -7495

7.RAM (74189) andALU

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	-	-	-	-	-	-
CO2	3	2	3	-	1	2	-	-	-	-	-	-
CO3	-	2	3	2	-	1	-	-	-	-	-	-
CO4	-	2	3	-	1	2	-	-	-	-	-	-
CO5	-	-	3	2	-	1	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5th Semester)			
CourseCode	**DIGITAL COMMUNICATION LAB** (ECE)				
Teaching	Totalcontacthours-36	L	T	P	C
Prerequisite(s): Knowledge of Digital modulation and demodulation techniques , Information theory and coding and MATLAB.		-	-	3	1.5

Course Objective:

1. Implementation of different digital modulation and demodulation using hardware & MATLAB.
2. Implementation of different Multiplexing methods.
3. Comparison of different modulation techniques.
4. Implementation of source coding using hardware.
5. Implementation the channel coding using hardware.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Implement different digital modulation and demodulation techniques.
CO2:	Analyze the performance of different multiplexing schemes.
CO3:	Analyze the performance of different modulation schemes.
CO4:	Analyze the performance of different source coding schemes.
CO5:	Analyze the performance of different channel coding schemes.

Syllabus:
List of Experiments:

Minimum Twelve Experiments to be conducted:

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.

8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code-Encoder and Decoder
12. Convolution Code –Encoder and Decoder
13. BCH Codes

Equipment required for Laboratories:

1. RPS-0–30V
2. CRO-0 –20 MHz.
3. FunctionGenerators-0–1MHz
4. RFGenerators-0–1000M Hz./0–100MHz.
5. Rated Voltmeters and Ammeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Bread boards and Multi-meters
   Spectrum Analyzer

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	3	3	3	-	-	-	--	-	-
CO2	3	3	2	3	2	3	-	-	-	-	-	-
CO3	3	3	2	3	2	3	-	-	-	--	-	-
CO4	3	3	2	3	2	3	-	-	-	-	-	-
CO5	3	3	2	3	2	3	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IIIB.Tech. I Sem (5th Semester)			
CourseCode	**Analog & Digital Circuit Design using MULTISIM** (ECE)				
Teaching	Total contact hours-36	L	T	P	C
Prerequisite(s):Knowledge of Analog and Digital circuit, MULTISIM		-	-	3	1.5

Course Objective

1. To analyze functioning of Multisim software.
2. To analyze diode and rectifier circuits.
3. To analyze single stage, double stage, feedback amplifier and oscillatory circuit.
4. To analyze digital logic gates.
5. To apply solutions to problems in designing analog and digital circuits

Course Outcomes:

On completion of Course, student will be able to	
CO1:	Understand the Multisim user interface
CO2:	Use Multisim to capture circuit schematics
CO3:	Understand the designofanalog circuits.
CO4:	Understand the designof digital circuits.
CO5:	Apply modular design with sub-circuits and multi-page designs

Syllabus:

List of Experiments:

Part-A-:

1. Study of PN junction characteristics.
2. Design andSimulation of Half wave and full wave rectifier.
3. Design andSimulation of single stage CE amplifier using BJT.
4. Design andSimulation of 2 stage RC Coupled Amplifier.
5. Design andSimulation of RC phase shift Oscillator.
6. Design andSimulation of Hartley/Colpitts/Wein bridge Oscillator.
7. Design andSimulation of voltage-series feedback amplifier.

8. Design andSimulation of basic & Universal gates.
9. Design andSimulation of FlipFlops.
10. Design and Simulation of CMOS inverter

Part-B-:

1. Design and simulation of cascode amplifier.
2. Design and simulation of Darlington pair amplifier.
3. Design and simulation of Multivibrator.
4. Design and simulation of Schmidt trigger circuit.
5. Design and simulation of Master-Slave flipflop.

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	3	3	3	-	-	-	--	-	-
CO2	3	3	2	3	2	3	-	-	-	-	-	-
CO3	3	3	2	3	2	3	-	-	-	--	-	-
CO4	3	3	2	3	2	3	-	-	-	-	-	-
CO5	3	3	2	3	2	3	-	-	-	-	-	-

Web Links:
1.www.iitkgp.ac.in
2.www.electronic4u.com
3.www.nptel.com

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
Course Code	**MICROPROCESSORS AND MICROCONTROLLERS**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Knowledge of Logic Gates, Registers, Counters, Memory, C programming, Interfacing concepts		3	0	-	3

Course Objectives:

1. To understand Microprocessor (8086) &Microcontroller (AVR) architecture.
2. To develop methods for memory interfacing and accessing.
3. To familiarize with Embedded-C programming concepts and IDE tools.
4. To develop various on-chip and off-chip devices interfacing concepts.
5. To familiarize with various serial and parallel communication methods.

On Completion of the course, students will be able to	
CO1:	Learn architectural difference between Microprocessor and Microcontroller and its need for development of products and product development procedure.
CO2:	Learn of RAM and ROM memory interfacing concepts and address calculations
CO3:	Apply concepts of programming in Assembly Language and Embedded C programming
CO4:	Analyze the concepts of Input / Output port Interfacing of microcontroller.
CO5:	Apply concepts of serial and parallel communication methods to various sensors

UNIT-1 8086 Microprocessors

Introduction, register organization of 8086, Architecture of 8086, Pin diagram and Signal description of 8086, Physical memory organization, general bus operation, I/O addressing capability, Minimum mode and Maximum mode of 8086 system and timings diagrams, Semiconductor memory (RAM and ROM) interfacing.

UNIT – 2 Programming with 8086 and Interfacing

Addressing modes, Instruction set, Assembly language programming, Introduction to stack, Stack structure of 8086, Interrupts and interrupt service routines, Interrupt cycle of 8086, non-maskable interrupt and Maskable interrupts, Architecture of 8255, Modes of operation of 8255, Stepper motor interfacing, Seven Segment Display Interfacing.

UNIT – 3 AVR Architecture and Assembly Programming

AVR architecture, General Purpose Registers and Special Purpose Registers, Status Registers, Program Counter, Stack Pointer and Stack Memory organization, Addressing Modes, Assembly Language Instruction Set, Delay Calculation and Directives, Bit-Addressability, Look-Up Table and processing, Macros.

UNIT – 4 Embedded C Programming

Compiler, Cross-Compilers, Intel and Motorola Hex file, Object File, Basics of Embedded C and C data types for AVR, I/O Programming in Embedded C, Delay calculation in Embedded C, LED interfacing and blinking.

UNIT-5 Interfacing AVR with External Peripherals

Interfacing Push-Buttons, Interfacing Key matrix, Seven Segment Display Interfacing, LCD Interfacing, Relay Interfacing, Temperature (LM35) Sensor Interfacing, DC motor Interfacing, Stepper Motor Interfacing, ADC & DAC Interfacing, AVR Timer Programming, AVR Interrupt Programming, AVR Serial Port Programming.

Text books:

1. Ray and Burchandi, "Advanced Microprocessors and Interfacing", Tata McGraw–Hill.
2. M.A.Mazidi,S.Naimi and S.Naimi, "The AVR Microcontroller and Embedded Systems Using Assembly and C", 1st Edition Pearson Publications, 2013.

Reference Books:

1. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, 2010.
2. Dhananjay V. Gadre, "Programming and Customizing The AVR Microcontroller", Tata McGraw-Hill publications, 2012.

Web Links:

1. https://nptel.ac.in/courses/108105102/
2. https://www.udemy.com/course/8086-microprocessor-architecture-in-one-video-in-easy-way/
3. https://www.sanfoundry.com/microprocessors-interview-questions-answers/
4. https://www.sanfoundry.com/avr-microcontroller-mcqs-architecture/

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- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
CourseCode	**DIGITAL SIGNAL PROCESSING**				
	Total Contact Hours - 50	L	T	P	C
Prerequisites: Signals and Systems		3	1	-	3

Course Objectives:

1. To develop a thorough understanding of the central elements of discrete time signal processing theory and the ability to apply this theory to real-world signal processing applications.
2. To use z-transforms and discrete time Fourier transforms to analyze a digital system.
3. To understand the discrete Fourier transform (DFT), its applications and its implementation by FFT techniques.
4. To design and understand finite & infinite impulse response filters for various applications.
5. To understand the principles and concepts of multirate signal processing.

On Completion of the course, students will be able to	
CO1:	Interpret, represent and process discrete/digital signals and systems.
CO2:	Understand frequency domain analysis of discrete time signals and systems using DTFT, DFT and FFT.
CO3:	Design and implement FIR and IIR filters using different methods, and how to test, analyze and refine design.
CO4:	Realize the basic structures of FIR and IIR systems.
CO5:	Acquire the basics of multi rate digital signal processing.

UNIT – 1

INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems , stability of LTI systems, Invertability, Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems,

Review of Z-transforms, solution of difference equations using Z-transforms, System function.

UNIT II

DISCRETE FOURIER SERIES &FOURIER TRANSFORMS: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III

DESIGN OF IIR DIGITAL FILTERS& REALIZATIONS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

UNIT IV

DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS:

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters, Basic structures of FIR systems, Lattice structures, Lattice-ladder structures

UNIT V

MULTIRATE SIGNAL PROCESSING

Introduction, Decimation, Interpolation, Sampling rate conversion, Implementation of sampling rate conversion and its applications.

Text Books:

1. Discrete Time Signal Processing: A.V. Oppenheim and Ronald W. Schafer, PHI 4th Edition,2017.
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis and Dimitris G. Manolakis, Pearson Education, PHI, 2013.
3. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill, 2006.

Reference Books:

1. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
2. Digital Signal Processing, A Computer Based Approach: SanjitK.Mitra, Mc Graw Hil,2011.
3. Digital Signal Processing: P. Ramesh Babu, 7th Edition, SciTech Publications,2017.

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	-	-	-	-	2	-	-
CO2	3	3	-	-	2	-	-	-	-	2	-	-
CO3	3	3	-	-	2	-	-	-	-	2	-	-
CO4	3	3	-	-	2	-	-	-	-	2	-	-
CO5	3	3	-	-	2	-	-	-	-	2	-	-

Regulation GRBT- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
CourseCode	Microwave & Optical Communication Engineering				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites EMwaves & Transmission lines		3	0	-	3

Course Objectives:

1. To understand fundamentals of rectangular waveguides and circular waveguides through electromagnetic field analysis.
2. To understand the waveguide components and multiport junction concept.
3. To understand the working principle and characteristics of microwave tubes.
4. To understand the M-type tubes with their characteristics.
5. To understand the function, design, and integration of the major microwave components like oscillator, modulatorin building a Microwave test bench setup for measurements.

On Completion of the course, students will be able to	
CO1:	Apply electromagnetic theory regarding Rectangular and circular waveguides.
CO2:	Apply the concept to multiport junction to calculate the scattering parameters.
CO3:	Analyse the types of microwave tubes.
CO4:	Distinguish between M-type and O-type tubes and modern tools.
CO5:	Analyse and measure microwave parameters using microwave bench.

UNIT – 1 Microwave Transmission Lines

Introduction, Microwave Spectrum and Bands, Applications of Microwaves, Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode.

UNIT – 2 Waveguide Components and Applications

Circular waveguides- Introduction,Characteristic Equation, Dominant and Degenerate Modes. Microstrip Lines– Introduction, Z_0 Relations, Effective Dielectric Constant, Losses, Q factor Cavity Resonators–Types, Resonant Frequencies, Q factor and Coupling

Coefficients, Related Problems. S-Matrix Calculations for Two-port Junction, E-plane and H-plane Tees, Magic Tee.

UNIT – 3 Microwave Tubes

Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, RelatedProblems.

UNIT – 4 Helix TWTs

Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants.
M-type Tubes- Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave. Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation

UNIT – 5 Introduction to Optical Fiber Communication

Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems

Fiber Characteristics: Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay.

Text books:

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. OrdungandH.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.
3. Microwave and Radar Engineering – M.Kulakarni, 4th Edition.

Reference Books:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press,John Wiley, 2nd Edition, 2002.
2. Microwave Engineering- David M.Pozar, John Wiley, 4th edition,2012.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Microwave and Radar Engineering – G Sasibhushana Rao, Pearson.
5. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition, 3rd Edition,2000.

Web Links:

1. http://nptel.iitg.ernet.in/Mech_Engg/IIT%20Roorkee/emwaves%
2. http://www.iienet2.org/
3. http://www.ilo.org/global/publications/lang--en/index.htm
4. http://nptel.ac.in/courses

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	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	2	-	-	-	-	2	-	-
CO5	3	2	-	-	-	-	-	-	-	2	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	**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:

a. ***To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste.***
b. ***To acquire the principles of treatment of municipal solid waste***
c. ***To know the impact of solid waste on the health of the living beings***
d. ***To learn the criterion for selection of landfill and its design***
e. ***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 Techobanoglous "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	-	-	-	-	-	-	-	-

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY GRBT-20

(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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (OPEN ELECTIVE-II)			
Course Code	CONCEPTS OF POWER SYSTEM ENGINEERING				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic Science		3	0	0	3

Course Objectives:

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

1. To understand about hydro-electric power plants
2. To understand about Thermal power plants
3. To understand about Nuclear power plants
4. To understand about Solar Photovoltaic Systems
5. To understand about Biomass

Course Outcomes:

After successful completion of the course, a successful student will be able to-	
CO1:	Understand about hydro-electric power plants
CO2:	Understand about Thermal power plants
CO3:	Understand about Nuclear power plants
CO4:	Understand about Solar Photovoltaic Systems
CO5:	Understand about Biomass

UNIT-I

Hydroelectric Power Stations:

Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation

UNIT-II

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.

Introduction transmission lines: Short, medium and long transmission lines.

UNIT-III

Nuclear Power Stations

Nuclear fission- Nuclear fuels, chain reaction- Nuclear reactor Components: Moderators, Control roads, Reflectors and Coolants. Types of Nuclear reactors - description of PWR, BWR and FBR.

UNIT-IV

Solar Photovoltaic Systems: Balance of systems – IV characteristics – System design: storage sizing – PV system sizing.

UNIT-V

Biomass Energy: Basic concepts, properties and types, biomass conversion, biofuels, advantages and disadvantages.

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, DhanpatRai& 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.

CO-PO Mapping:

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

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01	✓	✓										
C02	✓							✓				
C03	✓				✓							
C04	✓		✓									
C05							✓					

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2021-22)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Introduction to MEMS (Open Elective-II)**				
Teaching	Total contact hours-45	L	T	P	C
Prerequisite(s):	Engineering Physics.	3	0	0	3

Course Objectives:

Students undergoing this course will be able to:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the principles and various steps of different micro machining and fabrication techniques.
CO2:	Explain the working principle and fabrication methods of Micro mechanical sensors and actuators.
CO3:	Describe the working principles and construction of various thermal sensor and actuators.
CO4:	Discuss the working principles and fabrication techniques of Magnetic sensors and actuators, and MOEMS devices.
CO5:	Identify different micro fluid actuation techniques and explain the working and construction of BioMEMS devices.

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.

UNIT – II

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 – III

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, – thermisters, 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 – 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 – magnetic probe based storage device.

