GRBT-19
COURSE STRUCTURE AND SYLLABUS

DEPARTMENT OF MECHANICAL ENGINEERING

Godavari institute of Engg& Technology

Approved By AICTE NAAC'A^{+}' Grade Recognized by UCG,U/Sec.2(f)&12(B) Permanent affiliation by JNTUK, GIET Campus, Chaitanya Knowledge city,NH-16,Rajahmundry,East Godavari, A.P.
Tel:+91-883-2484828-31www.giet.ac.in

COURSE STRUCTURE
SYLLABUS
BOS MINUTES
REGULATIONS

MECHANICAL ENGINEERING

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Approved By AICTE, NAAC - A^{+} Grade Recognized by UCG,U/Sec.2(f)&12(B) Permanent affiliation by JNTUK

GIET Campus, Chaitanya Knowledge city,NH-16,Rajahmundry,East Godavari, A.P.

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GRBT- 19 COURSE STRUCTURE
Mechanical Engineering

B. Tech. I Semester

S. NO	Course Code	Course Type	Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19198101	BSC	Mathematics-I	3	0	0	3	30	70	100
2	19198102	HSMC	Communicative English I	3	0	0	3	30	70	100
3	19198103	BSC	Engineering Chemistry	3	0	0	3	30	70	100
4	19199104	ESC	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
5	19198105	MC	Professional Ethics & Human Values	2	0	0	0	30*	_	_
6	19198176	ESC	Engineering Graphics	1	0	3	2.5	30	70	100
7	19198111	HSMC	Communicative English Laboratory	0	0	3	1.5	50	50	100
8	19198112	BSC	Engineering Chemistry Laboratory	0	0	3	1.5	50	50	100
9	19199113	ESC	Basic Electrical & Electronics Engineering Lab	0	0	3	1.5	50	50	100
			Total	**15**	**0**	**12**	**19**	**300**	**500**	**800**
	BSC = 7.5	**ESC=7**	**HSMC=4.5**	**MC=0**						

B. Tech. II Semester

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

S. NO	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19198201	BSC	Mathematics-II	3	0	0	3	30	70	100
2	19198202	HSMC	Communicative English II	3	0	0	3	30	70	100
3	19198203	BSC	Engineering Physics and its Applications	3	0	0	3	30	70	100
4	19199204	ESC	Problem Solving & Programming in C	2	1	0	3	30	70	100
5	19198205	MC	Environmental Studies	2	0	0	0	30*	_	_
6	19198206	ESC	Engineering Mechanics	2	1	0	3	30	70	100
7	19198211	HSMC	Communicative English Laboratory -II	0	0	3	1.5	50	50	100
8	19198212	BSC	Engineering Physics Laboratory	0	0	3	1.5	50	50	100
9	19199213	ESC	Problem Solving & Programming Laboratory using C	0	0	3	1.5	50	50	100
10	19198214	ESC	Basic Engineering Workshop	0	0	3	1.5	50	50	100
			Total	**15**	**2**	**12**	**21**	**350**	**550**	**900**
	BCS=7.5	**ESC=9**	**HSMC=4.5**	**MC=0**						

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

B. Tech. III Semester

S. NO	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19139301	BSC	Mathematics-III	3	0	0	3	30	70	100
2	19130302	ESC	Metallurgy &Materials Science	3	0	0	3	30	70	100
3	19130303	PCC	Mechanics of Solids	2	1	0	3	30	70	100
4	19130304	PCC	Kinematics of Machinery	2	1	0	3	30	70	100
5	19130305	PCC	Thermodynamics	2	1	0	3	30	70	100
6	19130306	PCC	Fluid Mechanics & Hydraulic Machinery	3	0	0	3	30	70	100
7	19130387	MC	Design Thinking & Product Innovation	2	0	0	0	30*	_	_
8	19130311	PCC	Mechanics of Solids & Metallurgy lab	0	0	3	1.5	50	50	100
9	19130312	PCC	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	1.5	50	50	100
			Total	**17**	**3**	**6**	**21**	**280**	**520**	**800**
	BCS = 3	**ESC =3**	**PCC = 15**							

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

B. Tech. IV Semester

S. No	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19139401	BSC	Numerical Methods and Probability & Statistics	3	0	0	3	30	70	100
2	19130402	PCC	Dynamics of Machinery	3	0	0	3	30	70	100
3	19130403	PCC	Thermal Engineering -I	3	0	0	3	30	70	100
4	19130404	PCC	Production Technology	3	0	0	3	30	70	100
5		OEC	**Open Elective-1**	3	0	0	3	30	70	100
	19131465a		Environmental Pollution & Control							
	19132465a		Utilization of Electrical Energy							
	19134465a		Internet of Things							
	19135465a		Operating Systems							
	19136465a		Elements of Mining Technology							
	19137465a		Basic Automobile Engineering							
6	19130411	PCC	Computer Aided Machine Drawing Practice	1	0	3	2.5	50	50	100
7	19130412	PCC	Thermal Engineering Lab.	0	0	3	1.5	50	50	100
8	19130413	PCC	Production Technology Lab	0	0	3	1.5	50	50	100
9	19130421	PR	Community Service Oriented Project	0	0	1	0.5	100	_	100
			Total	**16**	**0**	**10**	**21**	**380**	**520**	**900**
	BCS = 3	**ESC =0**	**PCC = 14.5**	**OEC = 3**	**PR = 0.5**					

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

B. Tech. V Semester

S. No	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19130501	PCC	Design of Machine Members	2	1	0	3	30	70	100
2	19130502	PCC	Thermal Engineering -II	2	1	0	3	30	70	100
3	19130503	PCC	Metal Cutting & Machine Tools	3	0	0	3	30	70	100
4		PEC	**Department Elective-1**	3	0	0	3	30	70	100
	19130564A		A. Fuels Combustion and Emission control							
	19130564B		B. Tribology							
	19130564C		C. Industrial Robotics							
	19130564D		D. Advanced Materials							
5		OEC	**Open Elective-2**	3	0	0	3	30	70	100
	19131565a		Solid Waste Management							
	19132565a		Energy management							
	19134565a		Digital Image Processing							
	19135565a		Information Security							
	19136565a		Disaster Management in Mining							
	19137565a		Hybrid and Electric Vehicles							
6	19193511	PCC	Theory of Machines Lab.	0	0	3	1.5	50	50	100
7	19193512	PCC	Machine Tools Lab.	0	0	3	1.5	50	50	100
8	19139513	HSMC	Soft Skills	0	0	3	1.5	50	50	100
9	19130521	PR	Mini Project-1/Study Project/Internship	0	0	0	1.5	100	_	100
			Total	**14**	**1**	**9**	**21**	**400**	**500**	**900**
	PEC = 3	**HSMC = 1.5**	**PCC = 12**	**OEC = 3**	**PR=1.5**					

B. Tech. VI Semester

S. No	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19130601	PCC	Design of Transmission Elements	2	1	0	3	30	70	100
2	19130602	PCC	Industrial Engineering & Management	3	0	0	3	30	70	100
3	19130603	PCC	Heat Transfer	2	1	0	3	30	70	100
4	19130604	PCC	Metrology and Instrumentation	3	0	0	3	30	70	100
5		PEC	**Department Elective-2**	3	0	0	3	30	70	100
	19130665A		A. Refrigeration and Air Conditioning							
	19130665B		B. Mechatronics							
	19130665C		C. Advanced Foundry and Welding Technology							
	19130665D		D. Non Destructive Evaluation							
6		OEC	**Open Elective 3**	3	0	0	3	30	70	100
	19131666a		a. Global Environment Problems & Policies							
	19132666a		b. Renewable Energy Resources							
	19134666a		c. Data Communication							
	19135666a		d. Human Computer Interaction							
	19136666a		e. Remote sensing & GIS in Mining							
	19137666a		f. Modern Vehicle Technology							
7	19139687	MC	Constitution of India	2	0	0	0	30*	-	-
8	19130611	PCC	Heat Transfer Lab	0	0	3	1.5	50	50	100
9	19130612	PCC	Metrology and Instrumentation Lab	0	0	3	1.5	50	50	100
			Total	**18**	**2**	**6**	**21**	**280**	**520**	**800**
	PEC = 3	**HSMC = 0**	**PCC = 15**	**OEC = 3**	**PR=0**					

B. Tech. VII Semester

S. No	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19130701	PCC	Finite Element Methods	3	0	0	3	30	70	100
2	19130702	PCC	CAD/CAM	3	0	0	3	30	70	100
3		PEC	**Department Elective-3**	3	0	0	3	30	70	100
	19130763A		A. Power Plant Engineering							
	19130763B		B. Mechanical Vibrations							
	19130763C		C. Automobile Engineering							
	19130763D		D. Advanced Machining Processes							
4		PEC	**Department Elective-4**	3	0	0	3	30	70	100
	19130764A		A. Gas Dynamics & Jet Propulsions							
	19130764B		B. Micro Electro Mechanical System							
	19130764C		C. Design for Manufacturing							
	19130764D		D. Automation in Manufacturing							
5		OEC	**Open Elective-4**	3	0	0	3	30	70	100
	19139765a		a. Managerial Economics and Financial Analysis							
	19139765b		b. Entrepreneurship Qualities for Engineers							
	19139765c		c. Principles of Management							
	19139765d		d. Financial Management for Engineers							
	19139765e		e. Operations management							
	19139765f		f. Digital Marketing							
	19139765g		g. Total Quality Management							
	19139765h		h. Organizational Behaviour							
	19139765i		i. Human Resource Management							
6	19139786	MC	Intellectual Property Rights and Patents	2	0	0	0	30*	_	_
7	19130711	PCC	CAD/CAM Lab	0	0	3	1.5	100		100
8	19130721	PR	Mini Project - 2/Internship	0	0	0	2	100		100
9	19130731	PR	Fabrication Project	0	0	5	2.5	50	50	100
			Total	**17**	**0**	**8**	**21**	**430**	**400**	**800**
	PEC = 6	**MC = 0**	**PCC = 7.5**	**OEC = 3**	**PR=4.5**					

B. Tech. VIII Semester

S. No	Course Code		Subject Title	Periods per Week			Credits	Internal	External	Total
				L	T	P				
1	19139801	HSMC	Operations Research	3	0	0	3	30	70	100
2		PEC	**Department Elective-5**	3	0	0	3	30	70	100
	19130862A		A. Computational Fluid Dynamics							
	19130862B		B. Nano Technology							
	19130862C		C. Additive Manufacturing							
	19130862D		D. Production Planning and Control							
3	19130841	PR	Project	0	0	18	9	80	120	200
			Total	**6**	**0**	**18**	**15**	**140**	**260**	**400**
	PEC =3	**PR = 9**	**HSMC = 3**							

NOTE:- **L - LECTURE** **T- THEORY** **P – PRACTICAL** **C – CREDITS**

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

COURSE COMPONENT DISTRIBUTION

Sl. No.	Category	Category Description	Category	GRBT-19	APSCHE	AICTE credits
1	Basic Sciences	Basic Science courses	BS	21	24	25
2	Mandatory Courses	Mandatory Courses[Environmental Sciences, Induction training, Indian Constitution,Essence of Indian Traditional Knowledge](non-credit)	MC	0	0	0
3	Engineering Sciences	Engineering Science courses including workshop, drawing, basics of electrical/ mechanical/ computer etc	ES	19	24	24
4	Professional Core	Professional core courses	PC	64	51.5	48
5	Professional Electives	Professional Elective courses relevant to chosen specialization/branch	PE	15	15	18
6	Open Electives	Open subjects – Electives from other technical and /or emerging subjects	OE	12	15	18
7	Humanities & Social Sciences	Humanities and Social Sciences including Management courses	HS	13.5	13	12
8	Projects	Project work, seminar and internship in industry or elsewhere	PR	15.5	13	15
9	Lab Courses	Practical Lab based Courses	LC	0	4.5	
			Total ==>	**160**	**160**	**160**

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

Course Objective:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Transform the knowledge of solving system of linear equations using matrices.
CO2:	Apply mean value Rolls, Lagranges and Cauchy mean value theorem in engineering applications.
CO3:	Acquire the knowledge maxima and minima of function of several variables
CO4:	Evaluate multiple integrals and their applications
CO5:	Understand Beta and Gamma functions, evaluate improper integrals.

Syllabus:

Unit I: Matrix Operations and Solving Systems of Linear Equations

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

Unit II: Mean Value Theorems

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

Unit III: Multivariable calculus

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

Unit IV: Multiple Integrals

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

Unit V: Special Functions

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

Text books:

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

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. T.K.V.Iyenger, et.al., Engineering Mathematics, Volume-III, .Chand 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/
3. https://www.sanfoundry.com/engineering-mathematics-multiple-choice-questions-answers/
4. https://ocw.mit.edu/courses/mathematics/

CO-PO Mapping:

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

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

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

Course Objectives: This course aims

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

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	students will be able to develop effective reading strategies
CO2:	will be able to demonstrate writing skills that are required for professional development and use graphic elements for communication
CO3:	will be able to apply grammatical skills and vocabulary effectively in speech and writing

Syllabus:

UNIT-I

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

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

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

VOCABULARY: Content words and function words; Word forms

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

UNIT-II

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

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

GRAMMAR: Use of articles and zero article; prepositions.

VOCABULARY: Linkers, sign posts and transition signals.

WRITING SKILLS: Summarizing an oral or written text.

UNIT-III

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

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

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

VOCABULARY: Prefixes and suffixes

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

Unit–IV

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

GRAMMAR: Correction of sentences-sequencing jumbled sentences

VOCABULARY: use of antonyms and homophones

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

Unit – V

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

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

VOCABULARY: Idioms and Phrases

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

Text Books:

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

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

REFERENCE BOOKS:

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

WEB REFERENCES:

All Skills (LSRW)

https://www.englishclub.com/

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

http://learnenglish.britishcouncil.org/

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
Course Code 19198103	ENGINEERING CHEMISTRY *(COMMON TO MECH, AME, CIVIL & MINING)*				
Teaching	Total contact hours–65	L	T	P	C
Prerequisite(s): Knowledge of theoretical and experimental from Intermediate level, Application of Chemistry theory and calculations required course.		3	-	-	3

Course Objective:

To acquaint the students with soft and hard water types and softening methods, introduction of 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	Distinguish between temporary and permanent hardness of water
CO2	The concept applications of solar energy
CO3	Identify different organic coatings
CO4	Understand the setting and hardening of cement
CO5	Analyze the importance of nano materials

Syllabus:

UNIT –I

WATER TECHNOLOGY

Introduction –Hard and Soft water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge-priming and foaming, Boiler Corrosion, specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Industrial water treatment – 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 batteries (Lithium-MnO_2) – fuel cell, hydrogen-oxygen fuel cell, Solar energy, photovoltaic cell and applications.

UNIT – III

CORROSION ENGINEERING

Corrosion: Definition – theories of corrosion, chemical and electro chemical corrosion – pitting corrosion, differential aeration corrosion, passivity, galvanic series, factors affecting corrosion.

Corrosion controlling methods: Sacrificial and Impressed current cathodic protection, Metallic coatings, anodic coatings, cathodic coating, galvanizing and tinning, Electroplating – organic surface coatings, paints (constituents and their functions).

UNIT – IV

ENGINEERING MATERIALS AND POLYMERS

Cement: Portland cement, constituents, Manufacture of Portland Cement, chemistry of setting and hardening of cement (hydration, hydrolysis, equations).

Polymers: Introduction,Types of polymerization ,mechanism of addition polymerisation, compounding and fabrication of plastics, differences between thermoplastic and thermo setting resins, Preparation, properties and uses of Bakelite, PVC and polyetylene.

UNIT – V

NANO MATERIALS

Nano Materials: Introduction to Nano materials, chemical synthesis of nanomaterials: Sol-gel method, Reverse micellar method, Characterization of nanoparticles by SEM method andTEM (includes basic principle of TEM), Applications of nanomaterials. Definition ,classification ,properties and failures of Refractories.

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).

Weblink:

1. www.btechguru.com/courses--nptel--chemistry-and-biochemistry-video-lecture--cbc.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	2	2	1	-	1	1	-	-	2	-	-	2
CO2	3	2	3	2	3	3	-	-	3	-	-	3
CO3	3	2	2	2	2	2	-	-	2	-	2	2
CO4	3	2	3	2	2	3	-	-	2	-	-	3
CO5	3	2	3	2	3	3	-	-	3	-	-	3

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

Course Objective:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
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 Electrical Circuits

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

UNIT –II DC Machines

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

UNIT –III AC Machines

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

UNIT –IV Rectifiers & Linear Integrated Circuits

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

UNIT –V Transistors

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

Text books:

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

Reference Books:

1. Basic Electrical Engineering by M.S.Naidu and S.Kalnakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2th edition
3. Basic Electrical Engineering by Nagsarkar, 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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

Course Objectives:

The objectives of this course on 'Professional Ethics and Human Values' are:
(1) to understand the moral values that ought to guide the Engineering profession,
(2) to resolve the moral issues in the profession, and
(3) to justify the moral judgment concerning the profession.

Course outcomes:

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

UNIT I: Human values

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

UNIT II: Engineering ethics:

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

UNIT III: Engineering as social experimentation:

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

UNIT IV: Engineers' responsibility for safety and risk:

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

UNIT V: Engineer's responsibilities and rights:

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

TEXT BOOKS

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

Reference:

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

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY
((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 MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

Course Objectives:

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

Course Outcomes:

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

Syllabus:

UNIT-I

POLYGONS: Constructing regular polygons by general methods, inscribing and describing polygons on circles.
CURVES: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes.

UNIT-II

ORTHOGRAPHIC PROJECTIONS: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to one of the reference planes (HP,VP or PP)
PROJECTIONS OF STRAIGHT LINES: Inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

UNIT-IV

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

UNIT-V

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

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

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

Text Books:

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

Reference Books:

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

CO-PO Mapping:

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

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

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

Course Objective: The course aims to

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Learning to communicate in English
CO2:	Comprehend native speakers accent.
CO3:	Speak appropriately in real life situations

Syllabus:

UNIT 1: BASIC AURAL AND ORAL SKILLS

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

Speaking: Phonetics-Accent and pronunciation

UNIT 2 CONVERSATIONAL SKILLS

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

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

UNIT 3: LANGUAGE IN USE

Listening: Listening for global comprehension and summarizing.

Speaking: 1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating

2. Apologizing, Advising, Suggesting, Agreeing and Disagreeing

UNIT 4: LANGUAGE 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: FORMAL INTERPRETATION

Listening: TED Talks – understanding the summary

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

Suggested Text book: INTERACT from Orient Black Swan

Reference Books:

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

Web links:

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

CO-PO Mapping:

(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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (I semester)			
CourseCode 19198112	ENGINEERING CHEMISTRY LABORATORY *(COMMON TO MECH, AME, CIVIL and MINING)*				
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 Phenol-Formaldehyde resin
9. Determination of viscosity of a liquid
10. Determination of surface tension of a liquid
11. Estimation of active chlorine content in Bleaching powder

TEXT BOOKS

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

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

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

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

Course Objective:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Determine performance of electrical machines
CO2:	Determine characteristics of electronic devices
CO3:	Control speed of DC motor
CO4:	Measure current, voltage and power in a circuit.
CO5:	Determine current and voltage using Kirchhoff's laws.

List of Experiments:

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)				
	MATHEMETICS -II (common to all except CSE)	I B.Tech. II Sem (2nd semester)			
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Fundamentals of ODE, PDE and Vectors		3	-	-	3

Course Objective:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Solve higher order differential equations with constant coefficients, apply method of variation of parameters.
CO2:	Solve Cauchy's and Legendre's linear equations, applications of differential equations
CO3:	Solve first order linear and nonlinear pde's , Solve higher order pde's
CO4:	Apply del to Scalar and vector point functions, illustrate Gradient, Divergence and Curl operators
CO5:	Understand Green's, Stokes and Gauss divergence theorems and applications

Syllabus:

UNIT I: Linear Differential Equations of Higher Order

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

UNIT II: Equations Reducible to Linear Differential Equations and Applications

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

UNIT III: Partial Differential Equations

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV: Multivariable Calculus (Vector differentiation)

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

UNIT V: Multivariable Calculus (Vector integration)

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

Text books:

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

Reference Books:

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

Web Links:

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

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. IISem (II semester)			
	COMMUNICATIVE ENGLISH –II				
Teaching	Total contact hours – 54	L	T	P	C
Prerequisite(s): Learner should possess the primary communicative abilities suitable for global exposure and professional communication		4	-	-	3

Course Objective: This course aims to

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

Course Outcomes:

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

Syllabus:

UNIT: I

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

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

GRAMMAR: Conjunctions and sentence connectors

VOCABULARY: Adjective-noun collocations

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

UNIT: II

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

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

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

VOCABULARY: ACRONYMS and their usage

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

UNIT: III

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

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

GRAMMAR: subject agreement, verb-noun collocations

VOCABULARY: word roots

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

UNIT IV:

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

GRAMMAR: Misplaced modifiers-conditional clauses

VOCABULARY: Idiomatic expressions

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

UNIT V:

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

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

VOCABULARY: words often confused

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

Prescribed Text books:

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

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

Reference Books:

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

WEB REFERENCES:

English Language Learning Online

BBC Vocabulary Games

Free Rice Vocabulary Game

CO-PO Mapping:

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

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (I semester)			
Course Code	**Engineering Physics** (Civil, Mechanical, Mining and Automobile)				
Teaching	Total contact hours - 55	L	T	P	C
Prerequisite(s): Knowledge of theoretical and experimental physics from Intermediate Level		3	-	3	3

Course Objective

Physics Curriculum is re-oriented to the needs of Civil, Mechanical, Mining and Automobile branches of graduate engineering courses that serve as a transit to understand the specific advanced topics.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	To identify forces and moments in mechanical systems using scalar and vector techniques and interpret the equation of motion of a rigid rotating body (torque on a rigid body)
CO2:	To explain how sound is propagated in buildings and to analyze acoustic properties of typically used materials in buildings
CO3:	To interpret stress and strain curve and to develop the relationship between elastic constants
CO4:	To identify the different modes of heat, transfer and to determine the thermal conductivity of metals and non-metals
CO5:	To identify different types of sensors and applications and to explain physics behind the working principles of sensors with different applications

Syllabus:

UNIT –I

MECHANICS

Basic laws of vectors and scalars, rotational frames-conservative forces F = grad V, torque and angular momentum, Newton's laws in inertial and linear accelerating non-inertial frames of reference, rotating frame of reference with constant angular velocity, qualitative explanation of Foucault's pendulum-rigid body and angular velocity vector

UNIT –II

ACOUSTICS AND ULTRASONICS

Classification of Sound, decibel, Weber–Fechner law – Sabine's formula – for growth and decay of sound intensity– Reverberation Time- Absorption coefficient and its determination – factors affecting acoustics of buildings and their remedies.

Production of ultrasonics by magneto-striction and piezoelectric methods, Non-Destructive Testing – pulse echo system through transmission and reflection modes, A, B and C – scan displays, Medical applications

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

UNIT –III

ELASTICITY

Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one-dimensional stress-strain curve; Generalized Hooke's law; elastic constants and their relationships; Strain energy

UNIT –IV

HEAT TRANSFER

Transfer of heat energy – thermal expansion of solids and liquids - Specific heats- Einstein's and Debye theories - thermal conduction, convection and radiation and their fundamental laws – heat conductions in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment – applications (qualitative only)

UNIT –V

SENSORS

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magneto-strictive sensors, Temperature sensor - bimetallic strip and pyroelectric detectors.