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

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) – 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– electronic nose (E-nose) – mass sensitive chemosensors

Text Books:

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

References:

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

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	-	-	-	-	-	-	-	-	1
CO2	2	-	-	1	-	2	-	-	-	-	-	1
CO3	2	1	2	-	-	-	-	-	-	-	-	1
CO4	2	3	3	-	-	2	-	-	-	-	-	1
CO5	2	2	3	-	-	2	-	-	-	-	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (semester)			
Course Code	**INTERNET OF THINGS AND IT'S APPLICATIONS Open Elective**				
Teaching	Totalcontacthours-45	L	T	P	C
Prerequisites: Knowledge of Logic Gates, Relays, Registers, Counter, Sensors, Microprocessors,Microcontrollers,Serial & Parallel communication		3	-	-	3

Course Objectives:

1. To understand the basic concepts of Internet of things
2. To develop understanding with layered Wired and Wireless protocols.
3. To develop understanding with Arduino board and Arduino IDE.
4. To develop understanding with Data analytics and supporting services.
5. To develop understanding with Big data services and Sensors.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Learn the Architecture of iot,Sensors,Actuators,ARM processors.
CO2:	Learn the various Communication protocols present in a network.
CO3:	Apply the practical knowledge to Arduino board
CO4:	Analyze the Machine learning and various network services.
CO5:	Learn the importance of Big data and Virtualization concepts.

UNIT – 1 FUNDAMENTALS OF IOT

Evolution of Internet of Things, Enabling Technologies, IoT Architectures, oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, & Smart Objects .

IoT Platfortri overview: Overview of IoT supported Hardware platforms such as: ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT – 2 IOT COMMUNICATION PROTOCOLS

Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.49, 802.15.4e, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT – 3 DESIGN AND DEVELOPMENT ENVIRONMENT

Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Nodemcu Board details, IDE programming.

UNIT – 4 DATA ANALYTICS AND SERVICES

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning — No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics, Xively Cloud for IoT, Python Web Application.

UNIT – 5 CASE STUDIES / INDUSTRIAL APPLICATIONS

IoT applications in home, Agriculture 3.0, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT.

Text Books:

1. IoT Fundamentals: Networking Technologies, Protocols arid Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.

Reference Books:

1.Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, DavidBoyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2.Internet of Things with Arduino and Bolt by Ashwin Pajankar.

Web Links:

1. https://thingspeak.com
2. https://www.blynk.cc/getting-started
3. http://www.arduino.cc
4. 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	2	1	3	-	1	1	1	-	-	-	1	3
CO2	2	1	1	-	-	-	1	2	-	2	-	-
CO3	2	-	3	2	1	2	2	-	3	-	2	-
CO4	1	2	-	-	-	2	3	3	2	1	-	3
CO5	3	-	-	2	-	1	-	2	-	2	-	-

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (Autonomous)	IIIB.Tech II Semester			
Course Code 201CS604	**FUNDAMENTALS OF DATABASES** Open Elective-II: CSE, CSE (AI/ML), CSE (Cyber Security)				
Teaching	Total contact hours: 48	L	T	P	C
Prerequisite(s):---Basic knowledge of Data structures, Proportional logic		3	0	0	3

Course Objective(s):

1. To impart students with theoretical knowledge of databases and database management systems in information technology applications.
2. To instruct the student with practical skills in the use of databases and database management systems
3. To apprehend the logical design, physical design and implementation of relational databases are covered.

Course Outcome(s):

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

CO-1: Obtain the knowledge about Database Management System

CO-2: Accorda description of the Database Management structure and comprehend the applications of Databases.

CO-3: Realize the advantages and disadvantages of the different models.

CO-4: Perceive the constraints and controversies associated with relational database.

CO-5: Explain the concept of data planning and Database design and Identify the various functions of Database Administrator

UNIT-1

Introduction: Data base System Applications, data base System VS file System, Advantages of a DBMS View of Data, Data Abstraction, instances and Schemas, data Models, the ER Model, Relational Model, Other Models, Database Languages: DDL, DML, DCL.

UNIT-2

ER Model: Data base design and ER diagrams, Beyond ER Design Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model.

UNIT-3

Basic SQL Query: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, Set, Comparison Operators, NULL values, Comparison using Null values, sub queries, grouping, aggregation, ordering, implementation of different types of joins.

UNIT-4

SQL and PL/SQL: Creating tables with relationship, implementation of key and integrity constraints, views. Introduction to PL/SQL

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency (1NF, 2NF and 3NF).

Unit-5

Introduction to NoSQL:NoSQL Data Model Design, Feature Set, areas of applicability, Types of NoSQL – Key-Value, Document Type, Graph based

Text Books

1. Database System Concepts 6e By Abraham Silberschatz, Henry Korth and S Sudarshan
2. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH

Reference Books

1. Introduction to Database Systems, 8/e C J Date, PEA
2. The Database book principles & practice using Oracle/MySqlNarainGehani, University Press.
3. Oracle Database 11g. The complete reference (oracle press)

Web References:

https://nptel.ac.in/courses/106105175

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	PSO1	PSO2
CO1	1	1	-	3	-	-	-	-	1	-	3	-	2	-
CO2	2	2	-	2	-	-	-	2	2	-	2	-	1	2
CO3	1	1	-	2	2	2	-	-	1	-	2	3	-	1
CO4	2	-	3	1	1	-	-	-	-	3	1	-	-	1
CO5	2	1		2	-	-	1	-	-	-	-	-	1	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem.(6th Semester)			
Course Code 201PT665	**Basic Concepts in Petroleum Drilling Engineering** (Open Elective-II)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisites		3	0	0	3

Course Objectives

The objectives of this course are to

- Understand the different types of drilling.
- Impart knowledge on drilling rig components.
- Illustrate mud circulating system.
- Identify well borehole problems

Course Out comes

On Completion of the course, the students shall be able to-	
CO1:	Understand overview of drilling and rig components
CO2:	Understand selection of drill string and drill bit
CO3:	Understand mud circulation system
CO4:	Understand basics of casing and cementing
CO5:	Understand borehole problems

Syllabus

UNIT-I

Overview of Drilling

Drilling planning approaches, drilling team, types of drilling, power systems.

Hoisting System

Derrick & substructure, steel derricks, making a connection, tripping operation, draw-works.

Travelling Assembly

Crown block, travelling block & hook, drilling line, static crown load.

UNIT-II

Drill String

Drill string, drill string components, and design, stretch of drilling pipe, drill pipe maintenance

Drill Bits
Types of bits, standard classification of bits, failure mechanism of bits, bit selection and evaluation

UNIT-III
Drilling Mud Engineering
Introduction, functions, types of mud, fundamental properties of mud, mud circulation, mud conditioning system

Unit-VI
Casing & Cementing
Casing, functions, types, casing policy, casing design basics, cementing, functions of cement, cement classes, casing accessories, setting casing, single stage and two stage cementing.

Unit-V
Borehole Problems
Introduction, pipe sticking, differential sticking, mechanical sticking, and key seating; sloughing shale, lost circulation zones.

Text Book(s)
1. Neal Adams and Tommie Charrier, "Drilling Engineering: A Complete Well Planning Approach" PennWell Pub. Co., (1985).
2. Formulas and Calculation for Drilling, Production and workover, Norton J. Lapeyrouse, 2nd
   Edition, Gulf Publishing, (2002).

Reference(s)
1. Heriot Watt, "Drilling Engineering Handbook".
2. Economides, M. J., "Petroleum Well Construction" John Wiley & Sons, (1998).
3. Drilling Engineering- A complete Well Planning Approach, Neal J. Adams
4. Drilling Operation Practices Manual, IDT, ONGC

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	Open Pit Slope Analysis and Design (Open Elective-II)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To impart the knowledge on slopes, slope failures and factors that influence slopes.
2. To discuss the geotechnical parameters required for stability studies of a slope.
3. To elaborate the shear strength of intact rock mass and jointed rock mass.
4. To explain the impacts of water in slope stability.
5. To inculcate various methods and techniques used to assess the slope stability.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Classify various modes of slope failure.
CO2:	Comprehend and analyse the geotechnical parameters required for slope stability analysis.
CO3:	Interpret the shear strength of intact rock mass and jointed rock mass.
CO4:	Analyse the flow of water in slope stability.
CO5:	Summarize various methods and techniques used to assess the slope stability.

Syllabus

UNIT-I
Introduction
Types and formation of slopes in surface mines; Mechanism of common modes of slope failure; Factors influencing stability of slopes and planning of slope stability investigations.

UNIT-II
Geotechnical Information
Geotechnical data required for high wall slope stability studies; Collection of geological data and their interpretation for stability studies of high wall slopes.

UNIT-III
Slope Stabilization methods
Construction and Stabilization of Slopes, Construction and Stabilization of dumps, Construction of gabion wall, wire netting, preventing landslides, preventing debris from falling.

UNIT-IV

Slope Monitoring Instruments

Conventional slope monitoring system; Automatic deformation system; Sub-lateral movement monitoring system; Real-time monitoring system.

UNIT-V

Analysis and Design of Pit Slopes and Waste Dumps

Slope stability assessment methods and techniques; Analysis and design criteria and methodology for high wall slopes and backfill and waste dumps; Introduction to Slope Stability Software.

Textbook(s)

1. Hoek and Bray, Rock Slope Engineering, The Institution of Mining and Metallurgy, 1981.
2. G.B. Mishra, Surface Mining, Dhanbad Publishers, 1978.

Reference(s)

1. R.T. Deshmukh, Opencast Mining, M. Publications, Nagpur, 1996.
2. S. K. Das, Surface Mining Technology, Lovely Prakashan, Dhanbad, 1994.

III Year – II Semester		L	T	P	C
		3	0	0	3
OPEN ELECTRIVE-2 HYBRID AND ELECTRIC VEHICLES					

Course Objectives:

1. Understanding 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 shall be able to-	
CO1:	Grade hybrid electric technology and electronic drive trains
CO2:	Construction of hybrid electric vehicles
CO3:	Demonstrate electric vehicle components
CO4:	Construction of Electric vehicle technology
CO5:	Operate fuel cell technology and Identification of fuel cell based vehicles

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, Plug-in hybrid electric vehicles.

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 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 – ARCHITECTURE OF 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 – Methanol crossover.

TEXT BOOKS

1. Basu .S, *"Recent Trends in Fuel cell Science and Technology"*, Anamaya Publishers, New Delhi.,2007.
2. Viswanathan, B. and Aulice Scibioh, 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, Mehrdad Ehsani, 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	3	-	1	-	-	-	-	-	-	-	-
CO2	1	3	-	2	-	2	-	2	2	-	-	-
CO3	1	-	2	3	-	-	3	-	1	-	-	1
CO4	-	1	-	3	-	2	-	-	2	-	-	-
CO5	-	1	-	-	-	-	3	-	-	-	-	1

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech – III - II			
Course Code	**OPERATIONS MANAGEMANT (Common to all Branches)**				
Teaching	Total contact hours-45	L	T	P	C
Prerequisite(s):Basic knowledge of business production and operations system.		3	0	0	3

Course objectives:

1. It aims to provide students with a critical understanding of the scope and strategic importance of Operations management.
2. To make the students to know about role of operations managersand an appreciation of the interaction of operations with the organisation, employees and customers.
3. To impart the knowledge in the minds of the students how to maximize efficiency while producing goods.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.
CO2:	Analyze and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments.
CO3:	Develop aggregate capacity plans and MPS in operation environment.
CO4:	Plan and implement suitable materials handling principles and practices in the operations.
CO5:	Plan and implement suitable quality control measures in Quality Circles to TQM.

UNITI

Introduction to Operation Management: Nature & Scope of Operation/ Production Management, Relationship with another 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 Concept : Factors affecting Productivity – Job Design – Process Flow Charts – Work study-Methods Study – Work Measurement – Engineering and Behavioral Approaches.

UNIT V

Quality Management: Quality- Definition, Dimension, Cost of Quality, Quality Circles-Continuous improvement (Kaizen), Statistical Quality Control, Variable & Attribute, Process Control, Control Charts -Acceptance Sampling Total Quality Management (TQM)

References:

1. Krajewski&Ritzman (2004). Operation Management -Strategy and Analysis. Prentice Hall of India.
2. Panner Selvem, 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

Regulation GRBT- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
CourseCode	**RADAR ENGINEERING**				
Teaching	Total Contact Hours - 45	L	T	P	C
Prerequisites: Knowledge of Analog communications, Electromagnetic theory and Antenna and Wave propagation		3	0	-	3

Course Objective:

The student will

- *Understand the basics of RADAR systems and its components.*
- *Understand the basic concepts of ambiguity functions, CW Radar, FM-CW Radar and their applications.*
- *Understand concept of MTI and Pulse Doppler Radar*
- *Understand concepts about different trackers and radar antennas*
- *Understand the concept of Noise and radar receivers.*

Course Outcomes:

After going through this course, the student will be able to

CO1	Acquire the knowledge to apply and design required parameters for RADAR system.
CO2	Analyze the working principle of CW and Frequency Modulated Radar.
CO3	Analyze the working principle of MTI and pulse Doppler Radar.
CO4	Acquire the knowledge of different types of radars and radar trackers
CO5	Acquire the knowledge about different types of radar receivers.

Unit I
Introduction

Nature of Radar. Maximum Unambiguous Range. Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Related Problems. Radar Equation: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere). Transmitter power.

Unit II

PRF and Range Ambiguities, System Losses (Qualitative treatment). Related Problems. CW and Frequency Modulated Radar: Doppler effect, CW Radar – Block Diagram, Isolation between

Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirement, Applications of CW radar. FMCW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

Unit III

MTI and Pulse Doppler radar

Introduction, Principle, MTIR Radar with Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, and Double Cancellation staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler radar. Tracking Rader: Tracking with Radar, Sequential Lobing, Conical Scan, Mono-pulse tracking.

Unit IV

Radar Amplitude Comparison Mono-pulse (one – and two –coordinates), Phase Comparison Mono-pulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range Acquisition and Scanning Patterns. Comparison of Trackers. Radar Antennas – Antenna Parameters, Reflector Antennas, Lens Antennas, Lens Antennas Cosecant- Squared Antenna Pattern, Radomes.

Unit V

Electronically Steered Phased Array Antennas, Phase Shifters, Frequency – scan Arrays, Radiation for Phased Array, and Architecture for Phased Arrays. Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver.Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes, Series versus Parallel Feeds. Applications, Advantages and Limitations.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, Second Edition, McGraw – Hill, 1981.
2. Radar Engineering and fundamentals of Navigational Aids-G.S.N.Raju, I.K International, 2008.

REFERENCES:

1. Introduction to Radar Systems – Merrill I. Skolnik, Third Edition, Tata McGraw – Hill, 2001.
2. Radar: Principles, Technologies, Applications- Byron Edde, Pearson Education.
3.Radar principles-Peyton, Z.peebles, John wiley, Jr 2004.
4.Principles of Modern Radar- Mark A. Richards, Scitech publishing, INC.

WEB REFERENCES:

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

CourseCode :RADAR SYSTEMS													
CourseDesigned by		Department of Electronics& Communication Engineering											
	Program Outcomes	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Course Outcome	CO 1	✓	✓	✓									
	CO 2		✓	✓									√
	CO 3		✓	✓									
	CO 4		✓	✓		✓	✓						
	CO 5			✓	✓		✓						√
Category		General Humanities		Basic Sciences		Engineering Sciences And			Professional Subjects				

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 semester)			
CourseCode	**MOBILE & CELLULAR COMMUNICATION**				
Teaching	Total Contact Hours - 45	L	T	P	C
Prerequisites: Knowledge of Signals and Systems, Digital Signal Processing		3	0	-	3

Course Objectives:

6. To understand the fundamental concepts and applications of Image Processing.
7. To understand the concepts of Intensity Transformations and Spatial Filtering.
8. To understand Image Restoration and Reconstruction.
9. To understand the concepts of Color image processing.
10. To understand Morphological image processing, Image segmentation.