Text books:

1. D. Kleppner and Robert Kolenkow "An introduction to Mechanics"-II -Cambridge University Press,2015
2. Gaur R.K. and Gupta S.L., "Engineering Physics"- Dhanpat Rai publishers, 2012
3. M.N.Avadhanulu & P.G.Kshirsagar "A Text book of Engineering Physics" - S. Chand Publications, 2017
4. Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)

Reference Books:

1. M K Varma "Introduction to Mechanics"-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015

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

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

Course Objective(s)

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

Course Outcomes:

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

UNIT-1

Introduction to Computers: Generations, CPU, Memory, I/o Devices
Introduction to Problem Solving: Algorithm, Pseudo code and Flowchart.
Introduction to Computer Programming: Computer Languages: Machine level, Assembly level and High-level language.

UNIT-2

C' Fundamentals: Structure of a C-program, C-character set, C Tokens: variables, constants, identifiers, data types and sizes, operators, Preprocessor.
I/O Functions: Header files, Standard I/O library functions-formatted I/O functions.
Decision making statements: simple if, if-else, nested if-else, else-if ladder, switch-case statements and sample programs.
Iterative Statements: for, while, do-while. Jump Statements-break, continue, goto

UNIT-3

Introduction to Arrays, Strings

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

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

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

UNIT-4: Pointers, Functions & Storage Classes

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

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

Storage Classes: Auto, Static, Extern and Register

UNIT-5

Structures, Unions and Files

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

Files: Definition, Input and output operation into file.

Text Books

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

Reference Books

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

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-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. IISem (II semester)			
CourseCode 19198293	ENVIRONMENTAL STUDIES (COMMON FOR CE,AME,MM,MECH)				
Teaching	Totalcontacthours- 65	L	T	P	C
Prerequisite(s): Knowledgeofenvironment studies		3	0	0	0

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

Course Outcomes:

On Completion of the course, the students will be able to-	
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-renewableEnergy resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

UNIT – II: Ecosystems, Biodiversity, and its Conservation

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

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

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

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

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

UNIT – IV: Social Issues and the Environment

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

UNIT – V: Human Population and the Environment

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

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

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by 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	-	2	3	-	-	-	-	-	-	-	1
CO2	1	-	2	-	-	1	-	-	3	-	-	2
CO3	2	-	-	1	-	2	-	-	2	2	-	1
CO4	1	-	-	-	-	-	-	-	2	-	-	1
CO5	1	-	2	2	-	2	-	-	3	2	-	2

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 semester)			
Course Code	**Engineering Mechanics**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Engineering Physics		2	1	0	3

Course Objectives:

The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body. Describe the concept of friction and analyse the equilibrium of rigid bodies subjected to force.
CO2:	Analyse planar and spatial systems to determine the forces in members, to understand the concepts of Equilibrium of Systems of Forces, law of Triangle of forces and converse of the law of polygon of forces
CO3:	Discuss the concepts of ``centre of gravity" and ``centroids" and compute their location for bodies of arbitrary shape, to understand the concepts of Area moments of Inertia, Mass Moment of Inertia.
CO4:	Illustrate the laws of motion, kinematics of motion and their inter relationship.
CO5:	Able to determine basic dynamics concepts - the Work-Energy principle, Impulse-Momentum principle and to understand the concepts of Equations for Translation, D'Alembert's principle in rotation.

Syllabus:

UNIT – I

INTRODUCTION TO ENGINEERING MECHANICS – BASIC CONCEPTS.

Systems Of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction.

UNIT- II

EQUILIBRIUM OF SYSTEMS OF FORCES: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

UNIT – III

CENTROID: Centroids of simple figures (from basic principles) – Centroids of Composite Figures.

CENTRE OF GRAVITY: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappus theorem.

AREA MOMENTS OF INERTIA: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT –I V

KINEMATICS: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

KINETICS: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – V

WORK – ENERGY METHOD: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Text Books:

1. Engineering Mechanics statics and dynamics:A Nelson , McGraw Hill publications
2. Engineering Mechanics, S S Bhavikatti, New Age International Publications

References:

1. Engineering. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , McGraw Hill publications.
2. Engineering Mechanics: Basudeb Bhattacharyya, Oxford University Press
3. Engineering Mechanics: statics and dynamics – I.H.Shames, – Pearson Publ.
4. Engineering Mechanics, Tayal A.K. (2010) Umesh Publications
5. Engineering Mechanics,Khurmi R.S. (2010), S. Chand & Co.

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

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

Course Objectives the course aims

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	communicate confidently in English in social and professional contexts with improved skills of fluency and accuracy
CO2:	speak grammatically correct sentences employing appropriate vocabulary suitable to different contexts
CO3:	read for various scholarly materials for information and comprehension

Syllabus:

UNIT1: ARGUMENTATIVE SKILLS

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

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

UNIT 2: PRESENTATION SKILLS

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

UNIT 3: CO-ORDINATING SKILLS-

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

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

UNIT 4: INTERVIEW SKILLS-industry readiness

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

Speaking: Mock Interviews-Interview etiquette

UNIT 5: PROFESSIONAL COMPETENCE

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

Speaking: speech presentation.

Suggested Text Book: INTERACT by Orient Black Swan

SOFTWARE: Train to Success series and Speak Well

References book: Infotech English, Maruthi Publications.

Web Resources:

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

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. I Sem (1 semester)			
CourseCode	Engineering Physics Laboratory (Civil, Mechanical, Mining and Automobile)				
Teaching	Total contact hours- 48	L	T	P	C
		-	-	3	3

Course Objective

Physics Curriculum is re-oriented to the needs of Civil, Mechanical, Mining and Automobile branches of graduate engineering courses that serve as a transit to understand the specific advanced topics.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	To estimate the mechanical properties of materials and determine moment of inertia of a flywheel
CO2:	To compare heat transfer in different material
CO3:	To determine thermal conductivity of good and bad conductors
CO4:	To measure the elastic constants of the material

List of Physics Experiments

1. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
2. Moment of inertia by Flywheel
3. Hooke's Law experiment
4. To verify laws of vibration using Sonometer
5. To determine the acceleration due to gravity using Compound Pendulum
6. To determine the thermal conductivity of a bad conductor by Lee's disc method
7. Determination of velocity of sound – Volume Resonator
8. Study of Weight Measurement by using Strain Gauge
9. Thermal expansion of solids – bimetallic strip

References

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

Web Links:

1. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=354&cnt=1

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:

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	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

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

Course Objective(s):

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

Course Outcomes:
On completion of the course, the students will be able to-
CO-1. Know concepts in problem solving.
CO-2. Analyze a problems and Implement programs in C language.
CO-3. Work with arrays, pointers and structures.
CO-4. Apply functions concepts for problem solving.
CO-5. Implement FILE operations for storage purpose.

Programs:

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) Prjnt the multiplication table of a given number n up to a given value, where n is entered by the user.
   b) Enter a decimal number, and calculate and display the binary equivalent of that number.
   c) Enter a binary number, and calculate the decimal equivalent of that number.
7. Write a C program to
   a) Interchange the largest and smallest numbers in the array.
   b) Implement a linear search.
   c) Implement binary search.
8. Write a C program to
   a) Examples which explore the use of structures, union and other user defined variables.
   b) Declare a structure for calculating the percentage achieved by 3 students, by considering the structure elements as name, pin no, mark1, mark2, mark3.
9. Write C Programs
   a) For the following string operations without using the built in functions to
      i. length of a string
      ii. reverse a string
      iii. append a string to another string
      iv. compare two strings
   b) Write a C Programs to check whether the given string "MADAM" is palindrome or not without using the built in functions.
10. Write a C program
    a) Use functions to perform the following operations:
       i. To insert a sub-string in to given main string from a given position.
       ii. To delete n Characters from a given position in a given string.

b) To replace a character of string either from beginning or ending or at a specified location

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

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

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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 MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. II Sem (2 semester)			
Course Code	**Engineering Workshop**				
Teaching	Total contact hours – 48	L	T	P	C
Prerequisite(s) : Aptitude to learn .		0	0	3	1.5

Course Outcomes:

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

List of Experiments:

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

1. Carpentry
   1. T-Lap Joint
   2. Cross Lap Joint
   3. Dovetail Joint
   4. Mortise and Tenon Joint
2. Fitting
   1. Vee Fit
   2. Square Fit
   3. Half Round Fit
   4. Dovetail Fit
3. Black Smithy
   1. Round rod to Square
   2. S-Hook
   3. Round Rod to Flat Ring
   4. Round Rod to Square headed bolt
4. Tin Smithy
   1. Taper Tray
   2. Square Box without lid
   3. Open Scoop
   4. Funnel
5. House wiring
   1. Ordinary bulb connection

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2. Staire case connection
3. Parallelconnection
4. Series connection

Workshop Manual is to be given

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

CO-PO Mapping:

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)				
	MATHEMATICS-III (COMMON TO CE, ME, AME and MM)	II B.Tech. I Sem (3rd semester)			
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Derivatives, integration and complex numbers		3	-	-	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:	Demonstrate the knowledge of continuity, analytic and C-R equations of complex function, evaluate Taylor and Laurent series and apply Cauchy residue theorem
CO2:	Understand properties of Laplace and inverse Laplace transformations, apply to solve differential equations
CO3:	Evaluate Fourier series for different functions
CO4:	Understand properties of Fourier transformation apply for different function
CO5:	Classify nature of pde's and solve boundary value problems

Syllabus:

Unit I: Complex Variables

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

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

Unit II: Laplace Transforms

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

Unit III: Fourier Series

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

Unit IV: Fourier Transforms
Fourier integrals, Fourier sine and cosine integrals, Fourier transform, sine and cosine transforms, properties, convolution theorem.

Unit V: Applications of Partial Differential Equations
Method of separation of variables, Classification of second order partial differential equations, solution of 1D-wave, 1D-heat and 2D-Laplace's equation in Cartesian coordinates.

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.
5.

Web Links:

1. https://nptel.ac.in/courses/111103070/
2. https://nptel.ac.in/courses/111/106/111106084/
3. https://nptel.ac.in/courses/111/106/111106046/
4. https://nptel.ac.in/courses/111105093/

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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

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. III Sem (3 semester)			
Course Code	**Metallurgy & Material Science**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Engineering Physics and Engineering Chemistry		3	0	0	3

Course Objective: To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Demonstrate the knowledge of science and fundamentals of materials.
CO2:	Describe the regions of stability of phases that occur in the alloy systems.
CO3:	Able to classify steels and cast Irons with applications.
CO4:	Able to select heat treatment methods and non-ferrous materials.
CO5:	Explain the concept of ceramics and composites.

Syllabus:

UNIT – I

Structure of Metals and Constitution of alloys: Bonds in Solids–Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT –II

Equilibrium Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloysystems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and Fe-Fe3C.

UNIT –III

Cast Iron and Steels: Classification of Cast Iron-Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron,Spheriodal graphite cast iron, Alloy cast irons.

Classification of steels- structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – IV

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe3C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys. Magnesium and its alloys

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UNIT – V

Ceramic: Crystalline ceramics, glasses, cermets, abrasive materials nano-materials.

Composites: Definition, properties and applications of the above. Classification of composites-particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites various methods of manufacturing of composites.

Text Books:

1. Introduction to Physical Metallurgy - Sidney H. Avener – McGrawHill
2. Material science and Engineering - V. Rahghavan

References:

1. Material Science and Metallurgy – Dr.V.D.kodgire.
2. Materials Science and engineering - Callister &Baalasubrahmanyam
3. Material Science for Engineering students – Fischer – Elsevier Publishers
4. Introduction to Material Science and Engineering – Yip-Wah Chung CRC Press
5. Material Science and Metallurgy – A V K Suryanarayana – B S Publications
6. Material Science and Metallurgy – U. C. Jindal – Pearson Publication
7. Material Science and Metallurgy for Engineers-Kodgire-Everest Publishing House

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. III Sem (3 semester)			
Course Code	**Mechanics of Solids**				
Teaching	Total contact hours – 62	L	T	P	C
Prerequisite(s) :	Engineering Mechanics .	2	1	0	3

Course Objective:

The objective of this course is to make the students understand the concept of stress and strain in different types of structure different loading conditions. The course also covers the simple and compound stresses due to forces, stresses an circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to internal pressure.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.
CO2:	Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings.
CO3:	Determine the deflections and rotations produced by the three fundamental types of loads: axial, torsional, and flexural.
CO4:	Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.
CO5:	Able to calculate the failure load of column and struts with different type of end condition.