Course Outcomes:

On Completion of the course, students will be able to	
CO1	Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems
CO2	Understand the frequency management, channel assignment strategies and antennas in cellular systems
CO3	Understand the concepts of handoff and architectures of various cellular system

UNIT I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT II

INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni-directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

UNIT III

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells. **CELL COVERAGE FOR SIGNAL AND TRAFFIC:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

UNIT IV

HANDOFF STRATEGIES:

Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced hand-off,mobile assigned handoff, intersystem handoff, soft and hard hand offs, vehicle locating methods, dropped call rates and their evaluation.

UNIT V

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; TDMA, CDMA, OFDMA.3G and 4G Wireless Standards GSM , GPRS , WCDMA , LTE , Wi-MAX, Introduction to 5G standards.

TEXT BOOKS:
Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edn., 2006.
Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.
Advanced Wireless Communications-4G By. Savo G Glisic, John Wiley & Sons Publication 2nd Edition

REFERENCES:
Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn.,2002.
Fundamentals of Wireless Communication By. David Tse and Pramod Viswanath,Cambridge University Press

Web Links:

3. NPTEL online courses.
4. MOOCS online courses by JNTUK.

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	2	-	3	-	-	-	-	2	-	2
CO2	3	2	2	-	1	-	-	-	-	-	-	-
CO3	2	2	3	2	1	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	2	-	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 semester)			
CourseCode	**DIGITAL IMAGE PROCESSING (Professional Elective)**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Knowledge of Signals and Systems, Digital Signal Processing		3	0	-	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.
5. To understand Morphological image processing, Image segmentation.

Course Outcomes:

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:	Perform all morphological operations on images and image segmentation.

UNIT – 1 Digital Image Fundamentals

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 Spatial& Frequency 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.

Two-dimensional Fourier Transform, some properties of 2-D Discrete Fourier transform, correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.

UNIT – 3 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-4 Colour Image Processing

Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation

UNIT – 5 Morphological Image Processing and Image Segmentation

Preliminaries, Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, Gray scale morphology.

Image Segmentation: Detection of Discontinuities (point, line and edge), Edge Linking and Boundary Detection, Thresholding, Basic global thresholding, Adaptive Thresholding, Region-Based Segmentation, region growing, splitting and merging.

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 UsingMATLAB, 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

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	**VLSI DESIGN**				
Teaching	Total Contact Hours – 45	L	T	P	C
Prerequisites: Fabrication of Integrated circuits, Bipolar technology, Layout design, Scaling factors		3	0	-	3

Course Objectives:

1. Use the circuit analysis model in analysis of CMOS digital electronics circuits, including logic components and their interconnects.
2. Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
3. Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
4. Understand the concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).
5. Design static CMOS combinational and sequential logic at the transistor level, including mask layout.

Course Outcomes:

On Completion of the course, students will be able to	
CO1:	Analyze the fabrication process of CMOS digital circuits.
CO2:	Apply the concept of design rules during the layout of a circuit.
CO3:	Analyze the architectural issues of subsystem design.
CO4:	Implement circuit through various design styles (semi-Custom, Full Custom).
CO5:	Apply the clock mechanism, demonstrate the architectural of FPGA.

UNIT-1CMOS & BI-POLAR TECHNOLOGY

Introduction to IC Technology, IC production process, Enhancement and Depletion modes of MOS transistor, CMOS Fabrication processes, Comparison between CMOS and Bipolar technologies, Current and voltage relations of MOS circuit, MOS transistor transconductance and output conductance, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter, The CMOS Inverter, Bi-CMOS Technology, Latch-up in CMOS circuits.

UNIT-2 MOS AND BI-CMOS CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagram, Stick Diagrams of NMOS inverter, CMOS inverter, CMOS NAND, CMOS NOR gate. Design Rules and Layout, λ-based design rules, 2μm Double Metal double Poly design rules, CMOS/Bi-CMOS rules, 1.2μm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND, NOR gates and CMOS inverter and NMOS inverter.

UNIT-3 BASIC CIRCUIT CONCEPTS & SCALING FACTORS

Sheet resistance of MOS transistors and Inverters, Standard unit of capacitance, The Delay Unit, Inverter Delays, Propagation Delays, Fan-in and fan-out characteristics, Realization of gates using NMOS, PMOS and CMOS technologies. Scaling models, Scaling factors for device parameters, Limits due to sub threshold currents, current density limits on logic levels and supply voltage due to noise.

UNIT-4 SUBSYSTEM DESIGN:

Architectural issues, switch logic, Gate logic, examples of structured design, clocked sequential circuits, system considerations, general considerations of subsystem design processes, an illustration of design processes.

UNIT-5 VLSI DESIGN ISSUES & FPGA

VLSI Design issues and design trends, design for testability, BIST, stuck at faults, mixed signal design, ASIC design flow, FPGA design flow, Basic FPGA architecture, FPGA configuration modes, FPGA design flow, FPGA design families

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A. Pucknell and Eshraghian, Prentice-Hall of India Private Limited,2005 Edition.
2. Principles of CMOS- Weste and Eshraghian, Pearson education,1999.

REFERENCES:

1. Advanced Digital Design with the Verilog HDL, Michael D. Ciletti, Xilinx Design Series, Pearson Education.
2. VLSI Design-Black Book by Dr. K.V.K.K. Prasad, Kattula Shyamala, Kogent Learning Solutions Inc.2012 Edition.
3. Digital Integrated Circuits- John M Rabaey, PHI, EEE-1997.

WEB-RESOURCES:

www.pa.msu.edu
www.tutorvista.com
www.globalspec.com
www.ee.bilkent.edu.tr
NPTEL online courses.

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

Regulation GRBT-20 Course Code	MICROWAVE & OPTICAL COMMUNICATION ENGINEERING LABORATORY	III B.Tech. II Sem (6th Semester)			
Teaching	Total Contact Hours – 36	L	T	P	C
Prerequisites: Basic knowledge of microwave engineering and fiber optic communication		0	0	3	1.5

Course Objectives:

1. To learn the characteristics of Microwave components.
2. To gain hands on experience by exposing the students to various microwave components.

Course Outcomes:

On Completion of the course, students will be able to	
CO 1:	Analyze the working of several microwave components
CO 2:	Perform measurements with the microwave equipment
CO 3:	Measure several waveguides, antenna related parameters and analyze the performance characteristics

List of Experiments:

1. Reflex Klystron Characteristics
2. Gunn diode Characteristics
3. Attenuation Measurement
4. Directional Coupler Characteristics
5. VSWR Measurement
6. Impedance and Frequency Measurement

7. Waveguide Parameters Measurement
8. Scattering Parameters of Circulator
9. Scattering Parameters of MAGIC TEE
10. Characterization of LED
11. Measurement of data rate for Digital Optical Link
12. Intensity of modulation of laser Output Through an optical fiber
13. Measurement of numerical aperture
14. Measurement of losses for Analog Optical Link
15. Measurement of gain of an antenna
16. Study of Cellular Communication
17. Measurement od Dielectric Constant of a given material
18. Setup of Time Division Multiplexing using fiber optics
19. Antenna 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
CO1	2	2	3	-	-	-	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	-	2	2	-	-	3	-	-	-	-	-	-
CO5	-	-	3	1	-	3	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
Course Code	**MICROPROCESSORS AND MICROCONTROLLERS LAB**				
Teaching	Total Contact Hours - 36	L	T	P	C
Prerequisites: Basic knowledge of 8086 Microprocessors, Assembly & C Programming		0	-	3	1.5

Course Objectives:

1. Understand the basic concepts of 8086 programming and Interfacing.
2. Learn architecture of AVR Microcontroller, Importance of Bit addressability, function of Special registers and basic concepts of Assembly Language program
3. Learn the concepts of Embedded C Programming and Interfacing
4. Learn basic concepts of AVR Microcontroller Interfacing with the real world through different devices.

On Completion of the course, students will be able to	
CO1:	Develop Assembly Language Programme for various arithmetic and logical operations.
CO2:	Develop Assembly Language Programme for various string related operations.
CO3:	Develop 'C' Programme for interfacing of various peripherals to 8086 microprocessors.
CO4:	Develop 'C' Programme for interfacing of various peripherals to AVR microcontrollers.

EXPERIMENTS TO BE DONE USING DIGITAL IC

MASM programs:

1. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division- Signed and using arithmetic operation, ASCII- Arithmetic operation.
2. Logical Shifting Operations-Left shift, Right shift, rotate left, rotate right, converting packed BCD to Unpacked BCD, BCD to ASCII conversion.
3. Using string operation and Instruction prefix: Move Block, Reverse string, Inserting, Deleting of string.
4. String sorting: Ascending order, Descending order, String comparison, Length of the string.

INTERFACING WITH 8086 (Minimum of 4 experiment has to done)

1. Stepper motor interfacing
2. DC motor interfacing
3. Seven segment Display
4. Traffic light interfacing
5. Analog to Digital converter
6. LCD Display

INTERFACING WITH AVR MCU (Minimum of 4 experiment has to done)

1. Stepper motor interfacing
2. DC motor interfacing
3. Seven Segment Display
4. Analog to Digital converter
5. LCD display
6. LED Blinking

Text books:

1. Ray and Burchandi, "Advanced Microprocessors and Interfacing", Tata McGraw–Hill.
2. M.A.Mazidi,S.Naimi and S.Naimi, "The AVR Microcontroller and Embedded Systems Using Assembly and C", 1st Edition Pearson Publications, 2013.

References:

1. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, 2010.
2. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.
3. Dhananjay V. Gadre," Programming and Customizing the AVR Microcontroller", TATA McGraw Hill publications, 2012.

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	2	3	-	3	-	3	3	-	-	3
CO2	3	2	2	3	2	3	2	3	3	-	-	3
CO3	3	2	2	3	2	3	2	3	3	2	2	3
CO4	3	2	2	3	2	3	2	3	3	2	2	3

Regulation GRBT- 20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
CourseCode	**DIGITAL SIGNAL PROCESSING LAB**				
Teaching	Total Contact Hours - 45	L	T	P	C
Prerequisites: Linear system theory and Fourier Transforms, Digital Signal Processing, Basic Knowledge of MATLAB and C Programming		0	0	3	1.5

Course Objectives:

1. Knowledge to represent real world signals in digital format and understand transform-domain (Fourier and z-transforms) representation of the signals.
2. Learn to apply the linear systems approach to signal processing problems using high-level programming language.
3. Learn the basic architecture of microprocessors and digital signal processors and to learn about to implement linear filters in real-time DSP chips.

On Completion of the course, students will be able to	
CO1:	Design and implement a DSP system using tools like MATLAB
CO2:	Analyze and describe the functionality of a real world DSP system
CO3:	Design and execute the creation of a complex DSP system
CO4:	Apply DSP system design to real world applications

(Note: Students have to perform at least FOUR experiments from each part.)

PART-A

List of the Experiments

1. Generation of DT signals.
2. Verify the Linear Convolution of two DT signals
   a) Using MATLAB
   b) Using Code Composer Studio(CCS)
3. Verify the Circular Convolution of two DT signals
   a) Using MATLAB
   b) Using Code Composer Studio(CCS)
4. Find the sum of DT sinusoidal signals.
5. Computation of Discrete Fourier

Transform(DFT) and InverseDiscrete
Fourier Transform (IDFT)

a) Using MATLAB
b) Using Code Composer Studio(CCS)

6. Transfer Function Stability Analysis:
using pole-zero plot, bodePlot
and Nyquist plot.

PART-B

Following Experiments are to be done using a TIDSP Starter Kit.

7. Generation of a sinusoidal signal.
8. Linear and circular convolution of DT sequences.
9. Compute N-point DFT of a given DT sequence.
10. Design and implementation of FIR filters.
11. Design and implementation of IIR filters.

PART-C

FollowingExperimentsaretobedoneusing**CypressFM4StarterKit.**

12. Verification of sampling theorem.
13. Implementation of FFT algorithm.
14. Implementation of FIR filters.
15. Implementation of IIR filters.

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	-	-	-	-	-	-
CO2	3	2	3	-	1	2	-	-	-	-	-	-
CO3	-	2	3	2	-	1	-	-	-	-	-	-
CO4	-	2	3	-	1	2	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
CourseCode	**ARM BASED/ AURDINO BASED PROGRAMMING** (ECE)				
Teaching	Totalcontacthours-36	L	T	P	C
Prerequisite(s):Knowledge of Microcontroller and Arduino		-	-	3	1.5

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Comprehend Microcontroller-Transducers Interface techniques
CO2:	Establish Serial Communication link with Arduino
CO3:	Analyze basics of SPI interface.
CO4:	Interface Stepper Motor with Arduino
CO5:	Analyze Accelerometer interface techniques

LIST OF EXPERIMENTS:

1. Measure Analog signal from Temperature Sensor
2. Generate PWM output
3. Drive single character generation on Hyper Terminal
4. Drive a given string on Hyper Terminal
5. Full duplex Link establishment using Hyper terminal
6. Drive a given value on a 8 bit DAC consisting of SPI
7. Drive Stepper motor using Analog GPIOs
8. Drive Accelerometer and Display the readings on Hyper Terminal

COMPONENTS/ BOARDS :

1. Arduino Duemilanove Board
2. Arduino Software IDE

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	3	3	3	-	-	-	--	-	-
CO2	3	3	2	3	2	3	-	-	-	-	-	-
CO3	3	3	2	3	2	3	-	-	-	--	-	-
CO4	3	3	2	3	2	3	-	-	-	-	-	-
CO5	3	3	2	3	2	3	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code	**WIRELESS SENSOR NETWORKS (Professional Elective – III)**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Knowledge of Computer Networks, Routing Protocols and Security.		3	0	-	3

Course Objectives:

- To understand the basics of wireless sensor networks and concepts of various topologies used in the sensor networks.
- To understand design constraints of Ad-hoc Protocols with different mechanisms.
- To understand various routing protocols and mechanisms.
- To understand transport layer and various design constraints of transport layer.
- To understand various security algorithms and requirements of network platforms and tools.

Course Outcomes:

On Completion of the course, students will be able to	
CO1:	Identify major issues and challenges associated with wireless sensor networks.
CO2:	Identify the requirement of protocols for wireless ad-hoc networks as compared to the existing wired network.
CO3:	Explore network layer technologies by researching key areas such as algorithms, protocols, hardware, and applications.
CO4:	Discuss the concepts of transport layer protocols for wireless ad-hoc networks.
CO5:	Understand security requirements, Issues and Challenges involved in wireless ad-hoc networks.

UnitI

Introductionandoverviewofsensornetworkarchitectureanditsapplications,sensornetworkcomparisonwithAdHoc Networks,Sensornodearchitecturewithhardwareandsoftwaredetails.

UnitII

Hardware: Examples like mica2,micaZ, telosB,cricket,Imote2,tmote,btnode,and Sun SPOT,Software(OperatingSystems):tinyOS,MANTIS,Contiki,andRetOS.

UnitIII

Programming tools: C, nesC. Performance comparison of wireless sensor networks simulation andexperimentalplatformslike opensource(ns-2)andcommercial(QualNet,Opnet)

UnitIV

Overview of sensor network protocols (details of atleast 2 important protocol per layer): Physical,MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster basedprotocols,Fundamentals of802.15.4,Bluetooth,BLE (Bluetoothlow energy),UWB.

UnitV

Data dissemination and processing; differences compared with other database management systems,data storage; query processing. Specialized features: Energy preservation and efficiency; securitychallenges;fault-tolerance,IssuesrelatedtoLocalization,connectivityandtopology,Sensordeployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research,andEnablingtechnologiesinwirelesssensornetwork.

Text Books:

- Ad-hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy and B. S. Manoj, 2004, PHI.
- Wireless Ad-hoc and Sensor Networks: Protocols, Performance and Control, JagannathanSarangapani, CRC Press.
- Protocols and Architectures for Wireless Sensor Networks, Holger Karl & Andreas Willig, John Wiley, 2005.

Reference Books:

- Wireless Sensor Networks-Technology, Protocols, and Applications, KazemSohraby, Daniel Minoli&TaiebZnati, John Wiley, 2007.
- Wireless Sensor Networks-An Information Processing Approach, Feng Zhao & Leonidas J. Guibas, Elsevier, 2007.
- Ad-hoc Mobile Wireless Networks: Protocols & Systems, C. K. Toh, 1st ed., Pearson Education.
- Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam. 2004, Springer.

Web References

- NPTEL online courses.
- MOOCS online courses by JNTUK

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	2	-	-	-	-	-	-	-	-
CO2	3	2	3	-	2	-	1	-	-	-	-	-
CO3	3	2	3	-	2	-	1	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th Semester)			
CourseCode	**SOFTWARE DEFINED RADIO**				
Teaching	Total Contact Hours – 45	L	T	P	C
Prerequisites: Kowledge of frequency band and technologies		3	0	-	3

Course Objectives:

Demonstrate advanced knowledge in the evolving paradigm of Software defined radio and technologies for its implementation.

Analyze complex problems critically in the domains of Radio frequency implementation issues, Multirate signal processing in SDR, as well as a Smart antenna techniques for better spectrum exploitation for conducting research.

Apply appropriate techniques for the development of scientific and technological knowledge in designing software defined radios and their usage for cognitive radio.

UNIT –1

Introduction: The Need for Software Radios, What is Software Radio, Characteristics and benefits ofsoftware radio- Design Principles of Software Radio, RF Implementation issues- The Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design – RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios- Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion.

UNIT – 2

Multi Rate Signal Processing: Introduction- Sample Rate Conversion Principles- Polyphase FiltersDigital Filter Banks- Timing Recovery in Digital Receivers Using Multirate Digital Filters.

Digital Generation of Signals: Introduction- Comparison of Direct Digital Synthesis with Analog Signal Synthesis- Approaches to Direct Digital Synthesis- Analysis of Spurious Signals- Spurious Components due to Periodic jitter- Band Pass Signal Generation- Performance of Direct Digital Synthesis Systems- Hybrid DDS-PLL Systems- Applications of direct Digital Synthesis- Generation of Random Sequences- ROM Compression Techniques.

UNIT – 3

Analog to Digital and Digital to Analog Conversion: Parameters of ideal data converters- Parameters of Practical data converters- Analog to Digital and Digital to Analog Conversion- Techniques to improve data converter performance- Common ADC and DAC architectures.

UNIT – 4

Digital Hardware Choices: Introduction- Key Hardware Elements- DSP Processors- Field Programmable Gate Arrays- Trade-Offs in Using DSPs, FPGAs, and ASICs- Power ManagementIssues Using a Combination of DSPs, FPGAs, and ASICs.

UNIT –5

Object – Oriented Representation of Radios and Network Resources: Networks- Object Oriented Programming- Object Brokers- Mobile Application Environments- Joint Tactical Radio System. Case Studies in Software Radio Design: Introduction and Historical Perspective, SPEAK easy- JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT

Text books:

1. Software Radio: A Modern Approach to Radio Engineering - Jeffrey H. Reed, 2002, PEAPublication.
2. Software Defined Radio: Enabling Technologies- Walter Tuttle Bee, 2002, Wiley Publications.

Reference Books:

1. Software Defined Radio for 3G - Paul Burns, 2002, Artech House.
2. Software Defined Radio: Architectures, Systems and Functions - Markus Dillinger, KambizMadani, Nancy Alonistioti, 2003, Wiley.
3. Software Radio Architecture: Object Oriented Approaches to wireless System Engineering –Joseph Mitola, III, 2000, John Wiley & Sons.
4. R.F Microelectronics – B. Razavi, 1998, PHI. 5. DSP – A Computer Based Approach – S. K.Mithra, 1998, McGraw-Hill

Web Links:

5. NPTEL onlinecourses.
6. MOOCS online courses byJNTUK

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	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
CourseCode	COGNITIVE RADIO				
Teaching	Total Contact Hours – 45	L	T	P	C
Prerequisites:Knowledge of networks and spectrum		3	0	-	3

On Completion of the course, students will be able to	
CO1:	Understand the fundamental concepts of cognitive radio networks.
CO2:	Develop the cognitive radio, as well as techniques for spectrum holes detection thatcognitive radio takes advantages in order to exploit it.
CO3:	Understand technologies to allow an efficient use of TVWS for radio communicationsbased on two spectrum sharing business models/policies.
CO4:	Understand fundamental issues regarding dynamic spectrum access, the radio- resource management and trading, as well as a number of optimization techniques forbetter Spectrum exploitation

UNIT – 1

Introduction to Cognitive Radios: Digital dividend, cognitive radio (CR) architecture, functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.

UNIT –2

Sensing: Spectrum sensing, detection of spectrum holes (TVWS), collaborative sensing, geo-location database and spectrum sharing business models (spectrum of commons, real time secondary spectrum market).

UNIT – 3:

Optimization Techniques of Dynamic Spectrum Allocation: Linear programming, convex programming, non-linear programming, integer programming, dynamic programming, stochastic programming.

UNIT –4

Dynamic Spectrum Access and Management: Spectrum broker, cognitive radio architectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.

UNIT –5

Spectrum Trading: Introduction to spectrum trading, classification to spectrum trading, radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), classification of auctions (single auctions, double auctions, concurrent, sequential).Research Challenges in Cognitive Radio: Network layer and transport layer issues, cross- layer design for cognitive radio networks

Text books:

1. Ekram Hossain, DusitNiyato, Zhu Han, "Dynamic Spectrum Access and Management in Cognitive Radio Networks", Cambridge University Press,2009.
2. Kwang-Cheng Chen, Ramjee Prasad, "Cognitive radio networks", John Wiley & Sons Ltd.,2009.

Reference Books:

1. Bruce Fette, "Cognitive radio technology", Elsevier, 2nd edition,2009.
2. HuseyinArslan, "Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems", Springer,2007.
3. Francisco Rodrigo Porto Cavalcanti, Soren Andersson, "Optimizing Wireless Communication Systems" Springer,2009.
4. Linda Doyle, "Essentials of Cognitive Radio", Cambridge University Press,2009

Web Links:

1. NPTEL onlinecourses.
2. MOOCS online courses byJNTUK

CO-PO Mapping:

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CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
CourseCode	**INFORMATION THEORY CODING**				
Teaching	Total Contact Hours – 45	L	T	P	C
Prerequisites: knowledge of coding and errors		3	0	-	3

Course Objectives:

On Completion of the course, students will be able to	
CO1:	Design an Application with Error-Controlcoding
CO2:	Use Compression and DecompressionTechniques
CO3:	Perform source coding and channelcoding

UNIT –1

INFORMATION THEORY AND SOURCE CODING

Uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, source coding theorem, data compression, prefix coding, Huffman coding, Lempel-Ziv coding, Source with memory and itsentropy.

UNIT –2

DISCRETE CHANNELS

Binary Symmetric Channel, mutual information & its properties, Channel capacity, channel coding theorem and its application to BSC, Shannon's theorem on channel capacity, capacity ofa channel of infinite bandwidth, bandwidth - S/N trade off, practical communication systems inlight of Shannon's theorem, Fading channel, channels withmemory.

UNIT – 3

GROUPS, FIELDS AND LINEAR BLOCK CODES

Galois field and its construction in GF(2m) and its basic properties, vector spaces and matrices inGF(2), Linear block codes, systematic codes and its encoding circuit, syndrome and errordetection, minimum distance, error detecting and correcting capabilities of block code, decodingcircuit, probability of undetected error for linear block code in BSC, Hamming code and theirapplications.

UNIT – 4

CYCLIC CODES AND BCH CODES

Basic properties of Cyclic codes, Generator and parity check matrix of cyclic codes, encoding

and decoding circuits, syndrome computation and error detection, cyclic Hamming codes, encoding and decoding of BCH codes, error location andcorrection.

UNIT –5

CONVOLUTIONALCODES

Introduction to convolution code, its construction and Viterbi algorithm for maximum likelihooddecoding.Automatic repeat request strategies and their throughput efficiency considerations.

Text books:

1. Sklar, Digital Communication, Pearson Education Asia, 2nd Edition,2001.
2. Shu Lin and Costello, Error Control Coding: Fundamentals and Applications, 2ndEdition, Pearson,2004.

Reference Books:

1. Haykin Simon, Digital Communication, Wiley Publications,2013.
2. 2. Information theory and coding, Muralidhar Kulkarni, KS AShiva prakash,2015.
3. 3. JS Chithode, Information theory and coding, Technical publishers, 1st Edition,2014.

Web Links:

3. NPTEL onlinecourses.
4. MOOCS online courses byJNTUK

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code	**EMBEDDED SYSTEM DESIGN (Professional Elective – IV)**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: Knowledge of A/D Converters, D/A Converters, Compilers, linkers, Debuggers, Microprocessors, Microcontrollers.		3	0	-	3

Course Objectives:

1. To understand the basics in typical embedded system design.
2. To understand the communication devices and basic integrated circuit design.
3. To understand concepts of firmware design approaches, ISR concept and interrupt servicing.
4. To understand the basics of operating system and concept of choosing an RTOS.
5. To understand concepts of integrated development environment, compiler, debugger.

Course Outcomes:

On Completion of the course, students will be able to	
CO1:	Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO2:	Understand different I/O devices and peripherals used in embedded networking.
CO3:	Develop programming skills in embedded systems for various applications.
CO4:	Choose and operating system, and learn how to choose an RTOS.
CO5:	Acquire knowledge about Life cycle of embedded design and its testing.

UNIT – 1 Introduction to Embedded Systems

Embedded System - Definition, History, Classification, application areas and purpose of embedded systems, the typi embedded system - Core of the embedded system, Memory, Sensors and Actuators, Communication Interfa Embedded firmware, PCB and passive components. Characteristics, Quality attributes of embedded syste Application-specific and Domain-Specific examples of an embedded system.

UNIT – 2 Embedded Hardware Design

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel dev ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT – 3 Embedded Firmware Design

Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sourc Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C ver Embedded C and Compiler versus Cross-compiler.

UNIT – 4 Real Time Operating System

Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitaski Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How choose an RTOS.
Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.
UNIT – 5 Embedded System Development
The integrated development environment, Types of files generated on cross-compilation, Disassembler/Decompi Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software developm process and tools.

Text Books:

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008.
2. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
3. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

Reference Books:

1. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005
2. Embedding system building blocks By Labrosse, CMP publisher.
3. An Embedded Software Primer - David E. Simon, Pearson Education.

References

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

CO-PO Mapping:

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code	**REAL TIME OPERATING SYSTEMS**				
Teaching	Total Contact Hours - 45	L	T	P	C
Prerequisites:. Basics of operating system; Basics of Embedded system		3	0	-	3

Course objective(s):

The student will be able

1) To understand about fundamentals of system call which are used in UNIX/LINUX programming.
2) To learn about effective utilization of resources.
3) To Understand about Inter Process Communication.
4) To learn about concepts of Exceptions, Interrupts, Timers.
5) To learn Case study of different types of RTOS.

Course Outcomes

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

CO1: Summarize the issues in real time computing
CO2: Analyzing how RTOS utilize resources like memory ,CPU etc effectively.
CO3: Evaluate the scheduling problems and can apply them in real time applications in industry.
CO4: Analyze the concepts of Exceptions, Interrupts, Timers.
CO5: Classify the different Types of RTOS.

UNIT-I .

Objective: To learn about fundamentals of system call which are used in UNIX/LINUX programming

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit. wait, waitpid, exec).

UNIT-II

Objective: To learn about effective utilization of resources

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency.

Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage,

UNIT-III

Objective: To learn bout Inter Process Communication

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component, Configuration, Basic I/O Concepts, I/O Subsystem

UNIT-IV

Objective: To learn about concepts of Exceptions ,Interrupts, Timers

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations..

UNIT-V

Objective: Case studies of different Types of RTOS.

Case Studies of RTOS: RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOKS:

1. Qing Li, "Real Time Concepts for Embedded Systems", Elsevier, 2011

REFERENCES:

1. Rajkamal, "Embedded Systems- Architecture, Programming, and Design", 2007,TMH.
2. W. Richard Stevens, Stephan A. Rago, "Advanced UNIX Programming", 2006, 2ndEdition, Pearson.
3. Dr. Craig Hollabaugh, "Embedded Linux: Hardware, Software and Interfacing", 2008,1st Edition,Pearson.

Web-Resources:

1. www.electronic4u.com
2. www.nptel.com
3. http://www.satishkashyap.com/

CourseCode:	**REAL TIME OPERATINGSYSTEMS**												
Course Designed by		Department of Electronics & Communication Engineering											
	Program Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Course Outcomes	CO 1	✓		✓									
	CO 2		✓	✓									
	CO 3	✓	✓	✓								✓	
	CO 4			✓									
	CO 5			✓	✓	✓							✓

Category	**General Humanities**	**Basic Sciences**	**Engineering Sciences And Technical**	**Professional Subjects**
			✓	

Mode of Evaluation : Quiz, Assignment, Seminar, Written Examination

4.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code	**DIGITAL SIGNAL PROCESSOR AND ARCHITECTURE**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: knowledge of signal and architecture		3	0		3

Course Objectives:

1. To present overview of key digital signal processing concepts.
2. To give insight into the computational accuracy of algorithms when implemented using programmable DSP device.
3. To understand the architecture and programming of commercially available programmable DSP devices.
4. To teach the instruction set and implement basic DSP algorithms like convolution, correlation and filtering so on.
5. To impart knowledge in identifying the suitable programmable DSP devices for various application areas and design systems around these DSP devices.

Course Outcomes:

On Completion of the course, students will be able to	
CO1:	Recall sampling process, DFT, FFT and digital filtering concepts.
CO2:	Identify the computational accuracy involved in real time DSP implementations.
CO3:	Describe the architectural features of Programmable Digital Signal Processors.
CO4:	Develop assembly level programs forTMS320C54XX processors using various addressing modes and instructions.
CO5:	Develop the interface to connect the memory and parallel I/O peripherals to programmable DSPs.

Unit–I:

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system,The sampling proce Discrete time sequences, Discrete Fourier Transform (DFT) a FastFourierTransform(FFT),Lineartimeinvariantsystems,Digitalfilters,Decimationandinterpolation.Computational Accuracy in DSP Implementations: Number formats for signalsand coefficients in DSP systems, Dynamic Range a Precision, Sources of error in DSPimplementations, A/D Conversion errors, DSP Computational errors, D Conversion Errors, Compensating filter.