Syllabus:

UNIT –I

SIMPLE STRESSES & STRAINS: Elasticity and plasticity – Types of stresses & strains–Hooke's law & Generalized Hook's law, Engineering stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars – Temperature stresses. Stresses on an inclined plane under different uniaxial and biaxial stress conditions. Principal planes and principal stresses – Concept of Mohr's circle.

UNIT -II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniform distributed load, uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

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FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections Solid and Hollow, I,T sections – Design of simple beam sections.

UNIT -III

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T sections.

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads & U.D.L. Mohr's theorems – Moment area method – application to simple cases including overhanging beams. Brief explanation of statistically indeterminate Beams and solution methods.

UNIT -IV

THIN CYLINDERS & SPHERES: Thin cylindrical vessels subjected to internal pressure, longitudinal and circumferential stresses & strains, Volumetric strains – changes in dimensions of thin cylinders – Thin spherical shells.

THICK CYLINDERS: Stresses in a thick cylindrical shell, lame's equation – cylinders subjected to inside & outside pressures – stress in compound thick cylinder.

UNIT –V

TORSION: Introduction- Derivation- Torsion of Circular shafts –Transmission of power by circular shafts, composite shafts.

COLUMNS & STRUTS: Buckling and stability, slenderness ratio, Failure of Columns & Struts, End conditions for long columns, effect of end conditions on column buckling, Expressions for crippling loads. Euler's theory of Columns, Rankine's Formula.

Text books:

1. Mechanics of materials- BC Punmia, Lakshmi Publications (P) LTD.
2. Strength of materials, S. Ramamrutham, Dhanpathrai Publishing Company

Reference Books:

1. Strength of materials by R.K.Bansal, Laxmi Publications .
2. Strength of materials by Bhavikatti, Lakshmi publications
3. Strength of materials by RK Rajput, S Chand publications.
4. Mechanics of materials- BC Punmia, Jain, Jain
5. Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
6. Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.

Web Links:

http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

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

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	I B.Tech. III Sem (3 semester)			
Course Code	**Kinematics of Machinery**				
Teaching	Total contact hours – 48	L	T	P	C
Prerequisite(s) :	Engineering Mechanics .	2	1	0	3

Course Objectives:

The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines. The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	To know about the degrees of freedom for a particular combination of linkages.
CO2:	Understand the working of different mechanisms.
CO3:	The kinematics of machines deals with the motion of members of the mechanisms which includes the determination of velocities and acceleration of the machine members.
CO4:	Analyse the motion of the cams and followers.
CO5:	Understand the motion of the component of the mechanisms automobile and gear trains.

Syllabus:

UNIT – I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .Gruebler's criteria , Grashoff's law , Degrees of freedom, Kutzbachcriterian for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversions of quadric cycle chain – single and double slider crank chains.

UNIT – II

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.
Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio; Hooke's Joint: Single and double – Universal coupling–application–problems.

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UNIT – III

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method - Four bar chain. Velocity and acceleration analysis of a given mechanism, Kleins construction - Determination of Corioli's component of acceleration.

Plane motion of body: Instantaneous center of rotation, centrodes and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – IV

CAMS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V

GEARS

Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

Gear Trains

Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epi cyclic gear trains. Selection of gear box-Differential gear for an automobile.

Text Books:

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines – S. S Rattan- TMH

References:

1. Theory of Machines Sadhu Singh Pearsons Edn
2. Theory of machines and Machinery /Vickers /Oxford .
3. Theory of Mechanisms and machines – A.Ghosh&A.K.Malik – East West Press Pvt. Ltd.
Popov Eger P., "Engg. Mechanics of solids", Prentice Hall, New Delhi, 1998.
4. .Theory of machines and Mechanisms – J. J. Uicker, G.R.Pennock & J.E. Shigley – Oxford publishers.

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CO1	3	-	-	-	-	-	3	-	-	-	-	
CO2	-	-	-	-	-	3	-	-	-	-	-	3
CO3	-	-	-	-	-	3	-	-	-	3	-	-
CO4	-	-	-	-	-	-	3	-	3	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	3

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. III Sem (3 semester)			
Course Code	**Thermodynamics**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Fundamentals of Engineering Thermodynamics		2	1	0	3

Course Objective:

- Familiarize concepts of heat, work, energy and governing rules for conversion of one form to other.
- Explain relationships between properties of matter and basic laws of thermodynamics.
- Teach the concept of entropy for identifying the disorder and feasibility of a thermodynamic process.
- Introduce the concept of available energy for maximum work conversion.
- Familiarize steam properties to understand working of steam power plants.
- Provide fundamental concepts of thermodynamics cycles used in steam power plants, IC engines and gas turbines.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the importance of thermo dynamic properties related to conversion of heat energy into work.
CO2:	Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles.
CO3:	Utilize steam properties to design steam based components.
CO4:	Compare thermodynamic relations and air standard cycles.
CO5:	Applications of the thermo dynamics in Engineering.

Syllabus:

UNIT-I

INTRODUCTION: BASIC CONCEPTS: Concept of continuum, macroscopic and microscopic approach, thermodynamic systems - closed, open and isolated and surroundings, thermodynamic equilibrium: properties, state, path and process, quasi-static process, work, modes of work, laws of thermodynamics-Zeroth, first and Second Law. –concept of temperature and heat.

FIRST LAW OF THERMODYNAMICS: First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation. Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump , Parameters of performance, PMM I - Joule's Experiments.

UNIT -II

SECOND LAW THERMODYNAMICS: Kelvin's and Clausius statements and their equivalence, corollaries-PMM-II, Heat Engines, Refrigerator and Heat Pump, Coefficient of Performance, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature.

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ENTROPY: Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations ,Clausius Clapeyron equations, Joule Thomson coefficient, Elementary Treatment of the Third Law of Thermodynamics.

UNIT- III

PROPERTIES OF STEAM

Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Nonflow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes.

UNIT -IV

Deviations from perfect Gas Model – Vader Waals Equation of State – Compressibility charts – variable specific Heats, Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychrometric chart.

UNIT -V

AIRSTANDARD CYCLES: Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

REFRIGERATION CYCLES: Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

Text Books:

1. P.K.Nag, Engineering Thermodynamics, 5/e, Tata McGraw Hill, 2013.
2. J.B.Jones and G.A.Hawkins, Introduction to Thermodynamics, 2/e, John Wiley & Sons, 2012.

References:

1. Moran, Michael J. and Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, 3/e, Wiley, 2015
2. Claus Borgnakke Richard E. Sonntag, Fundamentals of Thermodynamics, 7/e, Wiley, 2009
3. R.K. Rajput, S.Chand& Co., Thermal Engineering, 6/e, Laxmi publications, 2010.
4. Yunus A. Cengel, Michaela A. Boles, Thermodynamics, 7/e, Tata McGraw Hill, 2011.

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. III Sem (3 semester)			
Course Code 19130306	**Fluid Mechanics & Hydraulic Machinery**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Engineering Mechanics		3	0	0	3

Course Objectives:

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

Course Outcomes:

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

Syllabus:

UNIT-I

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

UNIT-II

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

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

UNIT-III

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

BOUNDARY LAYER THEORY AND APPLICATIONS: Concepts of boundary layer, boundary layer

DEPARTMENT OF MECHANICAL ENGINEERING

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thickness and equations, momentum integral equation, boundary layer separation and its control, Cavitation. Circulation, Drag and lift on immersed bodies, Magnus effect.

UNIT-IV

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

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

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

UNIT-V

CENTRIFUGAL PUMPS: classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH. **RECIPROCATING PUMPS:** Working, Discharge, slip, indicator diagrams.

Text Books:

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

Reference Books:

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

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. III Sem (3 semester)			
Course Code	**Design Thinking and Innovation**				
Teaching	Total contact hours-42	L	T	P	C
Prerequisite(s):		2	0	0	0

Course Objectives:

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

Apply Design Thinking on the following Streams to

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

How To Pursue The Project Work?

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

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Tasks To Be Done:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

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

Task 3: Teams & Problems

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

Task 4: Empathizing

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

Task 5: Ideating

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

Task 6: Prototyping

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

Task 7: Testing

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

Task 8:

- Final Report Submission and Presentation

Note: The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

REFERENCES:

1. Tom Kelly, The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm (Profile Books, 2002)
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009)
3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017).

OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:

- Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
- Design Thinking Boot Camp Bootleg (Stanford D-School);

https://dschool.stanford.edu/resources/the-bootcamp-bootleg

- Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf
- Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech.I Sem (3 semester)			
Course Code	**Mechanics of Solids & Metallurgy lab**				
Teaching	Total contact hours-42	L	T	P	C
Prerequisite(s): Engineering Physics and Engineering Chemistry		0	0	3	1.5

Course Objective:

The students completing this course are expected to understand the testing methods to find the strength of different materials, microstructure of various materials.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Determine the Young's Modulus for ductile materials and analyze the various points on stress strain diagram. (Level 5)
CO2:	Analyze& compare the hardness values for various materials. (Level 4)
CO3:	Experiment on a spring to interpret the stiffness and shear modulus. (Level 3)
CO4:	Outline the concept of impact loading and to determine impact values for various materials. (Level 2)
CO5:	Compare the Micro structures of Ferrous & Non-Ferrous Alloys. (Level 1)

List of Experiments:

Any 6 experiments from each section A and B

(A) METALLURGY LAB:

1. To Study effect of carbon % on Micro Structure of different types of steels
2. To study the effects of heat treatment. (annealing, normalising, and hardening) on hardness and Microstructure of steels.
3. To Determine the grain size in given specimen of steels.
4. To Determine hardenability of steel specimen by Jominy End quench Test.
5. To Study the Micro structures of Non-Ferrous Alloy like Aluminum and brass.
6. To find out the hardness of various treated and untreated steels.

(B) MECHNICS OF SOLIDS LAB:

1. Tension test to determine the % elongation, % reduction in cross sectional area of the specimen.
2. Bending test

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a) Simple supported beam

b) Cantilever beam

3. Torsion test

4. Hardness test

a) Brinells hardness test

b) Rockwell hardness test

5. Test on springs

6. Compression test on cube

7. Impact test

a) Izod test

b) Charpy test

8. Double shear test

Lab Manual is to be given

CO-PO Mapping:

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. III Sem (3 semester)			
Course Code	**Fluid Mechanics & Hydraulic Machinery Lab**				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s): Engineering Mechanics		0	0	3	1.5

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

Course Outcomes:

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

List of Experiments:

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

Regulation GRBT-19 (effective from 2020-2021)	**Godavari Institute of Engineering & Technology (Autonomous)**	I B.Tech. II Sem (2nd semester)			
Course Code 19199201a	**PROBABILITY & STATISTICS** *CSE(AI&ML) and CSE (Cyber Security)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Knowledge of Mathematics at 10+2 , Basic Statistics with Reasoning ability		3	0	0	3

***Common to CSE**

Course Objective:

- Paraphrase a comprehensive set of descriptive statistical methods, in order to display data in a meaningful way.
- Integrate correlation analysis in order to estimate the nature and the strength of the linear relationship.
- Implement regression analysis to predict the value of one variable based on the value of the other variable.
- Exemplify probability theory in order to evaluate the probability of real world events.
- Apply discrete and continuous probability distributions to provide solutions for practical problems.
- Monitoring confidence interval estimates and hypotheses tests for population parameters.
- Execute comprehensive set of statistical tools in making practical decisions and creating reports in workplace situations; and in completing papers and research projects in other university and college courses.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Apply the knowledge of descriptive statistics and method of data science in practical engineering problems.
CO2:	Apply the Knowledge of Probability in practical Engineering problems.
CO3:	Demonstrate the knowledge of Probability distributions.
CO4:	Enhance knowledge in Sampling & Estimation techniques.
CO5:	Enhance Knowledge in Design of Experiments.

Syllabus:

Unit I: Descriptive Statistics and Methods for Data Science

Data science, Statistics Introduction, Population vs Sample, event, mutually exclusive, independent and exhaustive events. Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, regression lines.