Unit–II:

ArchitecturesforProgrammableDSPDevices:BasicArchitecturalfeatures,DSPComputationalBuildingBlocks,BusArchi ctureandMemory,DataAddressingCapabilities,AddressGenerationUnit,ProgrammabilityandProgramExecution,Speed ues,FeaturesforExternalinterfacing.

Unit-III:

Programmable Digital Signal Processors: Commercial digital signal processing devices, Data Addressing modes TMS320C54XX DSPs, data Addressing modes of TMS320C54XXProcessors, Memory space of TMS320C54 processors, program control, TMS320C54XXinstructionsandprogramming, ChipPeripherals,InterruptsofTMS320C54XXprocessors,pipelineOperationofTMS320C54XXProcessors.

Unit–IV:

Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices ALU and MAC block diagra Shifter Instruction, Base Architecture of ADSP 2100, ADSP2 highperformanceprocessor.IntroductiontoBlackfinProcessor-TheBlackfinProcessor,Introduction to Microsig Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, I Architecture and Memory, Basic Peripherals.

Unit–V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization ,Extern al interfacing signals,Memoryinterface,ParallelI/Ointerface,ProgrammedI/O,InterruptsandI/O,Directmemoryacc (DMA).

Text Books:

- Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
- DSP processor fundamentals - Architectures and features - Phil Lapsley, Jeffbier, Amit shoham, Edward Lee Wil IEE press.
- Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 20 TMH.

Reference Books:

- A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New A International, 2006/2009
- Digital Signal Processing – Jonatham Stein, 2005, John Wiley.

Web References

- NPTEL online courses.
- MOOCS online courses by JNTUK.

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	2	-	-	-	-	-	-	2	-	-
CO2	3		-	-		-	-	-	-	2	-	-
CO3	3	2	-	-	2	-	-	-	-	2	-	-
CO4	3	2	2	-	2	-	-	-	-	2	-	-
CO5	3	2	2	-	2	-	-	-	-	2	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code	**SOFT COMPUTING TECHNIQUES**				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites: knowledge on Computer techniques		3	0	-	3

Course Outcomes:

1. Develop intelligent systems leveraging the paradigm of soft computing techniques.
2. Implement, evaluate and compare solutions by various soft computing approaches for finding the optimal solutions.
3. Recognize the feasibility of applying a soft computing methodology for a particular problem
4. Design the methodology to solve optimization problems using fuzzy logic, genetic algorithms and neural networks.
5. Design hybrid system to revise the principles of soft computing in various application

UNIT I: Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT II: Artificial Neural Networks: Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT III: Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT IV: Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and ant D-colony search techniques for solving optimization problems.

UNIT V: Applications: GA application to power system optimization problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. &Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
3. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
4. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan,Sanjay Ranka, Penram International.
5. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
6. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi

Web References

NPTEL online courses.

MOOCS online courses by JNTUK.

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CO1	3	2	2	-	-	-	-	-	-	2	-	-
CO2	3		-	-		-	-	-	-	2	-	-
CO3	3	2	-	-	2	-	-	-	-	2	-	-
CO4	3	2	2	-	2	-	-	-	-	2	-	-
CO5	3	2	2	-	2	-	-	-	-	2	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	4 B.Tech. I Sem (7th Semester)			
Course Code	**INTERNET OF THINGS & CLOUD COMPUTING**				
Teaching	Total Contact Hours – 45	L	T	P	C
Prerequisites: Cloud computing, Protocols, Threats, Deployment, Data Security		3	0	-	3

Course Objectives:

1. Understand the Fundamentals of IOT.
2. Understand the types of Sensors and Mother Boards
3. Understand the principles of Communication Protocols.
4. Understand the Securities issues & Cloud computing in the development of IOT.
5. Understand the Services and Legal aspects in Cloud computing.

On Completion of the course, students will be able to	
CO1:	Demonstrate the IOT Development cycles, Challenges and Requirements.
CO2:	Understand the types of Sensors and various sensor operation with Mother boards.
CO3:	Analyze the Wired and Wireless Communication Protocols implementation.
CO4:	Learn about Privacy and Security challenges present in IOT and IoT Cloud Services.
CO5:	Learn about the Cloud and Web applications connections related to Cloud.

UNIT-I

Fundamental of IoT

Internet of things definition, Block diagram for IoT, IoT Functional view of IoT ,Design methodology of IoT, IoT vision, fundamental characteristics of IoT, IOT Layered Architecture, Potential success factors of IoT Applications and use case scenarios, Resource management for IoT.

UNIT-II

Sensors and Mother Boards

Sensors and Actuators: Classification of sensors, classification of actuators, Resistive Sensors, Capacitive Sensors and Inductive Sensors, Temperature Sensor, Humidity Sensor, Ultra-Sonic Sensor, Gas Sensor.

Development Platform:

Mother Boards: Arduino Uno Board, Node MCU Board, Raspberry pi Board.

UNIT-III

Communication Protocols for IoT

Wired Communication Protocols:RS232, RS 485,Ethernet, UART, USART, USB.

Wireless Communication Protocols: Blue tooth, ZigBee, RFID, Application Protocols MQTT, CoAP, HTTP.

UNIT-IV

Security, Privacy and IoT Cloud

Mitigating to Privacy Concern: Guide to perform PIA, PbD Principles.

IOT Cloud: Necessity of Cloud, Concepts of Cloud, Models of Cloud, Functions of Cloud, Your Organization and Cloud Computing, Cloud Computing Services (IaaS, PaaS , SaaS). Things speak cloud, Blynk cloud

UNIT-V

Virtualization , Safety & Security of Cloud

Virtualization concepts— Amazon AWS – Microsoft Azure – Google APIs.IoT and the Cloud – Role of Cloud Computing in IoT – AWS Components – S3 – Lambda – AWS IoT Core -Connecting a web application to AWS IoT using MQTT- AWS IoT Examples. Security Concerns, Risk Issues, and Legal Aspects of Cloud Computing- Cloud Data Security.

Text books:

1. O.Vermesan, P.Friess, " Internet of Things-From Research and Innovation to Market Deployment", River Publishers,2014.
2. R. B. Northrop, " Introduction to Instrumentation and Measurement" Second Edition, CRC Taylor and Francis2005.
3. B. Russell and D.VanDuren, "Practical InternetofThings Security". - PacktPublishing,2016.
4. A. T. Velte, T. J. Velte, R.Elsenpeter, "Cloud Computing – A Practical Approach" Mg-Graw Hill, 2010.
5. J.Balye, " C Programming for Arduino" Packt Publication,2013.
6. Cloud Computing Concepts Technology & Architecture- Thomas Eril with Zaighad Mahmood and Puttini. 2017.

Web Links:

1. https://thingspeak.com
2. https://www.blynk.cc/getting-started
3. https://www.arduino.cc
4. https://mqtt.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
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	4 B.Tech. I Sem (7th Semester)			
Course Code	DIGITAL IC DESIGN USING CMOS (PE-5)				
Teaching	Total Contact Hours – 50	L	T	P	C
prerequisites	Knowledge of integrated circuits	3	0	-	3

Course Objectives:

On Completion of the course, students will be able to	
CO1:	Understand the concepts of MOS Design
CO2:	Design and analysis of Combinational and Sequential MOS Circuits.
CO3:	Extend the Digital IC Design to Different Applications.
CO4:	Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization

UNIT-I:

MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT – 2

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT – 3

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-4

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-5

Interconnect: Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconncet Techniques.

Semiconductor Memories: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.
Designing Memory and Array Structures: Introduction, Memory Classification, Memory Architectures and Building Blocks, The Memory Core, Read Only Memories, Non-volatile Read-Write Memories, Read-Write Memories (RAM), Contents Addressable or Associative Memory (CAM), Memory Peripheral Circuitry, The Address Decoders, Sense Amplifiers, Voltage References, Drivers/Buffers, Timing and Control.

Text books:

1. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.
2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

Reference Books:

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee 3rd Edition, Pearson

Web Links:

3. NPTEL onlinecourses.
4. MOOCS online courses by JNTUK

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	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	4 B.Tech. I Sem (7th Semester)			
Course code	**COMPUTER NETWORKS (PE-5)**				
Teaching	**Total contact hours - 45**	L	T	P	C
Prerequisites: Build an understanding of the fundamental concepts of computer networking		3	0	-	3

Course Objectives:

The students will be able to:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

On Completion of the course, students will be able to	
CO1:	Analyze a communication system by separating out the different functions provided by the network; and some example networks.
CO2:	Understand various network topologies required for communications.
CO3:	Understand that there are fundamental limits to any communications systems
CO4:	Understand the general principles behind addressing routing, reliable transmission and other stateful protocols as well as specific examples of each.
CO5:	Have an informed view of both internal workings of the Internet and of number of common internet applications and protocols

UNIT – 1

INTRODUCTION: OSI model overview, TCP/IP and other networks models, Network Topologies, Network technologies (WAN, LAN, MAN), Physical layer: Transmission media (Guided, Wireless)

UNIT – II

DATA LINK LAYER: Design issues, Framing: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum

ELEMENTARY DATA LINK LAYER PROTOCOLS: Simplex protocol, Simplex stop and wait protocol. **Sliding window protocol**: One bit, Go back N, Selective repeat-Stop and

wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

UNIT – III

RANDOM ACCESS: ALOHA, Carrier Sense Multiple Access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA).

UNIT –IV

NETWORK LAYER: Design Issues, Internetworking, Routing Algorithms. Shortest path routing, Flooding, Broadcast routing, Congestion control algorithms: general principles of congestion control, congestion prevention policies.

NETWORK LAYER PROTOCOLS: ARP, ICMP, IPV addressing, IPV4, IPV6 frame format

TRANSPORT LAYER: The transport service, Elements of transport protocols, the internet transport protocols: UDP, TCP congestion control.

UNIT –V

APPLICATION LAYER (WWW AND HTTP): Architecture: Client server model, Domain name system (DNS): E-mail (SMTP) and File transfer (FTP), HTTP and WWW.

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan. Third Edition TMH.

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

WEB-RESOURCES:

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	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

Regulation GRBT - 20	Godavari Institute of Engineering & Technology (Autonomous)	4 B.Tech. I Sem (7th Semester)			
Course Code	**PATTERN RECOGNITION & MACHINE LEARNING (PE-5)**				
Teaching	Total Contact Hours – 45	L	T	P	C
prerequisites	Knowledge of linear models	3	0	-	3

Course Objectives:

On Completion of the course, students will be able to	
CO1:	Study the parametric and linear models for classification
CO2:	Design neural network and SVM for classification
CO3:	Develop machine independent and unsupervised learning techniques

Unit I

Introduction to Pattern Recognition: Problems, applications, design cycle, learning and adaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory- Bays rule, discriminate functions, loss functions and Bayesian error analysis

Unit II

Linear models: Linear Models for Regression, linear regression, logistic regressionLinear Models for Classification

Unit III

Neural Network: perception, multi-layer perception, back propagation algorithm, error surfaces, practical techniques for improving back propagation, additional networks and training methods, Adboost, Deep Learning

Unit IV

Linear discriminate functions - decision surfaces, two-category, multi-category,minimum-squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

Unit V

Algorithm independent machine learning – lack of inherent superiority of any classifier, bias and variance, re-sampling for classifier design, combining classifiers

Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering, hierarchical clustering

TEXT BOOKS:

1. Richard O. Duda, Peter E. Hart, David G. Stork, "Pattern Classification", 2ndEdition John Wiley & Sons,2001.
2. Machine learning by Saikat Dutt, S. Chandramouli and A.K.Das Pearso publishing, 2018.

REFERENCE BOOKS:

1. C. Bishop, "Pattern Recognition and Machine Learning", Springer,2006
2. Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, "The Elements of Statistical Learning", 2nd Edition, Springer,2009.

Web Links:

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

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	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	2	2	-	-	-	-	-	-
CO5	2	2	2	2	-	2	-	-	-	-	-	-

4-1(B)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 semester)			
Course Code	**BUILDING TECHNOLOGY (OPEN ELECTIVE-III)**				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Knowledge of Construction materials, Building drawing		3	-	-	3

Course Objectives:

The objective of this course is to enable the students to:

a. ***Understand the different components of the buildings.***
b. ***Understand the different materials of the buildings.***
c. ***Learn various specifications of buildings.***
d. ***Learn various dimensions of buildings.***
e. ***Understand the Drawings of the buildings.***

Course Outcomes

Upon the successful completion of this course student should be able to

1. ***Know the different elements of the buildings.***
2. ***Know the different materials of the buildings.***
3. ***Determine various specifications of materials.***
4. ***Determine various dimensions of buildings.***
5. ***prepare the Plans of the buildings.***

Unit – I

STONES, BRICKS & TIMBER:

STONES: Classification of stones and Aggregates, properties

BRICKS: Composition,manufacture, tests, size, weight and colour of bricks.

TIMBER: Structure of a tree, seasoning of timber and defects in timber.

Unit – II

CEMENT, LIME & STEEL:

CEMENT: Chemical compostion, manufacturing, types, tests.

LIME: chemical composition, classification

STEEL: manufacturing, types and properties of steel

Unit – III

CONCRETE: Chemical compostion of concrete, grades, tests, workability, tests on workability, compressive strength, split tensile strength, flexural strength, seggregation, bleeding, manufacturing of fresh concrete.

Unit – IV

BUILDING COMPONENTS: Parts of Building from foundation to roof like, footings, plinth wall, coloumns, beams, slab, walls, floors, lintels, sunshades, doors, windows, ventilators, parapet wall, stair case, etc. Functions of each component in Building.

Unit – V

BUILDING PLANS: Building Bye-laws, Preparation of Building plan, section, elevation for 2BHK Building and 3BHK Building.

Text Books:

1. "Building Materials", S.K.Duggal, New Age International Publications.
2. Building construction and construction materials", Birdie, G.S. and Ahuja, T.D.,
3. Building construction and construction materials", Birdie, G.S. and Ahuja, T.D., Dhanpath Rai Publishing company, "New Delhi, 1986.
4. "Building planning and drawing", (3rd edition), Kumara swami & Kameswara rao, N., Anand Charotar Publishing House Pvt Ltd, 2010.
5. Building planning and drawing by M. Chakravarthi.

References:

1. Building drawing by Shah and Kale
2. Planning and Design of buildings by Y.S. Sane
3. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh
4. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur, "Building byelaws", of state and Central Governments and Municipal corporations, 2011.
5. "Building byelaws", of state and Central Governments and Municipal corporations, 2011.
6. "Building Materials", S.K.Duggal, New Age International Publications.
7. "Building Materials", P.C.Verghese, PHI learning (P) Ltd., 2009.
8. "Building Materials", M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
9. "Building construction", P.C.Verghese, PHI Learning (P) Ltd.
10. "Building construction and construction materials", Birdie, G.S. and Ahuja, T.D.,
11. Dhanpath Rai Publishing company, "New Delhi, 1986.
12. "Building Materials", S.S. Bhavikatti, Vikas publications House private ltd.
13. "Building Materia1s", B.C. Punmia, Laxmi Publications Pvt. Ltd.