UNIT II: Probability

Probability, axioms of probability, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT III: Probability Distributions

Probability distribution - Binomial, Poisson approximation to the Binomial distribution and Normal distribution-their properties.

UNIT 1V: Estimation and Testing of Hypothesis, Large Sample Tests

Estimation- parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

UNIT V: Small Sample Tests

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

Text Books:

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
3. Probability and statistics for Engineering and Scientists : Ronald E.Walpole, Sharon L.Mayers and Keying Ye:Pearson.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Web Links:

1. https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-151-probability-and-statistics-in-engineering-spring-2005/lecture-notes/
2. https://lecturenotes.in/subject/69/probability-and-statistics-ps
3. https://nptel.ac.in/courses/111105041/

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

Course Code	**Dynamics of Machinery**				
Teaching	Totalcontacthours-55	L	T	P	C
Prerequisite(s): Kinematics of Machinery		3	0	0	3

Course Objective:

The students completing this course are expected to equip the student with fundamental knowledge of dynamics of machines so thatstudent can appreciate problems of dynamic force balance, transmissibility of forces, isolation ofsystems, vibrations.Develop knowledge of analytical and graphical methods for calculating balancing of rotaryand reciprocating masses.Develop understanding of vibrations and its significance on engineering design.Develop understanding of dynamic balancing, flywheel analysis, gyroscopic forces andmoments.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze stabilization of sea vehicles, aircrafts and automobile vehicle. (Analyze)
CO2:	Compute frictional losses, torque transmission of mechanical systems (Compute)
CO3:	Analyze and design the flywheels and governors (Analyze).
CO4:	Estimate the unbalanced forces in reciprocating and rotary masses (Estimate).
CO5:	Understand free and forced vibrations of single degree freedom systems (Understand).

Syllabus:

UNIT–I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motorcycle, aeroplanes and ships.

UNIT–II

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis, lubricated surfaces, boundary friction, film, lubrication.

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.

BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle.General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission,

UNIT–III

TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams–fluctuation of energy–flywheels and their design.

GOVERNERS: Watt, Porter and Proellgovernors, Springloadedgovernors–HartnellandHartungwithauxiliary springs. sensitiveness, isochronism and hunting.

UNIT– IV

BALANCING: Balancing of rotating massessingleandmultiple–single and differentplanes,use of analyticalandgraphicalmethods. Primary, secondary, andhigherbalancingofreciprocatingmasses.Analyticalandgraphical methods, unbalancedforcesandcouples – examinationof"V" multicylinderinlineandradialenginesforprimary and secondarybalancing,locomotivebalancing, hammerblow,swayingcouple,variationoftractiveeffort.

UNIT–V

VIBRATIONS: Free vibration of spring mass system – oscillation of pendulums, centres of oscillation and suspension, transverse loads, vibrations of beams with concentrated and distributed loads.Dunkerly'smethods,Raleigh'smethod,whirlingofshafts,criticalspeeds,torsionalvibrations, two and three rotor systems. Introduction to damped and forced vibrations.

Text Books:

1. TheoryofMachines,"S.SRatan,Mc.GrawHillPubl.
2. Theory of Machines, "Thomas Bevan,. CBS Publishers

References:

1 Theoryof Machines,-Khurmi, S.Chand publications

Useful Web-links: http://nptel.ac.in/courses.php

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CO4	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	2	-	-	-	-	-

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**Thermal Engineering-I**				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s):	Basic knowledge of Thermodynamics.	3	0	0	3

Course Objective:

1. Understand ideal and air standard vapor cycle and evaluate the performance in open systems like steam power plant, gas turbine etc.
2. Analyse different air standard cycles specifically related to IC engines and solve problems on the intricacies of performance of the cycle.
3. Understand the direction law and concept of entropy increase of the universe.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyse all the thermodynamic relations of IC Engines & Air Compressors
CO2:	Classify various types of IC Engines, Air compressors & cycle of operations
CO3:	Demonstrate the effect of various operating variables on engine performance
CO4:	Estimate performance and various efficiencies of IC Engine & Air compressors
CO5:	Design and evaluate performance and various efficiencies of IC Engine & Air compressors.

Syllabus:

UNIT – I

I. C. ENGINES: Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankle engine, principles of supercharging and turbo charging.

UNIT – II

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

UNIT – III

Combustion in S.I. Engines: Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Combustion in C.I. Engines: Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

Measurement, Testing and Performance: Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT – IV

COMPRESSORS: Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating Compressors: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

UNIT -V

Rotary Compressors (Positive displacement type): Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency.

Text Books:

1. I.C. Engines / V. GANESAN- TMH
2. Heat engines, Vasandani & DS Kumar, Metropoliton Book Company, New Delhi

References:

1. IC Engines – M.L.Mathur & R.P.Sharma – DhanpathRai & Sons.
2. I.C.Engines–Applied Thermosciences–C.R.Ferguson&A.T.Kirkpatrick-2 nd Edition-Wiley Publ
3. I.C. Engines - J.B.Heywood /McGrawHIll.
4. Thermal Engineering – R.S.Khurmi & J.S.Gupta- S.chandPubl Useful

Web Links:

1.http://nptel.ac.in/courses.php http://mit.espe.edu.ec/courses/mechanical-engineering/

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY
((AUTONOMOUS)
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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**Production Technology**				
Teaching	Total contact hours – 48	L	T	P	C
Prerequisite(s):	Metallurgy and Material Science, Engineering Workshop	3	0	0	3

Course Objectives:

To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the fundamentals of manufacturing process.
CO2:	To gain knowledge in manufacturing techniques like casting, welding, forging etc.
CO3:	Apply principles of production techniques and be able to fabricate basic parts.
CO4:	Understand the principles of forming techniques to fabricate rolled parts
CO5:	Apply the principles of plastic processing to fabricate plastic parts.

Syllabus:

UNIT – I

CASTING: Steps involved in making a casting, Advantage of casting and its applications, Patterns and Pattern making, Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems.

UNIT – II

Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Casting design considerations, principle and applications of Permanent mould casting, Centrifugal casting, Die casting and Investment casting,
Continuous casting.

UNIT – III

Welding: Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Gas cutting.Principles of Arc welding, Manual metal arc welding, Carbon arc welding, Sub merged arc welding, Inert Gas welding- TIG & MIG welding.
Resistance welding, Solid state welding processes- Friction welding, Friction stir welding, Forge welding, Explosive welding, Thermit welding, Plasma welding, Laser welding, Electron beam welding, Soldering & Brazing.Heat affected zones in welding, Weldability of metals, welding defects – causes and remedies, Destructive and non-destructive testing of welds, Design of welded joints.

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

UNIT – IV

Plastic deformation of metals and alloys, Hot working and Cold working, Strain hardening and Annealing.

Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects, Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion characteristics, Types of extrusion, Impact extrusion, Hydrostatic extrusion, Drawing-Wire drawing, Deep Drawing and Tube drawing.

Introduction to powder metallurgy – compaction and sintering, advantages and applications.

UNIT – V

Sheet metal forming - Blanking and piercing, Forces and power requirement, stretch forming, Bending, Bending, Springback, Coining, Spinning, Types of presses and press tools.Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods, Blow and Injection moulding.

Text Books:

1. Manufacturing Processes for Engineering Materials - Kalpakjian S and Steven R Schmid- Pearson Publ , 5th Edn.
2. Manufacturing Technology -Vol I- P.N. Rao- TMH

References :

1. Manufacturing Science – A.Ghosh&A.K.Malik – East West Press Pvt. Ltd
2. Process and materials of manufacture- Lindberg- PHI
3. Production Technology- R.K. Jain- Khanna
4. Production Technology-P C Sharma-S. Chand
5. Manufacturing Processes- H.S. Shaun- Pearson
6. Manufacturing Processes- J.P. Kaushish- PHI
7. Fundamentals of Modern Manufacturing - Mikell P Groover- Wiley publ – 3rd Edition

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

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

Course Objective:
The objective of this course is:

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.*

Course Outcomes:

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

Syllabus:

Unit – I
Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.
Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000.

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

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

Unit – III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.
Separation and Transformation of Solid Waste: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

Unit – IV

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

Unit – V

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

Text Books:

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

References:

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

Web References:

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

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**UTILIZATION OF ELECTRICAL ENERGY (Open Elective-I)**				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic electrical engineering		3	0	0	3

Course Objective:

1. To Identify most appropriate heating or welding techniques for suitable applications
2. To understand various level of luminosity produced by different illuminating sources
3. To identify a suitable motor for electric drives and industrial applications
4. To Plot speed-time curves for different services.
5. To Understand Specific energy consumption

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:	Plot speed-time curves dfor different services.
CO5:	Understand Specific energy consumption

Syllabus:

UNIT – I

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

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

UNIT – II

Illumination Fundamentals: Introduction, terms used in illumination–Laws of illumination–Polar curves– Integrating sphere–Lux meter–Sources of light

Various Illumination Methods: Discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting.

UNIT – III

Selection of Motors: Choice of motor, type of electric drives, starting and running characteristics– Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

UNIT – IV

Electric Traction – I: System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves.

UNIT – V

Electric Traction – II: Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking retardation adhesive weight and coefficient of adhesion– Principles of energy efficient motors.

Text Books:

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

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1996.

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

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

Course Objectives:

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

Course Outcomes:

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

Syllabus:

UNIT-1 Fundamental of IoT

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

UNIT-2 Communication Protocols for IoT

Wired Communication Protocols:

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

Wireless Communication Protocols:

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

UNIT-3 Threats, Security, Privacy and IoT Cloud

IoT as Interconnection of Threats:

Phase attach, Attack as per Architecture, Attach based on Components.

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

Mitigating to Privacy Concern:

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

IOT Cloud:

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

Case Study: ThingSpeak Cloud, Blynk Cloud, MQTT Cloud

UNIT-4 Measurement Errors and Sensors

Measurement Errors:

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

Sensors and Transducers:

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

UNIT-5: Development Platform: Hardware, Software, Programming Language
Hardware:
Arduino Uno Board, NodeMCU Board
Software Tools:
Arduino IDE, Compilers, Cross-Compilers, Linkers, Libraries, Debuggers, Simulators, Emulators, Serial Monitor, Intel Hex File and Motorola Hex File Format.
Programming Language:
Arduino Programming Structure, Data Types, Operators, Control Statements (IF, IF-ELSE, WHILE, DO-WHILE, FOR, SWITCH-CASE, SWITCH-CASE-BREAK, SWITCH-CASE-CONTINUE) and Precompiled Functions.

Case Studies:
Home Automation, Agriculture 3.0, Health Care, Industry 4.0

Text books:

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

Course Objective(s):

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

Course Outcome(s):

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

CO-1: Describe the general architecture of computers

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

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

UNIT-1

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

UNIT-2

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

UNIT-3

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

UNIT-4

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

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

UNIT-5

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

Text Books

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

Reference Books

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

Web References:

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

CO-PO Mapping:

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

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

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

Course Objective:

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

Course Outcomes:

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

Syllabus:

UNIT –I

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

UNIT –II

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

UNIT –III

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

UNIT -IV

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

UNIT -V

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

Text books:

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

Reference Books:

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

Web Links:

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

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech2 ndSem (4 semester)			
CourseCode XXXXX	OPEN ELECTIVE BASIC AUTOMOBILE ENGINEERING				
Teaching	Totalcontacthours-50	L	T	P	C
Prerequisite(s): principles		3	0	0	3

Course Objectives:

To make the student able to

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

Course Outcomes:

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

UNIT-I

Introduction to Automobiles & Engines:

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

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

UNIT-II

Transmission Systems:

Clutches, principle of operations, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel-gear boxes, types, sliding mesh, constant mesh, 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-III

Control Systems:

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

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

UNIT-IV

Auxiliary Systems:

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

UNIT-V

Vehicle Safety Systems & Eco Friendly Systems and Vehicles:

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

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

TEXT BOOKS:

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

REFERENCES:

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

CO-PO Mapping:

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

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

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**Computer Aided Machine Drawing**				
Teaching	Total contact hours – 42	L	T	P	C
Prerequisite(s): Engineering Drawing		1	0	3	2.5

Course Objective:

Students will able to understand the CAD software and can model simple to complex machine elements.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Demonstrate the conventional representations of materials and machine components (Understanding).
CO2:	Model riveted, welded and key joints using CAD system.. (Applying).
CO3:	Create solid models and sectional views of machine components (Creating).
CO4:	Translate 3D assemblies into 2D drawings(Understanding)
CO5:	Create manufacturing drawing with dimensional and geometric tolerances(Creating).