Web-Resources: www.nptel.com

CO-PO Mapping:

(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High], '-':NoCorrelation)

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

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (OPEN ELECTIVE-III)			
Course Code	FUNDAMENTALS OF SMART GRID TECHNOLOGIES				
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 of smart grid technologies
2. To understand the communication technologies used in smart grids.
3. To understand the concepts of information security for smart grid.
4. To understand the concept of smart metering.
5. To understand communication infrastructure and protocols for smart metering.

Course Outcomes:

After successful completion of this course, a student will be able to:	
CO1:	Provide the students an understanding of the basic concepts of smart grid technologies
CO2:	Analyse the communication technologies used in smart grids
CO3:	Understand the concepts of information security for smart grid.
CO4:	Understand the concept of smart metering
CO5:	Understand communication infrastructure and protocols for smart metering.

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,

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.

UNIT-IV

Concept of 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.

UNIT-V

Communication infrastructure and protocols for smart metering- Introduction, Home area network, Neighborhood area network, data concentrator, meter management system, protocols for communication.

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 Correlafion)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01	✓	✓										
C02								✓				
C03					✓							
C04	✓		✓									
C05						✓						

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2021-22)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IVB.Tech.I Sem (7^{th} Semester)			
Course Code	**Nano Technology and its Applications (Open Elective-III)**				
Teaching	Total contact hours-45	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

Students undergoing this course will be able to:

- Study the applications of nano materials.
- Understand the mechanical, electrical, thermal and physical properties of nano materials.
- Learn the synthesis and fabrication techniques of nano particles.
- Gain the knowledge on characterization techniques like SEM, TEM and XRD.
- Impart the knowledge on the synthesis methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the classification and applications of nano materials in engineering and other fields.
CO2:	Discuss the mechanical, electrical, thermal and physical properties of nano materials.
CO3:	Explain the synthesis, fabrication and requirements of nano particles.
CO4:	Describe the uses of characterization techniques such as spectroscopy, SEM, TEM and XRD.
CO5:	Discuss the application of carbon nano technology.

Syllabus

UNIT-I

INTRODUCTION: History of nano science- definition of nano meter, nano materials, nano technology-Classification of nano materials-Crystal symmetries, crystal directions, crystal planes-Band structure-Applications in material science, biology and medicine, surface science, energy and environment

UNIT-II

PROPERTIES OF NANO MATERIALS: Mechanical, Electrical, Dielectric, thermal, magnetic and opto electronic properties of nano materials. Effect of size reduction on properties, electronic structure of nano materials.

UNIT-III

SYNTHESIS AND FABRICATIONOF NANO MATERIALS: Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD. Top Down

Approach – Ball milling, micro fabrication, lithography. Requirements for realizing semiconductor nano structures, growth techniques for nano structures.

UNIT-IV

CHARACTERIZATION TECHNIQUES: X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezo response microscopy, X-ray photo electron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photo luminescence spectra, Raman spectroscopy.

UNIT-V

CARBON NANO TECHNOLOGY: Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nano crystalling diamond films, grapheme, applications of carbon nano tubes.

Text Books:

1. Nano science and nano technology by M.S RamachandraRao, Shubra Singh, Wiley publishers.
2. Introduction to Nanoscience and Nanotechnology by k.kchattopadhyay/A.N Banerjee/PHI.

References:

1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.
2. Nanotechnology by Jermy J Ramsden, Elsevier publishers.
3. Nano Materials- A.K.Bandyopadhyay/ New Age International.

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	-	-	-	-	-	-
CO2	3	3	-	3	-	2	-	-	-	-	-	-
CO3	3	3	-	3	-	3	-	-	-	-	-	-
CO4	3	3	-	2	-	2	-	-	-	-	-	-
CO5	3	3	-	2	-	2	-	-	-	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. 1.Sem (7 semester)			
CourseCode	**INTRODUCTION TO EMBEDDED SYSTEM**				
Teaching	Total contact hours–53	L	T	P	C
Prerequisites: Knowledge of Familiarise with the different IDEs for firmware development for different family of processors/controllers and embedded operatingsystems.		3	-	-	3

Course Objectives:The student should be made:

1. The basic concepts of an embedded system areintroduced.
2. The various elements of embedded hardware and their design principles areexplained.
3. Different steps involved in the design and development of firmware for embedded systems iselaborated.
4. Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed.
5. Fundamental issues in hardware software co-design were presented andexplained.

Course Outcomes:At the end of the course, the student should be able to:

On Completion of the course, the students will be able to-	
CO1:	Understand the basic concepts of an embedded system
CO2:	An embedded system design approach to perform a specificfunction
CO3:	The hardware components required for an embedded system and the design approach of an embedded hardware.
CO4:	The various embedded firmware design approaches on embeddedenvironment.
CO5:	Understand how to integrate hardware and firmware of an embedded system using real time operating system

Syllabus

UNIT-I

INTRODUCTION: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware

UNIT-II

EMBEDDED HARDWARE DESIGN: Characteristics of an embedded system, Quality attributes of embedded systems, and Application-specific and Domain-Specific examples of an embedded system.

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports

UNIT-III

EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, , Wireless devices, Timer and counting devices, Watchdog timer, Real time clock. , DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV

REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization, Device Drivers. ISR concept, Interrupt sources, Interrupt servicing mechanism, multiple interrupts

UNIT-V

HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

EMBEDDED SYSTEM DEVELOPMENT: The integrated development environment, Types of files generated on cross-compilation, Dissembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Text Books:

1. Embedded Systems Architecture- By Tammy Overgaard, Elsevier Publications, 2013.
2. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited,2013.

References:

1. Embedded System Design, Frank Vahid, Tony Gavages, John Wiley Publications, 2013.
2. Embedded Systems-Lyla B.Das-Pearson Publications,2013.

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)

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

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	IV B.Tech I Semester			
CourseCode 201CS704	**INFORMATION SECURITY** Open Elective-III: CSE, CSE (AI/ML), CSE (Cyber Security)				
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):

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

Course Outcome(s):

After completion of the course the 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

CO-5: 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.

Web Reference:

1. https://www.youtube.com/watch?v=fQ3ESFfvchg&list=PLUtfVcb-iqn834VGI9faVXGIGSDXZMGp8
2. https://www.youtube.com/watch?v=BvWvFAS1iP0&list=PLUtfVcb-iqn834VGI9faVXGIGSDXZMGp8&index=2
3. https://www.youtube.com/watch?v=b45EyiedG3M&list=PLUtfVcb-iqn834VGI9faVXGIGSDXZMGp8&index=4

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	PSO1	PSO2
CO1	1	-	-	2	-	-	-	-	-	-	-	-		
CO2	1	-	1	-	3	-	-	-	1	-	-	-		
CO3	-	2	-	2	-	-	1	-	-	-	-	-		
CO4	2	1	2	-	3	-	-	-	-	-	-	-		
CO5	1	-	2	-	3	-	-	-	-	-	-	-		

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IVB.Tech. ISem (7th Semester)			
Course Code 201PT7614	**Introduction to Petroleum Production Engineering** (Open Elective-IV)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisites		3	0	0	3

Course Objectives

The objectives of this course are to

- Impart knowledge on competition techniques
- Illustrate oil and gas well stimulation techniques
- Understand oil and gas well services.

Course Outcomes

On Completion of the course, the students shall be able to-	
CO1:	Identify the well head equipment
CO2:	Identify the different types of well completion.
CO3:	Understand well activation and stimulate well for improving the flow at well bore
CO4:	Identify well production problems and apply mitigation techniques
CO5:	Understand work over jobs for oil well

Syllabus

UNIT-I
Well Equipment
Well Head Equipment's, Christmas tree, valves, hangers, flow control devices, packers, tubular and flow lines.

UNIT-II
Well Completion
Types of well completion, Perforating Oil & Gas Wells - Conventional and Unconventional techniques viz. through tubing and tubing conveyed underbalanced perforating techniques, type size and orientation of perforation holes.

UNIT-III

Well Activation and Stimulation Techniques

Well activation methods, stimulation type & description, design of matrix acidization and acid fracturing. Design of hydraulic fracturing (mini, massive & high energy frac.). Wave technology & microbial stimulation.

UNIT-IV

Well Production Problems and Mitigation

Scale formation, paraffin deposition, formation damage, water production, gas production, sand deposition etc.

UNIT-V

Work over Operations

Work over system, work over rigs and selection, rig less work over including Endless/ Coiled tubing unit, minor & major work over jobs-diagnosis & remedial measures water shut off and gas shut off-Chemical treatment and conformance control.

Text Book(s)

1. Thomas O Allen, Alan P. Roberts, "Production Operations: Well Completions, Workover, and Stimulation", (Volume 1 and 2), Oil & Gas Consultants International.

Reference(s)

1. Daniel Hill, Christine Ehlig-Economides, Ding Zhu, Michael J. Economides, "Petroleum Production Systems", 2nd Ed., Prentice Hall.
2. BoyunGuo, William C. Lyons, Ali Ghalambor, "Petroleum Production Engineering: A computer assisted approach" Elsevier Science and Technology Books.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	Mining and Its Importance (Open Elective - III)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		3	0	0	3

Course Objectives

1. To discuss the contribution of mining industry to nation.
2. To elaborate importance of coal mining in India.
3. To illustrate the status and importance of metal mining.
4. To enlighten about sustainable concepts for mining industry.
5. To familiarize with the applications of different sensors in mining industry.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Understand the role of mining industry for development of nation.
CO2:	Classify the coal mining methods.
CO3:	Understand the concepts of metal mining.
CO4:	Assess the sustainable mining practices in India and abroad.
CO5:	Summarize the applications of different sensors for mining industry.

Syllabus

UNIT-I
Introduction
Introduction to mining industry; National and International mineral Scenario; Status of Minerals in National scenario; Role of mining in national economy, infrastructure building and society. Basic mining terminologies, Introduction to Mining Methods.

UNIT-II
Coal Mining
History of coal mining; Coal resources and their geographical distribution; Coal mining in India; Contribution of Indian coal mining industry towards nation; Indian coal classification; Coal Mining Methods – Opencast and Underground.

UNIT-III
Metal Mining
Status of Indian metal mining industry and its contribution towards nation development; Metal mining terminologies; Applicability; Scope and limitations of underground metal mining; Opening of underground deposits.

UNIT-IV
Sustainable Mining
Introduction to sustainability, Importance of sustainability in mining industry; Examples of Sustainable mining practices followed in India and abroad.

UNIT-V

Transdisciplinary application to Mining Industry

Case studies on application of sensors for real time gas detection, smoke detection, noise and vibrations detection, ground control monitoring, proximity analysis.

Textbook(s)

1. R.D. Singh, Principle and practices of modern coal mining, New Age International Publishers, 2005.
2. Lodhia S. K, Mining and Sustainable Development, Taylor & Francis, 2018

Reference(s)

1. D. J. Deshmukh, Elements of Mining Technology, Vol-I, Denett & Co., 2008.
2. D. J. Deshmukh, Elements of Mining Technology, Vol II, Denett & Co., 2016.

IV Year – I Semester		L	T	P	C
		3	0	0	3

OPEN ELECTRIVE-3 MODERN VEHICLE TECHNOLOGY

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 shall be able to-	
CO1:	Integrate modern vehicles
CO2:	Design modern suspension systems for automobile safety and comfort
CO3:	Analyze and control the exhaust emissions and noise
CO4:	Analyze the vehicle operation, incorporate and develop the electronic control systems
CO5:	Distinguish and choose the fuel injection system

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, Hydro-elastic suspension system, Hydra gas suspension.

UNIT-III

Braking systems and safety: Modern rear wheel brake, indirect floating caliper disc brake, self energising disc brake, brake limiting device, anti-slide system, Ford Escort and Orion anti lock system. Closed loop suspension; Regenerative braking; Passenger comfort.

UNIT-IV

Fuel Supply Systems: SPFI, MPFI, DI, Pilot Injection, Unit Injection. CRDI; Two Wheeler Technology: DTS- i, DTS - Fi, DTS - Si; Four Wheeler Technology: VVT, Camless Engine, GDI.

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.

UNIT-V

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.

REFERENCES

1. K.K. Ramalingam, "Automobile Engineering", Scitech Publications Pvt. Ltd., 2005
2. Dr. N.K. Giri, "Automobile Mechanic", Khanna Publishers, 2006
3. Crouse/Anglin "Automotive Mechanics"
4. K.Newton, W.Steeds "The Motor Vechicle"
5. 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	2	2	2	2	2	2	2	-	-	-	3
CO2	-	2	-	2	-	2	-	-	1	-	-	-
CO3	2	2	1	-	3	-	3	-	2	-	-	-
CO4	1	-	1	-	1	-	-	2	-	2	-	1
CO5	1	-	-	2	1	-	3	1	-	2	-	1

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech – IV -I			
Course Code	**Entrepreneurship for Engineers (Common to all Branches)**				
Teaching	Total contact hours-45	L	T	P	C
Prerequisite(s):Knowledge of microeconomics, accounting,finance, management, marketing, and operations.		3	0	0	3

Course objectives:

The objective of Entrepreneurship for Engineers course provides the students with cutting-edge knowledge and skills on how to successfully develop captivating products and services to solve challenging problems in a highly uncertain environment, often under considerable time constraints with very limited resources.Studentswill be able to apply these skills in the context of both new ventures as well as in established companies..

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	Pick up about Foundation of Entrepreneurship Development and its theories
CO2:	Demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems.
CO3:	Analyze the various aspects, scope and challenges under an entrepreneurial venture.
CO4:	Understand various steps involved in starting a venture and to explore marketing methods & new trends in entrepreneurship.
CO5:	Explain classification and types of entrepreneurs and the process of entrepreneurial project development.

UNIT I

IntroductiontoEntrepreneurship: Meaning and Definition, Importance and growth –Objectives, Characteristics,Requirements and Qualities of Entrepreneur-Need of Entrepreneurship, Role of Entrepreneurship, Ethics and Social Responsibilities. corporate entrepreneurship – mobility of entrepreneur – entrepreneurial motivation. Agencies involved in entrepreneurship (SIDO,MDI,EDI,AISSIB,NIESBUD etc.,)

UNIT II

Creative and Entrepreneurial Plan: Creating and starting the venture sources of new ideas, methods of generating ideas, creating problem solving, product planning and development process. 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 organizationalplan, Launching formalities.

UNIT III

Operation Issues: Financing and managing the new venture Sources of capital, record keeping, recruitment, motivating and leading teams, financial controls . marketing and sales controls.

UNIT IV

Financial Planning and Issues : New venture expansion strategies and Issues features and evaluation of joint ventures, acquisitions, merges, franchising. public issues, rights issues, bonus issues and stock splits. institutional support to entrepreneurship. role of directorate of Industries.

UNIT V

Production and Commercialization: Production and marketing management. selection of production techniques, plant utilization and maintenance,. inventory control, material handling and quality control. sales promotion and product pricing.

Text books:

1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5th Edition.
2. Dollinger: Entrepreneurship,4/e, Pearson, 2004.