Syllabus:

UNIT – I

The following contents are to be done by any 2D software package

Conventional representation of materials and components:

Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint, bolted joint with washer and locknut, stud joint, screw joint.

Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted , double riveted double strap joints.

Welded joints: Lap joint and T joint with fillet, butt joint with conventions.

Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key.

Shaft coupling, bushed pin-type flange coupling, universal coupling, Oldhams' coupling.

UNIT -II

The following contents to be done by any 3D software package

Sectional views

Creating solid models of complex machine parts and create sectional views.

Assembly drawings: (Any four of the following using solid model software)

Lathe tool post, tool head of shaping machine, tail stock, machine vice, gate valve, carburettor, piston, connecting rod, excentric, screw jack, plumber block, axle bearing, pipe vice, clamping device, Geneva cam, universal coupling.

Manufacturing drawing:

Representation of limits, fits and tolerances for mating parts. Use any four parts of above assembly drawings and prepare manufacturing drawing with dimensional and geometric tolerances.

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DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Text books:

1. Machine Drawing –K.L.Narayana, P.Kannaiah& K. Venkata Reddy - New Age Publications.
2. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex

Reference Books:

1. Machine Drawing – N.Siddeswar, K.Kannaiah&V.V.S.Sastry - TMH
2. Machine Drawing – Ajeeth Singh, McGraw Hill
3. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex
4. Engineering Drawing and Graphics using Auto Cad – T Jeyapoovan, vikas
5. Machine Drawing – Dhawan, S.Chand Publications
6. Engineering drawing by N.D Bhatt , Charotar publications
7. Machine Drawing-VijayaBhaskar Reddy, R. Rajesh and R. Suresh – Falcon Publications

Web Links:

1.http://nptel.ac.in/courses.php
2.http://mit.espe.edu.ec/courses/mechanical-engineering/

CO-PO Mapping:

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

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**Thermal Engineering Lab**				
Teaching	Total contact hours – 42	L	T	P	C
Prerequisite(s): Basic knowledge of Thermo Dynamics and Thermal Engineering-I.		0	0	3	1.5

Course Objective: To impart practical exposure to the student on the performance evaluation methods of various types of internal combustion engines and compressors.

Course Outcomes:

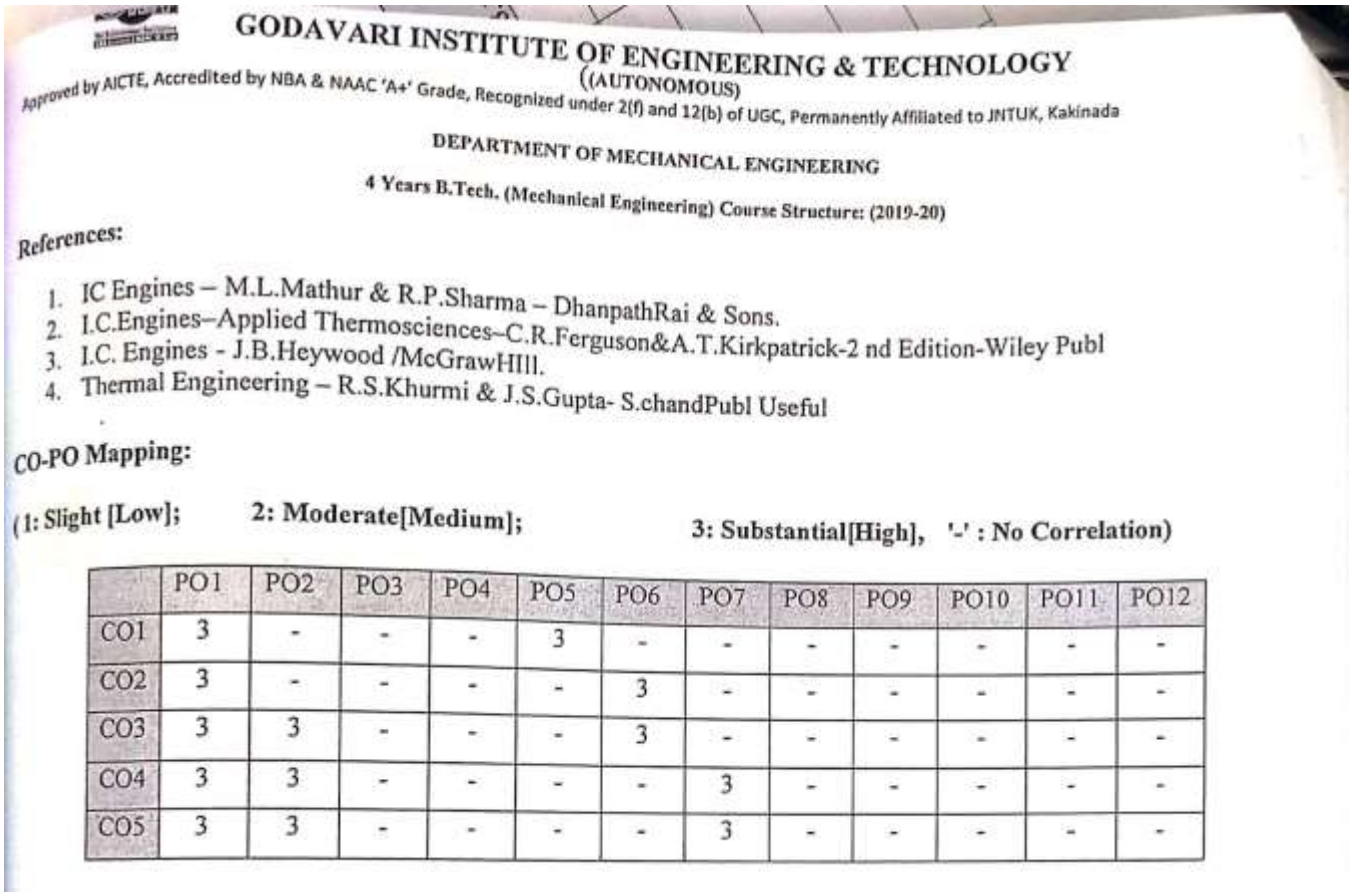
On Completion of the course, the students will be able to-	
CO1:	The student will be able to calculate the various efficiencies, various horse powers and energy balance for several types of Internal Combustions Engines and compressors.
CO2:	Classify various types of IC Engines, Air compressors & cycle of operations
CO3:	Demonstrate the effect of various operating variables on engine performance
CO4:	Estimate performance and various efficiencies of IC Engine & Air compressors
CO5:	Design and evaluate performance and various efficiencies of IC Engine & Air compressors.

List of Experiments:

1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test (4 -stroke diesel engines)
3. I.C. Engines performance test on 2-stroke petrol.
4. Evaluation of engine friction by conducting morse test on 4-stroke multi cylinder petrol engine.
5. Determination of FHP by retardation and motoring test on IC engine.
6. I.C. Engines heat balance.
7. Economical speed test of an IC engine.
8. Performance test on variable compression ratio engines.
9. Performance test on reciprocating air compressor unit.
10. Study of boilers
11. Dis-assembly / assembly of Engines.
12. Find out properties of fuel (Flash point, Fire point, Viscosity, Calorific value etc).
13. Determine COP of Refrigeration test rig.
14. Determine COP and tonnage capacity of Air conditioning test rig.

Text Books:

1. I.C. Engines / V. GANESAN- TMH
2. Heat engines, vasandani& Kumar publications Thermal



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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

References:

1. IC Engines – M.L.Mathur & R.P.Sharma – DhanpathRai & Sons.
2. I.C.Engines–Applied Thermosciences–C.R.Ferguson&A.T.Kirkpatrick-2 nd Edition-Wiley Publ
3. I.C. Engines - J.B.Heywood /McGrawHIll.
4. Thermal Engineering – R.S.Khurmi & J.S.Gupta- S.chandPubl Useful

CO-PO Mapping:

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

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

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 semester)			
Course Code	**Production Technology Lab**				
Teaching	Total contact hours – 42	L	T	P	C
Prerequisite(s): Engineering Workshop and Production Technology		0	0	3	1.5

Course Objective: To impart hands-on practical exposure on manufacturing processes and equipment.

Minimum of 12 Exercises need to be performed.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand the fundamentals of pattern making, molding process.
CO2:	To gain knowledge in manufacturing techniques like casting, welding, forging etc.
CO3:	Apply principles of production techniques and be able to fabricate basic parts.
CO4:	To gain knowledge of forming techniques to fabricate rolled parts
CO5:	Apply the principles of plastic processing to fabricate plastic parts.

List of Experiments:

I. METAL CASTING:

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - for strength and permeability
3. Mould preparation, Melting and Casting
4. CO2 Core making process

II. WELDING:

1. Gas welding
2. Gas cutting
3. Manual metal arc welding - Lap & Butt Joints
4. TIG Welding
5. MIG Welding
6. Resistance Spot Welding
7. Brazing and soldering

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DEPARTMENT OF MECHANICAL ENGINEERING
4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

III METAL FORMING AND POWDER METALLURGY:

1. Blanking & Piercing operations and study of simple, compound and progressive dies.
2. Deep drawing and extrusion operations.
3. Bending and other operations
4. Basic powder compaction and sintering

IV PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

Text Books:

1. Manufacturing Processes for Engineering Materials - Kalpakjian S and Steven R Schmid- Pearson Publ , 5th Edn.
2. Manufacturing Technology -Vol I- P.N. Rao- TMH
3. Fundamentals of Modern Manufacturing - Mikell P Groover- Wiley publ – 3rd Edition

References :

1. Manufacturing Science – A.Ghosh&A.K.Malik – East West Press Pvt. Ltd
2. Process and materials of manufacture- Lindberg- PHI
3. Production Technology- R.K. Jain- Khanna
4. Production Technology-P C Sharma-S. Chand
5. Manufacturing Processes- H.S. Shaun- Pearson
6. Manufacturing Processes- J.P. Kaushish- PHI

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} Semester)			
Course Code	**Design of Machine Members**				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): Engineering Mechanics, Mechanics of Solids.		2	1	0	3

(Use of approved design data book is permitted in the end semester examination)

Course Objectives:

- To learn about the basic stresses in machine elements and manufacturing considerations in Machine design.
- To learn about the strength of various machine elements.
- To learn about the design of riveted and welded and bolted joints of machine components.
- To learn about the design principles in the cotter joints and levers.
- To learn about the design and various application of springs.

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Describe the concepts of basic machine elements.
CO2:	Identify the preferred sizes, codes and selection of proper material for design of machine element
CO3:	Design the machine element under static and dynamic loading conditions.
CO4:	Choose the temporary and permanent joints required to assemble the machine elements.
CO5:	Suggest the required spring for the given application.

Syllabus

UNIT-I

INTRODUCTION: General considerations in the design, Engineering Materials and their properties – Selection –Manufacturing considerations in design, tolerances and fits –BIS codes of steels.

STRESSES IN MACHINE MEMBERS: Simple stresses – Combined stresses – Torsional and bending stresses – Impact stresses – Stress strain relation – Various theories of failure – Factor of safety – Design for strength and rigidity – Preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations.

UNIT-II

STRENGTH OF MACHINE ELEMENTS: Stress concentration – Theoretical stress concentration factor– Fatigue stress concentration factor– Notch sensitivity – Design for fluctuating stresses – Endurance limit – Good man's line – Soderberg's line – modified Good man's line.

UNIT- III

RIVETED JOINTS: Types of riveted joints, Design of riveted joints, Boiler shell riveting, eccentric loading.

WELDED JOINTS: Design of transverse and parallel fillet welded joints. Eccentric loading of welded joints.

UNIT- IV

BOLTED JOINTS: Forms of Screw threads, Stresses in Screw fasteners, Design of bolts with pre-stresses – Design of joints under eccentric loading

COTTER AND KNUCKLE JOINTS: Cotter joints-Socket and spigot, Sleeve and cotter, Jib and cotter joints- Knuckle joints.

UNIT- V

MECHANICAL SPRINGS: Stresses and deflections of helical springs – extension -compression springs– Springs for fatigue loading, energy storage capacity – Helical torsion springs – Co-axial springs, leaf springs.

LEVERS: Design of levers – Hand levers-Foot lever – Cranked lever – Bell cranked lever of a lever safety loaded valve- rocker arm.

Text Books:

1.V.B. Bhandari, Machine Design of Machine Elememts, 4/e, Tata McGraw Hill, 2017.
2.Norton, R. L., Machine Design: An Integrated Approach, 5/e, Pearson, 2013.
3.Faculty of Mechanical Engineering, Design Data: Data Book of Engineers, PSG College of Engineering, 2012

References:

1.R.S. Khurmi and J. K. Gupta, Machine design, 25/e, S.Chand Publishers, 2014.
2.T.V. Sundaramoorthy& N.Shanmugam, Machine Design, 6/e, SciTech Publishers, 2010.
3.Shigley, J.E and Mischke, C. R. Mechanical Engineering Design, 8/e, Tata McGraw Hill, 2008.
4.Design data hand book, S. Md. Jalaludeen.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Thermal Engineering-II**				
Teaching	Total contact hours-62	L	T	P	C
Prerequisite(s): Fundamentals of Engineering Thermodynamics		2	1	0	3

Course Objectives:

- To investigate thermodynamic analysis of steam power plants and various methods to improve efficiencies.
- To predict various types of boilers and their performance.
- To name various types nozzles and condensers and to find their efficiencies.
- To examine the performance evaluations of various Turbines.
- To investigate and analyse performances of various systems such as gas turbines, jet and rocket propulsion.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze the thermal power plants and different methods to improve plant efficiency.
CO2:	Evaluate the performance of various steam nozzles.
CO3:	Examine various efficiencies of Condensers and steam turbines.
CO4:	Discuss gas turbines working principle and different methods to improve thermal efficiencies of gas turbines.
CO5:	Choose optimal parameters of jet propulsion units.

Syllabus:

UNIT–I

BASIC CONCEPTS: Carnot cycle - Rankine cycle-schematic layout- Thermodynamic analysis- Concept of mean temperature of heat addition-Methods to improve cycle performance– Regeneration &reheating. combustion: fuels and combustion-Concepts of heat of reaction-Adiabatic flame temperature-Stoichiometry-Fluegas analysis.

UNIT-II

BOILERS: Classification – Working principles of water tube and fire tube boilers with sketches– Mountings and accessories– Working principles-boiler horse power- equivalent evaporation-Efficiency and heat balance– Draught- Classification– Height and diameter of chimney for given draught and discharge-Condition for maximum discharge-Efficiency of chimney– Artificial draught, induced and forced.

UNIT–III

STEAM NOZZLES: Function of a nozzle – Applications- types-Flow through nozzles-Thermodynamic analysis– Assumptions- Velocity of fluid at nozzle exit- Ideal and actual expansion in a nozzle-Velocity coefficient-Condition for maximum discharge-Critical pressure ratio-Criteria to decide nozzle shape: Super saturated flow- Its effects, degree of super saturation and degree of under cooling-Wilson line.

STEAM TURBINES: Classification – Impulse turbine; mechanical details – Velocity diagram – Effect of friction – Power developed, axial thrust, blade or diagram efficiency – Condition for maximum

efficiency. De-Laval turbine - Methods to reduce rotor speed- Velocity compounding, pressure compounding and velocity & pressure compounding, velocity and pressure variation along the flow – Combined velocity diagram for a velocity compounded impulse turbine-Condition for maximum efficiency.

UNIT-IV

REACTION TURBINE: Mechanical details– Principle of operation, thermodynamic analysis of a stage and degree of reaction– Velocity diagram– Parson's reaction turbine– Condition for maximum efficiency– Calculation of blade height.

STEAM CONDENSERS: Requirements of steam condensing plant– Classification of condensers– Working principle of different types– Vacuum efficiency and condenser efficiency – Air leakage, sources and its affects- Air pump- Cooling water requirement.

UNIT–V

GAS TURBINES: Simple gas turbine plant–ideal cycle- Essential components– Parameters of performance– Actual cycle– Regeneration, inter cooling and reheating – Closed and semi- Closed cycles– Merits and demerits-Types of combustion chambers.

JET PROPULSION: Principle of operation– Classification of jet propulsive engines– Working principles with schematic diagrams and representation on T-s diagram - Thrust, thrust power and propulsion efficiency– Turbo jet engines– Needs and demands met by turbojet– Schematic diagram, thermodynamic cycle, performance evaluation andthrust augmentation– Methods.

Text books:

1. Thermal Engineering by RK Rajput Laxmi publications (P) LTD, Tenth Edition, 01 January 2018 .
2."Thermal Engineering"-P.L.Bellaney, Khanna publishers, Fifth Edition.
3. "Gas Turbines"–V.Ganesan,TMH, Forth Edition, 01 July 2017

References:

1." Gas Turbines and Propulsive Systems", P.Khajuria & S.P.Dubey, Dhanpatrai
2." Thermal Engineering",R.SKhurmi, JSGupta,S.Chand.
3." Thermal Engineering",M.L.Marthur&Mehta,Jainbros

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Metal Cutting & Machine Tools**				
Teaching	Total contact hours–60	L	T	P	C
Prerequisite(s): **Material Science, Strength of Materials**		3	0	0	3

Course Objectives:

- The course provides students with fundamental knowledge and principles in material removal processes.
- To demonstrate the fundamentals of machining processes and machine tools.
- To develop knowledge and importance of metal cutting parameters.
- To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms
- Train in knowing the fundamental parts of various machine tools and their kinematic schemes.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the cutting tool geometry, chip formation and cutting forces.
CO2:	Describe the various parts and operations of machine tools viz. lathe, shaper, planer, drilling, boring, milling, grinding and broaching machine.
CO3:	Identify various machine tools viz. lathe, shaper, planer, drilling, boring, milling and grinding machine for various applications.
CO4:	Discuss various principles and applications of jigs and fixtures .
CO5:	Explain the working principles of various Non Traditional Machining.

Syllabus:

UNIT-I

FUNDAMENTALS OF MACHINING: Elementary treatment of metal cutting theory – Elements of cutting process – Geometry of single point tool, tool signature, chip formation and types of chips – Built up edge and its effects - Chip breakers, mechanics of orthogonal cutting – Merchant's circle, cutting forces, cutting speed, feed, depth of cut, metal removal rate, tool life, heat generation in metal cutting, coolants, tool materials, machinability, economics of metal cutting.

UNIT –II

LATHE MACHINES: Engine lathe – Working principle, specification of lathe – Types of lathe – Work holders and tool holders –Lathe operations- Problems on taper turning and thread turning, lathe attachments, constructional features of speed gear box and feed gear box. Turret and Capstan lathes - Tool layout. Principal features of automatic lathes – Classification – Single spindle and multi-spindle automatic lathes – Tool layout.
SHAPING, SLOTTING AND PLANING MACHINES: Working principle– Principal parts – Specifications, Operations performed, Machining time calculations**.**

UNIT – III

DRILLING AND BORING MACHINES: Working principle, specifications, types, operations performed – Tool holding devices – Twist drill– Deep hole drilling machine - Boring Machines – Fine Boring Machines – Jig boring machine,**..**

MILLING MACHINES: Working principle – Specifications – Classification of milling Machines – Principal features of horizontal, Vertical and universal milling Machine, Machining operations, types of cutters, geometry of milling cutters – Methods of indexing - Accessories of milling machines.

UNIT –IV

FINISHING PROCESSES: Theory of grinding – Classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines - Types of abrasives, specification and selection of a grinding wheel. Dressing and truing of grinding wheels, Lapping, Honing.

JIGS & FIXTURES: Principles of jigs and fixtures design - Classification of jigs & fixtures, principles of location and clamping, types of clamping devices.

UNIT - V

Introduction to Non Traditional Machining:

Classification of machining processes, Principle, Applications, Advantages and disadvantages of Ultra Sonic Machining (USM), Abrasive Jet Machining (AJM), Electrochemical machining (ECM), , Electro Discharge Machining (EDM), Electron Beam Machining (EBM), Laser Beam Machining (LBM), Plasma Arc Machining(PAM).

Text Books:

1."A Course in Workshop Technology", B.S. Raghu Vamshi, Dhanpat Rai & Co., Vol. II, 10th Ed., 2012.
2."Production Technology: Manufacturing Processes, Technology and Automation", R.K. Jain, Khanna Publishers, 6th ed., 2004.
3. Machining Technology: Machine Tools and Operations Hardcover , Helmi A. Youssef & Hassan El- Hofy – 9 May 2008.

References:

1."Manufacturing Technology: Metal Cutting and Machine Tools", P.N Rao, McGraw Hill Education, Vol. 2, 3rd ed., 2013
2. "Advanced Machining Processes", V. K. Jain, Allied Publishers Pvt. Ltd., New Delhi, 2007
3."Manufacturing Processes for Engineering Materials", Serope Kalpakjian, Steven R.Schmid, Pearson Education, 14th ed., 2016.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Fuels Combustion and Emission Control (Department Elective-I)**				
Teaching	Total contact hours – 64	L	T	P	C
Prerequisite(s): Internal Combustion Engines		3	0	0	3

Course Objectives:

- To identify solid, liquid and gaseous fuels and their properties, analysis of fuels, process and handling.
- To outline thermodynamics of combustion and equilibrium compositions of gaseous fuels.
- To discuss the chemical and dynamic structure of laminar an turbulent premixed flames, diffusion, and turbulent diffusive combustion in one and two-phase flows.
- To identify emissions from combustion and their controlling measures.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe various types of fuels, combustion equations, adiabatic flame temperature and pollutant concentration.
CO2:	Examine various properties of fuels and their analysis.
CO3:	Identify the various factors responsible for laminar and turbulent flame propagation.
CO4:	Use different principles of flame stabilization and ignition to design combustor.
CO5:	Categorize emissions associated with combustion and identify their control techniques.

Syllabus:

UNIT-I

Fuels: Introduction - Classification of fuels – Conventional and Unconventional, Solid, Liquid, gaseous and nuclear fuels – Origin of Coal – Analysis of coal. Coal – Carburisation, gasification and liquefaction – Lignite: Petroleum based fuels – Problems associated with very low calorific value.
Gases: Coal gas, Blast furnace gas, Alcohols and Bio-gas.

UNIT -II

Fundamentals of Fuels: Definitions, properties and various measurements- Definitions and properties of solid fuels- Definitions and properties of liquid and gaseous fuels- Various measurement techniques as per standards.

UNIT- III

Thermodynamics of Combustion: Enthalpy of formation – Heating values of fuel – Adiabatic . flame Temperature – Equilibrium composition of gaseous mixtures.

UNIT -IV

Laminar and Turbulent Flames Propagation and Structure: Flame stability – Burning velocity of fuels – Measurement of burning velocity – Factors affecting the burning velocity. Combustion of fuel, droplets and sprays – Combustion systems – Pulverized fuel furnaces – Fixed, entrained and fluidised bed Systems.

UNIT -V

Environmental Considerations: Air pollution – Effects on environment, Human health etc. Principal pollutants and their effects – Legislative measures – Methods of emission control.