Reference books:

1. Vasant Desal: 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. ArunaKaulgud: Entrepreneurship Management by. Vikas publishing house, 2003.
6. Thomas W. Zimmerer& Norman M. Scarborough: Essential of Entrepreneurship and small business management, PHI, 4/e, 2005.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{TH} semester)			
Course Code	**SAFETY ENGINEERING (OPEN ELECTIVE-IV)**				
Teaching	Total contact hours - 32	L	T	P	C
Prerequisite(s):Basics of Safety engineering in Construction, Railways Irrigation and Transportation.		3	-	-	3

Course Objective:

The objectives of the course are to enable the student to learn

a. To impart knowledge on different facets and aspects of engineering systems safety,
b. to focus on tools, techniques and methodologies needed for prevention of occurrences of unsafe operations,
c. to anticipate, recognize, evaluate and control hazardous conditions and practices affecting people, property and the environment,
d. to help prevent workplace injuries and illnesses,

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	To outline the different safety concepts and Job Safety analysis.
CO2	To outline and explain the Human and vehicle characteristics and protective devices.
CO3	To identify and suggest suitable mitigation measures in construction industry.
CO4	Investigate the Railway risk and safety operations
CO5	To explain the operation of various types of Irrigation System Accidents

UNIT-I

CONCEPTS AND TECHNIQUES :- History of Safety movement –Evolution of modern safety concept- general concepts of management –line and staff functions for safety-budgeting for safety-safety policy. Incident Recall Technique (IRT), disaster control, job safety analysis, safety survey, safety inspection, safety sampling, evaluation of performance of supervisors on safety.

UNIT-II

Road Safety in Planning And Geometric Design: Vehicle And Human Characteristics, Road Design and Road Equipments, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care

UNIT-III

Construction Safety Management:- Introduction to Construction Industry- Safety issues in construction- Human factors in construction safety management. Safety in various construction operations- Excavation- under- water works- under- pinning & shoring Ladders & Scaffolds- Tunneling- Blasting- Demolition- Pneumatic caissons- confined Space Temporary Structures. Safety in material handling and equipments-Safety in storage & stacking of construction materials: Safety in these of construction equipments- Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Mixers, Conveyors, Pneumatic and hydraulic

tools in construction. Contract Labor (R&A) Act and Central Rules: Licensing of Contractors.

UNIT IV

Railway Safety :- Railway risk and safety systems, Railway risk and safety operations and organization, Railway communications and control (include signaling), railway control systems.

UNIT V

Irrigation System Accidents, Irrigation Hazard Electrical Contacts Electrical Safety Goal Equipment & Installation Problems: Irrigation Hazard Overhead Power Lines ;Spraying Water on Power Lines, Lightning Irrigation Machine Disconnections Entanglements Chemical Exposure/Poisoning Precautionary Measures

Text books:

1. Safety Management in Construction (Principles and Practice), S.K. Bhattacharjee.
2. Safety Engineering Principles and Practices , Third Edition Frank R. Spellman.

Reference Books:

1. 1st Edition Fundamentals of Process Safety Engineering By Samarendra Kumar Biswas.
2. System Safety Engineering and Risk Assessment A Practical Approach, Second Edition, Nicholas J. Bahr

CO-PO Mapping:
(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High], '-' : NoCorrelation)

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

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age

CO-PO Mapping:

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

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01	✓	✓										
C02								✓				
C03					✓							
C04	✓		✓									
C05												✓

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (OPEN ELECTIVE-IV)			
Course Code	**Basics of electrical measurements and instrumentation**				
Teaching	Total contact hours – 45	L	T	P	C
Prerequisite(s): Basic electrical engineering		3	0	0	3

Course Objectives:

1. To impart knowledge on Basic functional elements of instrumentation
2. To impart knowledge on Fundamentals of electrical and electronic instruments
3. To impart knowledge on Comparison between various measurement techniques
4. To impart knowledge on Various storage and display devices
5. To impart knowledge on Various transducers and the data acquisition systems

Course Outcomes:

After successful completion of this course, a student will be able to:	
CO1:	To acquire knowledge on Basic functional elements of instrumentation
CO2:	Ability to compare between various measurement techniques
CO3:	To acquire knowledge on Various storage and display devices
CO4:	To understand the concepts Various transducers and the data acquisition systems
CO5:	Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System

UNIT I

INTRODUCTION

Functional elements of an instrument ,Static and dynamic characteristics ,Errors in measurement ,Statistical evaluation of measurement data ,Standards and calibration.

UNIT II

ELECTRICAL AND ELECTRONIC INSTRUMENTS

Principle and types of analog and digital voltmeters, ammeters, multi meters ,Single and three phase watt meters and energy meters.

UNIT III

COMPARATIVE METHODS OF MEASUREMENTS

D.C potentiometers, D.C (Wheat stone, Kelvin and Kelvin Double bridge) & A.C bridges (Maxwell, Anderson and Schering bridges), transformer ratio bridges, self-balancing bridges.

UNIT IV

STORAGE AND DISPLAY DEVICES

Magnetic disk and tape ,Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & Dot matrix display ,Data Loggers.

UNIT V

TRANSDUCERS AND DATA ACQUISITION SYSTEMS

Classification of transducers ,Selection of transducers ,Resistive, capacitive & inductive Transducers .Piezoelectric. Hall effect. optical and digital transducers .Elements of data

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], '-' : NoCorrelation)

-	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C01		✓								✓		
C02			✓								✓	
C03			✓									
C04				✓								
C05					✓							

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2021-22)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} semester)			
Course Code	**Introduction to Operations Research (Open Elective- IV)**				
Teaching	Total contact hours- 45	L	T	P	C
Prerequisite(s): Mathematics		3	0	0	3

Course Objectives:

Students undergoing this course will be able to:

- Impart knowledge on various concepts of Operations Research and LP problems.
- Learn the solution methods of transportation, assignment and sequencing.
- Learn the solution methods of replacement and game theory problems.
- Understand inventory and waiting lines problems.
- Understand simulation methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe various operations research models and their applications.
CO2:	Solve various engineering and managerial problems of LPP, transportation, assignment, sequencing and replacement.
CO3:	Apply game theory in different competitive situations.
CO4:	Solve the problems related to theories of waiting line and inventory models.
CO5:	Apply the principles of dynamic programming and simulation framework to solve various decision making situations.

Syllabus:

UNIT –I

INTRODUCTION: Development, Definition, Characteristics and phases, Types of operation research models, Applications.

LINEAR PROGRAMMING PROBLEM: Linear programming problem formulation - Graphical solution -Simplex method -Artificial variables techniques -Two-phase method - Big-M method - Special cases: degeneracy, multiple optimal solution, infeasibility and unbounded solution, duality principle.

UNIT – II

TRANSPORTATION PROBLEMS: Formulation - Initial and optimal solutions for balanced and unbalanced transportation problems – Degeneracy in transportation problems.

ASSIGNMENT PROBLEMS: Formulation - Optimal solution - Variants of assignment problem-

SEQUENCING: Introduction, flow – Shop sequencing, n jobs through two machines, n jobs through three machines - Job shop sequencing, two jobs through 'm' machines.

UNIT – III

REPLACEMENT: Introduction – Replacement of items that deteriorate with time, when money value is not counted and counted, replacement of items that fail completely, group replacement.

THEORY OF GAMES: Introduction – Mini. max (max. mini) – Criterion and optimal strategy, solution of games with saddle points, rectangular games without saddle points, 2 x 2 games, dominance principle, m x 2 & 2 x n games, graphical method.

UNIT-IV

WAITING LINES: Introduction – Single channel, Poisson arrivals, exponential service times, with infinite population and finite population models, multichannel, Poisson arrivals, Exponential service times with infinite population single channel Poisson arrivals.

INVENTORY MODELS: Introduction, Deterministic inventory models – Static economic order quantity models, P-System, Q-System.

UNIT – V

DYNAMIC PROGRAMMING: Introduction – Bellman's principle of optimality, applications of dynamic programming, capital budgeting problem, shortest path problem.

SIMULATION: Definition, types of simulation models, phases of simulation, applications of simulation, inventory problems, advantages and disadvantages, simulation languages, problems on inventory and queuing models.

Text Books:

1. Operations Research, S.D.Sharma, Kedarnath, Ramnath&Co, 5th edition, 2008.
2. Operations Research -An Introduction, H.A. Taha., PHI, 8th edition, 2008

References:

1. Operations Research Theory &Applications, J.K.Sharma, Macmillan, 6th edition, 2013.
2. Operations Research, A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education, 2nd edition, 2014.
3. Operations Research, Methods & Problems, Maurice Saseini, ArhurYaspan& Lawrence Friedman, 1st edition, 1959.
4. Operations Research, R.Pannerselvam, PHI Publications, 2nd edition, 2009.
5. Operations Research, S Kalavathy, Vikas Publishers, 4th edition, 2013.

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	-	-	-	-	2	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	2	-

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. Sem (semester)			
Course Code	**Fundamental of Digital Image Processing (Open Elective)**				
Teaching	Total contact hours-45	L	T	P	C
Prerequisites: knowledge of Signals and Systems, Concepts of Digital signal processing, and Basic Calculus and Probability.		3	-	-	3

Course Objectives:

1. To understand the basic concepts of Digital Image Processing.
2. To develop an understanding of the techniques of image enhancement.
3. To develop concepts for image segmentation.
4. To develop an understanding of color image processing and to develop coding methods of image compression.
5. To develop an understanding of various algorithms for image morphology.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Learn the basics of digital image processing and image transforms.
CO2:	Learn the various techniques to enhance digital images in the spatial and frequency domain.
CO3:	Apply various techniques of image segmentation to digital images.
CO4:	Analyze the concepts of color image processing and understand various coding techniques for digital image compression.
CO5:	Learn various algorithms of morphological image processing.

UNIT – 1 DIGITAL IMAGE FUNDAMENTALS

Introduction to Digital Image, Image processing applications, Digital Image Processing System,
Sampling and Quantization. Representation of Digital Image, Levels of image processing operations: Low-level operations and High-level operations.

Image transforms 2D-DFT, Properties of 2D-DFT, 2D-DCT, Walsh transform, Hadamard transform. Types of Image File Formats: BMP, GIF, DICOM, PNG, TIFF, and JPEG.

UNIT – 2 IMAGE ENHANCEMENT IN SPATIAL DOMAIN AND FREQUENCY DOMAIN

Inversion, Contrast stretching, Intensity slicing, Bit-plane slicing. Histogram stretching, Histogram equalization. Neighborhood Processing, Spatial Filtering, Smoothing and Sharpening Filters, Median Filter. Noise models. Image smoothing in the frequency domain, Image sharpening in the frequency domain.

UNIT – 3 IMAGE SEGMENTATION

Detection of discontinuities: Point detection and Line detection. Image Edge detection using Robert, Sobel, and Prewitt masks. Image Edge detection using Laplacian Mask. Thresholding-based segmentation: Global thresholding, Multiple thresholding, and Adaptive thresholding. Similarity-based segmentation: Region-Growing algorithm, Split-and-Merge algorithm.

UNIT – 4 COLOR IMAGE PROCESSING AND IMAGE COMPRESSION

Color Fundamentals, Color Models: RGB, HSV, and CMYK, Pseudo color image processing, Color features. Image compression models, Types of redundancies, Run-length coding, Huffman coding, Shannon-Fano coding, and Bit-plane coding. Image quality factors and Image quality metrics.

UNIT – 5 MORPHOLOGICAL IMAGE PROCESSING

Need for morphological image processing, Dilation operation, Erosion operation, Properties of Dilation and Erosion, Hit-or-Miss transform, BasicMorphological algorithms: Boundary extraction, Noise removal, Thinning, Thickening. Grey-scale Dilation and Erosion, Top-hat and Well transformations algorithms.

Text Books:

1. Digital Image Processing, Second Edition by Rafel C. Gonzalez and Richard E. Woods, Pearson Education
2. Digital Image Processing First Edition by S.Sridhar.

Reference Books:

1. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI
2. Fundamentals of Digital Image Processing by Anil K Jain, PHI
3. Digital Image Processing Using Matlab, Rafel C. Gonzalez and Richard E. Woods, Pearson Education

Web Links:

1. https://www.imageprocessingplace.com/
2. https://www.udemy.com/course/digital-image-processing-made-easy/
3. https://github.com/topics/digital-image-processing
4. https://in.mathworks.com/products/image.html

CO-PO Mapping:

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

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

Regulation GRBT-20	GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(Autonomous)	IV B.Tech I Semester			
CourseCode 201CS705	**HUMAN COMPUTER INTERACTION** Open Elective-IV: CSE, CSE (AI/ML), CSE (Cyber Security)				
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):

1. Understand the important aspects of implementation of human-computer interfaces
2. Identify the various tools and techniques for interface analysis, design, and evaluation
3. Identify the importance of working in teams and the role of each member within an interface development phase

Course Outcome(s):

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

CO-1: Explain the capabilities of both humans and computers from the viewpoint of human information processing.

CO-2: Identify the various tools and techniques for interface analysis, design, and evaluation

CO-3: Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.

CO-4: Apply an interactive design process and universal design principles to designing HCI systems.

CO-5: Identify the challenges and apply information visualization

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. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

Web Links:

1. https://nptel.ac.in/courses/106/103/106103115/
2. https://www.youtube.com/watch?v=azk99gD_2Io&list=PLwdnzlV3ogoX3iAr OKRq4RHSPrZyxhkrI

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	PSO1	PSO2
CO1	-	-	2	-	-	-	-	-	1	-	-	-	1	3
CO2	1	-	-	2	3	-	-	-	-	-	2	3	2	2
CO3	2	-	2	3	-	3	-	2	-	-	3	-	1	-
CO4	1	-	2	-	-	2	-	-	-	-	-	-	2	-
CO5	1	2	-	3	3	2	-	-	-	-	3	3	-	2

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IVB.Tech. ISem (7th Semester)			
Course Code 201PT7613	**Basic Concepts in Reservoir Engineering** (Open Elective-III)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisites		3	0	0	3

Course Objectives

The objectives of this course are to

- Impart knowledge on basic concepts in reservoir engineering
- Analyze PVT behavior of oil & gas reservoirs
- Apply material balance concepts to oil & gas reservoirs.
- Utilize Darcy's law in oil and gas reservoirs.
- Estimate well inflow for stabilized conditions.

Course Outcomes

On Completion of the course, the students shall be able to-	
CO1:	Identify Reservoir rock properties
CO2:	Understand the phase behaviour of reservoir fluid.
CO3:	Understand fluid flow through porous media.
CO4:	Identify type of drive mechanism and calculate the reserve estimation
CO5:	Understand the reservoir development in oil filed.

Syllabus

UNIT I

Reservoir Rock Properties

Porosity, permeability determination, combination of permeability in parallel & series beds, porosity permeability relationship, fluid saturation determination and significance, effective and relative permeability, wettability, capillary pressure characteristics, measurements and uses.

UNIT II

Reservoir Fluids

Phase behavior of hydrocarbon system, ideal & non ideal system, equilibrium ratios, reservoir fluid sampling, and PVT properties determination.

UNIT III

Flow of Fluids through Porous Media

Darcy's law, single and multiphase flow, linear, radial& spherical flow, steady state & unsteady state flow, flow through fractures, GOR, WOR equations, Water and gas coning. Principles of Fluid Flow for steady state, semi steady state & non steady state conditions.

UNIT IV

Reservoir Drives

Reservoir drive mechanics and recovery factors

Reserve estimation

Estimation of petroleum reserve, resource & reserve concept, MBE, decline curve analysis.

UNIT V

Reservoir Development (oil and gas filed development)

Rational development plan, Rate and order of drilling well, well spacing & pattern, selection of development scheme, economic aspect of development of oil and gas fields.

Text book(s)

1. Tarek Ahmed, "Reservoir Engineering Handbook", Gulf Professional Publishing..
2. NnaemekaEzekwe, "Petroleum Reservoir Engineering Practice", Pearson Education, Inc.

Reference(s)

1. Benjamin Cole Craft, Murray Free Hawkins, and Ronald E. Terry, "Applied Petroleum Reservoir Engineering" by Prentice Hall.
2. LP Dake, "Fundamentals of Reservoir Engineering" shell learning and development.
3. Tarek Ahmed, Paul D. McKinney, "Advanced Reservoir Engineering" Gulf Professional Publishing.
4. BF Towler, "Fundamental Principles of Reservoir Engineering", SPE.
5. Heriot Watt, "Reservoir Engineering Handbook".
6. Abhijit Y. Dandekar, "Petroleum Reservoir Rock and Fluid Properties", CRC Press.

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7th Semester)			
Course Code	Remote Sensing & GIS in Mining (Open Elective - IV)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisites: Nil		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.

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.

Textbook(s)

1. Bhatta B, Remote sensing and GIS, Oxford University Press, 2008.
2. Narayan LRA, Remote Sensing and its Applications, Universities Press, 2012.

Reference(s)

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.

AUTOMOBILE ENGINEERING GRBT20

IV Year – I Semester		L	T	P	C
		3	0	0	3
OPEN ELECTRIVE-4	ALTERNATIVE ENERGY RESOURCES FOR AUTOMOTIVES				

COURSE OBJECTIVES:

Students undergoing this course will be able to:

1. Produce and use the alternative fuels
2. Predict the properties of vegetable oils, gaseous fuels, hydrogen fuels, alcohol fuels
3. Judge the effect of alternative fuels on fossil fuels when use in IC engines
4. Analyze electric and hybrid automobiles

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Produce and use vegetable oils, gaseous fuels, hydrogen fuels, alcohol fuels
CO2:	Determine the properties, performance, emission characteristics of alternative fuels
CO3:	Evaluate alternative fuels on fossil fuels when use in combination with both fuels
CO4:	Design, analyze and build the electric and hybrid automobiles
CO5:	Understand working of fuel cell and solar cars

UNIT-I Introduction: Need for non-conventional energy sources. Energy alternative: solar, photo-voltaic, Hydrogen, Biomass. Electrical- their merits and demerits.
Vegetable Oils: Various vegetable oils for diesel engines, structure and properties, problems in using vegetable oils in diesel engines, methods to improve the engine performance using vegetable oils-preheating,Esterification(biodiesel,blendingwithgoodsecondaryfuels,semi-adiabaticengine,surface ignition engine, ignition accelerators dual fuelling with gaseous and liquid fuels, performance, combustion and emission characteristics of vegetable oil fuelled diesel engines.

UNIT-II Gaseous Fuels: Properties of hydrogen, production and storage methods, safety precautions , use in SI and CI engines, biogas production and its properties, use in SI and CI engines, properties of LPG and CNG, use in SI and CI engines. Performance, combustion and emission characteristics of hydrogen, biogas, LPG and CNG in SI and CI engines.
Energy from Bio mass: Photosynthesis, photosynthetic oxygen production, energy plantation. Biogas production from organic waste, description and types of Bio gas plants, Application and limitations – Merits and demerits performance characteristics and their comparison.

UNIT-III Hydrogen Fuel: Hydrogen Energy: Properties of Hydrogen, sources of Hydrogen, Thermodynamics of water splitting Production of Hydrogen, Electrolysis of water. Thermal decomposition of water. Thermo-chemical production, Biochemical production.
Hydrogen fuel, Storage and Transportation methods, Applications to engines modifications necessary, precautions and safety measures- Performance characteristics in Engine and their comparison.

UNIT IV Alcohol Fuels: Properties of alcohols, engine modifications required to use alcohols in SI engines, performance, combustion and emission characteristics in SI engines, alcohol – gasoline blends, fuel flexible vehicle, methanol reformed gas engine, use of alcohols in CI engines-emulsions, dual fuelsystem,sparkassisteddieselengine,surfaceignitionengine,ignitionaccelerators,performance,combustion and emission characteristics in CI Engines.

UNIT-V Electric & Hybrid Vehicles: cost of' electric car, Availability of energy for recharging. Traction motors and types. Electric Automobiles: Design considerations, limitations. Opportunities for improvement Batteries, problems. Future possibilities, capacities, types, material requirement
Solar & Fuel Cell Vehicles : Solar photo-voltaic conversion, Collection and storage of solar energy, collection devices, flat plate collectors, concentrating type collectors, principles and working of photo-voltaic Conversion, Applications to automobiles.

TEXT BOOKS:

1. G.D. Rai 'Non-conventional sources of energy Khamma Lab.
2. William Hamilton 'Electric Automobiles', PHI
3. Alternative sources and control system. Yes Dee publishing pvt Ltd

REFERENCEBOOKS:

1. S.P. Sukhatme 'Solar Energy', Tata Mc Graw Hill.
2. S. Rao & B. B. Larulekar 'Energy Technology', Khamma Lab
3. Frank Kreith & Jan F.Krieder 'Principles of Solar Engineering 'Mc Graw Hill.
4. J.A. Duffie & W.A. Beckman 'Solar Energy-thermal Process 'Mc Graw Hil1
5. E,D; Totta, 'Solar Hydrogen Energy-Systems'
6. T.N. Veziroglu. Alternative energy sources.
7. Mitsui E. Stal, Biological solar energy conversion

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	3	-	3	-	2	2	-	2	-	2
CO2	2	1	2	-	2	2	-	2	1	1	-	-
CO3	1	2	-	1	-	-	2	3	2	-	1	2
CO4	2	1	-	2	-	-	-	-	-	-	-	1
CO5	2	1	-	-	-	-	2	-	-	-	1	-

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

Regulation GRBT20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech – IV -I			
Course Code	**Digital Marketing (Common to all Branches)**				
Teaching	Total Contact Hours-45	L	T	P	C
Prerequisite(s): Basic knowledge of English		3	0	0	3

Course Objectives:

1.To analyzethe confluence of marketing, operations, and human resources in real-time delivery.

2. To demonstrate cognitive knowledge of the skills required in conducting online research and research markets, as well as in identifying, assessing and selecting digital market . opportunities.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	Gain Knowledge of overall understanding of digital marketing
CO2:	Develop insight on current trends – digital and social statistics (Infographics)
CO3:	Provide an introduction to digital marketing platforms like.. Facebook, Twitter, YouTube, Pinterest, etc.
CO4:	Learn the knowledge of SEO& SEM.
CO5:	Learn Web analytics.

UNIT I

Introduction to Digital Marketing : Evolution of Digital Marketing from traditional to modern era, Role of Internet; latest trends, Info-graphics, implications for business & society, Emergence of digital marketing as a tool, Drivers of the new marketing environment; Digital marketing strategy, Digital marketing plan, Digital marketing models.

UNIT II

Internet Marketing and Digital Marketing Mix: Internet Marketing, opportunities and challenges, Digital marketing framework, Digital Marketing mix, Impact of digital channels on IMC,Display marketing: Types of Display Ads - Buying Models - Programmable Digital Marketing - Analytical Tools - YouTube marketing.

UNIT III

Social Media Marketing: Role of Influencer Marketing, Tools & Plan, Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy. Facebook Marketing: Business through Face book Marketing, Face book Marketing Tools, Linked in

Marketing: Introduction and Importance of Linked in Marketing, Framing Linked in Strategy, Lead Generation through Linkedin, Content Strategy, Analytics and Targeting,

UNIT IV

Introduction to SEO, SEM, Web Analytics: Need for SEO, How to use internet & search engines; search engine and its working pattern, On-page and off-page optimization, SEO Tactics - Introduction to SEMMobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics

UNIT V

Web Analytics: Google Analytics & Google Ad Words; data collection for web analytics, multichannel attribution, Universal analytics, tracking code Trends in digital advertising, Landing Page.

Text Books :

1. Digital Marketing Paperback – Illustrated, 13 April 2015 by Vandana Ahuja (Author)
2. Digital Marketing | Second Edition Paperback – 6 August 2020 by Seema Gupta (Author)
3. Fundamentals of Digital Marketing | Second Edition | By Pearson Paperback – 30 June 2019by Puneet Bhatia (Author)
4. Social Media & Mobile Marketing Paperback – 1 January 2019by Puneet Singh Bhatia

References

1. E-Commerce: Strategy, Technologies and Applications Paperback – 2001 by David Whiteley
2. E-Commerce: An Indian Perspective Paperback – Import, 30 Nov 2015-by P. T. Joseph
3. One Click: Jeff Bezos and the Rise of Amazon.com Kindle Edition- by Richard L. Brandt
4. E-Commerce: Strategy, Technologies and Applications Paperback – 2001 by David Whiteley
5. E-Commerce: An Indian Perspective Paperback – Import, 30 Nov 2015-by P. T. Joseph

Web references

1 https://learndigital.withgoogle.com/digitalunlocked/
2 https://digitalskills.fb.com/en-in/
3 https://www.hubspot.com/digital-marketing
4 http://www.afaqs.com/
5 https://www.linkedin.com/learning/
6 Journal of Marketing 7 ET-Brand Equity 8 HBR T

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech. III or IV Sem			
Course Code HSMC (H-102)	UNIVERSAL HUMAN VALUES: 2 UNDERSTANDING HARMONY				
Teaching	Total contact hours – 48	L	T	P	C
Prerequisite(s): None. Universal Human Values-I (desirable)		2	1	0	3

COURSES ON HUMAN VALUES

During the Induction Program, students would get an initial exposure to human values through Universal Human Values-I. This exposure is to be augmented by this compulsory full semester foundation course.

Course Objective

This introductory course input is intended:

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all humanbeings
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

COURSE OUTCOMES

By the end of the course, students are expected to become

On Completion of the course, the students will be able to-	
CO1:	Be aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO2:	Be Efficient in critical thinking ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
CO3:	Practice what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

UNIT 1 – Introduction to Value Education (6 lectures and 3 tutorials for practice session) Understanding Value Education -Self-exploration as the Process for Value Education- Continuous Happiness and Prosperity – the Basic Human Aspirations -Right Understanding, Relationship and Physical Facility - Happiness and Prosperity – CurrentScenario- Method to Fulfill the Basic Human Aspirations

PracticeSessionPS1: Sharing about Oneself, PS2: Exploring Human Consciousness andPS3: Exploring NaturalAcceptance

UNIT 2 – Harmony in the Human Being (6 lectures and 3 tutorials for practice session) Understanding Human being as the Co-existence of the Self and the Body -Distinguishing between the Needs of the Self and the Body- The Body as an Instrument of the Self- Understanding Harmony in the Self- Harmony of the Self with the Body- Programme to ensure self-regulation and Health

PracticeSession: PS4 Exploring the difference of Needs of Self andBody,PS5 Exploring Sources of Imagination in the Self and PS6 Exploring Harmony of Self with theBody.

UNIT 3 – Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) Harmony in the Family – the Basic Unit of Human Interaction-Values in Human-to-Human Relationship-'Trust' – the Foundational Value in Relationship - Understanding Harmony in the Society- Vision for the Universal Human Order

PracticeSession: PS7 Exploring the Feeling of Trust -'Respect' – as the RightEvaluation,PS8: Exploring the Feeling of Respect and PS9Exploring Systems to fulfil HumanGoal

UNIT 4 – Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session) Understanding Harmony in the Nature- Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature- Realizing Existence as Co-existence at AllLevels- The Holistic Perception of Harmony inExistence

Practice Session:PS10 Exploring the Four Orders of Nature and PS11 Exploring Co-existence in Existence

UNIT 5 – Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session) Natural Acceptance of Human Values- Definitiveness of (Ethical) Human Conduct- A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order- Competence in Professional Ethics-: Holistic Technologies, Production Systems and

Management Models-Typical Case Studies- Strategies for Transition towards Value-based Life and Profession

Practice Session: PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education and PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Text Book and Teachers Manual

a. The Textbook :A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual
Teachers` Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-53-2

Reference Books

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

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	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	-	3	3	-	-	-

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
CourseCode	**VERILOG/HDL PROGRAMMING LABROTARY**				
Teaching	Total Contact Hours – 45	L	T	P	C
Prerequisites: Basic knowledge of CMOS technology, Logic design and Digital system design		0	0	3	1.5

Course Objectives:

1. To observe the design the schematic diagrams using CMOS logic
2. To observe the layout diagram using design rules
3. To observe the transmission gates and pass transistor logic
4. To observe the different amplifier techniques using CMOS logic
5. To observe the Simulation process using EDA tools (Mentor graphics/Tanner)

Course Outcomes:

On Completion of the course, students will be able to	
CO1:	Identify and describe operation of CMOS logic
CO2:	Apply CMOS logic to design logic gates
CO3:	Draw the stick diagrams
CO4:	Analyze layout methods for integrated circuits
CO 5:	Understand and Simulate different devices using Mentor graphics

List of Experiments:

1. Design and implementation of an inverter
2. Design and implementation of universal gates
3. Design and implementation of Half adder
4. Design and implementation of full adder
5. Design and implementation of Half subtractor
6. Design and implementation of full subtractor

7. Design and implementation of Pass Transistor
8. Design and implementation of Transmission Gate
9. Design and implementation of Common Source Amplifier
10. Design and implementation of Common Drain Amplifier
11. Design and implementation of Decoder
12. Design and implementation of D-latch

Equipment required for Laboratory:

1. Desktop Computers
2. EDA tool (Mentor graphics)

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	3	-	-	-	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	-	2	2	-	-	3	-	-	-	-	-	-
CO5	-	-	3	1	-	3	-	-	-	-	-	-

General Minor Courses (Offered by other Department)

Note : 1. A student can opt any 4 subjects from each pool @ 4 credits per subject.
2. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

Offered by Electronics and Communication Engineering

Code No.	Subject Name	Code No.	Subject Name
ECMR1	Digital Electronics	ECMR2	Micro Processors & Micro Controllers
ECMR3	Introduction to Embedded System Design	ECMR4	Wireless Sensor networks
ECMR5	Computer Architecture Organization	ECMR6	Data Communication
ECMR7	Principles of Communication System	ECMR8	MATLAB Practice

Honors Courses

Note : 1. The subjects opted for Honors should be Advanced type which are not covered in regular curriculum

2. Students has to acquire 16 credits with minimum one subject from each pool.

3. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

Pool 1

Code No.	Subject Name	Code No.	Subject Name
ECHP11	Digital System Design	ECHP12	Sensors & Actuators
ECHP13	Arm Processors & its applications	ECHP14	IOT & its applications

Pool 2

Code No.	Subject Name	Code No.	Subject Name
ECHP21	VLSI Signal Processing	ECHP22	Memory Architecture
ECHP23	Scripting Languages for VLSI	ECHP24	Microelectronic Devices Technology & circuits

Pool 3

Code No.	Subject Name	Code No.	Subject Name
ECHP31	Advanced Digital Signal Processing	ECHP32	Digital Video & Image Processing
ECHP33	Medical Image Processing	ECHP34	Pattern Recognition & Machine Learning

Pool 4

Code No.	Subject Name	Code No.	Subject Name
ECHP41	Speech Processing	ECHP42	RF & Mixed Signals
ECHP43	Non-Linear Optical Communication	ECHP44	Fiber Optics & Satellite Communication