Text Books:

1. Fuels and combustion / Sharma and Chander Mohan/ Tata McGraw Hill
2. Combustion / Sarkar / Mc. Graw Hill, Third edition, 2009
3. Combustion Engineering / Gary L. Berman & Kenneth W. Ragland/ Mc. Graw Hill International Edition, 06 Dec 2007

References:

1. Combustion Fundamentals / Roger A Strehlow / McGraw Hill
2. Combustion Engineering and Fuel Technology / Shaha A.K./ Oxford and IBH.
3. Principles of Combustion / KannethK.Kuo/ Wiley and Sons.
4. An Introduction to Combustion / Stephen R. Turns/ Mc. Graw Hill International Edition.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Tribology (Department Elective-I)**				
Teaching	Total contact hours-62	L	T	P	C
Prerequisite(s): Fluid Mechanics		3	0	0	3

Course Objectives:

- To provide the knowledge and importance of Tribology in Design, friction, wear and lubrication aspects of machine components.
- To select proper grade lubricant for specific application.
- To understand the principles of lubrication, lubrication regimes, theories of hydrodynamic and the advanced lubrication techniques.
- To introduce the concept of surface engineering and its importance in tribology.
- To understand the behaviour of Tribological components.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the viscosity and laws of fluid flow with reference to lubrication.
CO2:	Examine hydrodynamic and hydrostatic properties of lubricants.
CO3:	Explain the journal and slider bearings under different load carrying conditions.
CO4:	Describe the oil flow through bearings under different pressures and with thermal equilibrium conditions.
CO5:	Analyze the behavior of tribological components and measures subjected to different working conditions.

Syllabus:

UNIT – I

Introduction: Nature of surfaces and contact, surface topography- Friction and wear mechanisms and effect of lubricants, methods of fluid film formation-Selection of rolling element bearings Nominal life, static and dynamic capacity - Equivalent load- Probabilities of survival, cubic mean load – Bearing mounting details - Preloading of bearings, condition monitoring using shock pulse method.

UNIT – II

Hydrodynamic bearings: Fundamentals of fluid film formation – Reynold's equation; Hydrodynamic journal bearings – Sommerfeld number –Performance parameters – Optimum bearing with maximum load capacity – Friction – Heat generated and heat dissipated. Hydrodynamic thrust bearings: Raimondi and Boyd solution for hydrodynamic thrust bearings – Fixed and tilting pads, single and multiple pad bearings – Optimum condition with largest minimum film thickness.

UNIT – III

Hydrostatic bearings: Thrust bearings – Pad coefficients – Restriction – Optimum film thickness – Journal bearings – Design procedures- Aerostatic bearings: thrust bearings and journal bearings, design procedure - Dry rubbing bearings Porous metal bearings and oscillatory journal bearings, qualitative approach only.

UNIT – IV

Lubrication: Choice of lubricant type, oil, grease and solid lubricants, additives- Lubrication systems and their selection – Selection of pump, filters, piping design, oil changing and oil conservation.

UNIT – V

Seals: Different types, mechanical seals, lip seals, packed glands, soft piston seals, mechanical piston rod packing, labyrinth seals and throttling bushes, oil flinger rings and drain grooves-Selection of mechanical seals.Failure of tribological components - Failure analysis of plain bearings, rolling bearings, gears and seals, wear analysis using SOAP and Ferrography.

Text Books:

1. Fundamentals of Tribology – S.K. Basu, S.N. Sengupta& B.B. Ahuja – PHI, 2015.
2. Engineering Tribology – Prasanta Sahoo – PHI, 2013.

References:

1. Tribology Handbook – Neale M J – Neumann Butterworths, 2016.
2. Introduction to Tribology – Bharat Bhushan ¬ – John Wiley and Sons Ltd, 2013.
3. Hydrostatic and Hybrid Bearing Design – Rowe W W& O' Dionoghue – Butterworths& Co. Publishers Ltd., 2012

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} Semester)			
Course Code	**Industrial Robotics (Department Elective-I)**				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): KOM		3	0	0	3

Course Objectives:

- To understand the functions of the basic components of a Robot.
- To study the use of various types of End Effectors and Sensors.
- To impart knowledge in Robot Kinematics and Programming.
- To learn Robot safety issues and economics.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the fundamental components and coordinate systems of different industrial robots.
CO2:	Explain different types of drives used in robots and end effectors.
CO3:	Describe types of sensors used in industrial robot.
CO4:	Analyze the kinematics of robot arm.
CO5:	Identify the suitable robot for different industrial applications with economic considerations.

Syllabus:

UNIT-I

INTRODUCTION TO ROBOTICS: Automation and Robotics - Robot – Definition – Robot anatomy – Co ordinate systems, work envelope types and classification-Specifications-Pitch, yaw, roll, joint notations, pay load- Robot parts and their functions-Need for robots-Different applications.

UNIT-II

ROBOT ACTUATORS 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 – 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

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

UNIT-IV

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

FEED BACK COMPONENTS: Position Sensors – Potentiometers, Resolvers, and Encoders – Velocity Sensors.

UNIT-V

ROBOT PROGRAMMING AND IMPLEMENTATION : Lead Through Programming, Robot Programming Languages -VAL Programming - Motion Commands, Sensor Commands, End Effectors in Robotics - Commands and Simple Programs - RGV, AGV; Implementation of Robots in Industries - Safety Considerations for Robot Operations - Economic Analysis of Robots.

Text Books:

1. Groover M.P., "Industrial Robotics -Technology Programming and Applications", McGraw Hill, 2012.
2. Klafter R.D., Chmielewski T.A and Negin M., "Robotic Engineering - An Integrated Approach",Prentice Hall, 1989.

References:

1. Craig J.J., "Introduction to Robotics Mechanics and Control", Pearson Education, 2008.
2. Deb S.R., "Robotics Technology and Flexible Automation" Tata McGraw Hill Book Co., 1994.
3. Koren Y., "Robotics for Engineers", Mc Graw Hill Book Co., 1992.
4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw Hill Book Co., 1987.
5. Janakiraman P.A., "Robotics and Image Processing", Tata McGraw Hill, 1995.
6. Rajput R.K., "Robotics and Industrial Automation", S.Chand and Company, 2008.
7. Surender Kumar, "Industrial Robots and Computer Integrated Manufacturing", Oxford and IBH Publishing Co. Pvt. Ltd., 1991.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} Semester)			
Course Code	**Advanced Materials (Department Elective-I)**				
Teaching	Total contact hours–64	L	T	P	C
Prerequisite(s): Metallurgy & Material Science		3	0	0	3

Course Objectives:

- To understand the concepts and need of composites in various applications.
- To learn about manufacturing of different types of composites and their properties.
- To understand the macro-mechanical analysis procedure of composite lamina.
- To understand the fundamentals of functional graded materials, shape memory alloys and nano materials.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the composites and their classification.
CO2:	Describe polymer composites and their manufacturing methods.
CO3:	Analyze the mechanical behavior of composite laminates.
CO4:	Investigate properties and applications of functionally graded materials and shape memory alloys.
CO5:	Explain the properties and applications of nano materials.

Syllabus:

UNIT-I

INTRODUCTION TO COMPOSITE MATERIALS: Introduction, classification- Polymer matrix composites, metal matrix composites, ceramic matrix composites, Carbon Fibre composites, Carbon–Carbon composites, fibre reinforced composites and nature-made composites, Properties of Composites in comparison with standard materials and applications.

REINFORCEMENTS: Classification of Reinforcement - Fibres, Filled, Whiskers, Flake, Particulates, Directly Solidified Eutectics.

UNIT-II

Polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, hand layup, Pultrusion, RTM.

UNIT-III

MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, generalized Hooke's law, reduction of Hooke's law in three dimensions to two dimensions, Types of Laminates-Symmetric Laminates, Anti symmetric laminate, Balanced Laminate, Quasi-Isotropic Laminates. Relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina.

UNIT-IV

FUNCTIONALLY GRADED MATERIALS: Types of functionally graded materials-Classification different systems-Preparation-properties and applications of functionally graded materials.

SHAPE MEMORY ALLOYS: Introduction-Shape memory effect-Classification of shape memory alloys composition-Properties and applications of shape memory alloys.

UNIT-V

NANO MATERIALS: Introduction-properties at nano scales-Advantages & disadvantages-Applications in comparison with bulk materials (nano – structure, wires, tubes, composites). Special nano materials: carbon nanotubes, fullerenes, nanowires, porous silicon. Piezoelectric materials, Electro active polymer (EAP) , Magnetostrictive material.

Text Books:

1. Nano material /A.K. Bandyopadyay/New age Publishers
2. Material science and Technology: A comprehensive treatment/Robert W.Cahn,/VCH
3. Engineering Mechanics of Composite Materials / Isaac and M Daniel/Oxford University Press

References:

1. Mechanics of Composite Materials / R. M. Jones/ Mc Graw Hill Company, New York, 1975.
2. Analysis of Laminated Composite Structures / L. R. Calcote/Van Nostrand Rainfold,NY 1969
3. Analysis and performance of fibre Composites /B. D. Agarwal and L. J. Broutman /Wiley-Interscience, New York, 1980 4. Mechanics of Composite Materials - Second Edition (Mechanical Engineering) /Autar K.Kaw / CRC Press.

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

Course Objective:

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.

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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	-	-	-	-	-	-	-	-

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GRMT-.20
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	Open Elective - II			
Course/ Code	ENERGY MANAGEMENT	L	T	P	C
Teaching	Total contact hours - 45	3	0	0	3
Prerequisite(s):	MEFA, Mathematics				

urse Objectives:

1. To provide students with a general awareness on the importance of energy and its conservation,
2. To provide students on its impact on society, various energy sources
3. To provide students on energy conversion processes, energy management
4. To provide energy audit and energy conservation measures.

urse Outcomes:

fter successful completion of the course, a successful student will be able to	
01:	The students shall have an understanding of the impact of energy on society ,
02:	the need for sustainable energy, global and Indian energy policies
03:	They would have gained knowledge on various techniques of energy management and conservation.
O4:	They would also have gained the basic ideas of conducting an energy audit

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GRMT-.20
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Syllabus:

UNIT-I:
Energy resources: Energy conversion processes and devices Energy conversion plants – Conventional - Thermal, Hydro, and Non – conventional – Solar, Wind Biomass, Fuel cells,. Energy from waste.

UNIT-II:
Energy storage and Distribution – Electrical energy route – Load curves – Energy conversion plants or Base load , Intermediate load, Peak load and Energy displacement – Energy storage plants. Energy Scenario – Global and Indian –Impact of Energy on economy, development and environment, Energy policies, Energy strategy for future.

UNIT-III:
Energy Management – Definitions and significance – objectives –Characterising of energy usage – Energy Management program – Energy strategies and energy planning Energy Audit – Types and rocedure – Optimum performance of existing facilities – Energy management control systems – Computer applications in Energy management

UNIT-IV:
nergy conservation – Principles – Energy economics – Energy conservation technologies – ogeneration – Waste heat recovery – Combined cycle power generation – Heat Recuperators – eat regenerators – Heat pipes – Heat pumps – Pinch Technology

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GRMT-.20
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT-V:

Energy Conservation Opportunities – Electrical ECOs – Thermodynamic ECOs in chemical process industry – ECOs in residential and commercial buildings – Energy Conservation Measures.

Text Books:

1. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online)
2. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3, Electrical Utilities (available online)
3. S. C. Tripathy, "Utilization of Electrical Energy and Conservation", McGraw Hill, 1991. Success stories of Energy Conservation by BEE, New Delhi (www.bee-india.org)

eference Books:

. Amlan Chakrabarti, Energy Engineering and Management, Prentice Hall India, 2011.
. Eastop T. D. and D. R. Croft, Energy Efficiency for Engineers & Technologists, Longman, 1990.
. Albert Thumann P. E. and W. J. Younger, Handbook of Energy Audits, Fairmont Press, 2008.
. Doty S. and W. C. Turner, Energy Management Hand book, 7/e, Fairmont Press, 2009.
. Rao S. and B. B. Parulekar, Energy Technology, Khanna Publishers, 2005.
Rai G. D., Non-conventional Energy Sources, Khanna Publishers, 2011.

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

e Objectives:

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

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

T-1 Digital Image Fundamentals

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

T-2 Image Enhancement in the Spatial Domain

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

T-3 Image Enhancement in the Frequency Domain

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

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

nage Restoration

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

olor Image Processing

amentals, Color Models, Pseudo color Image Processing.

ionzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th
, Indian Reprint, 2002.

Books:

nda and D. Dutta Majumdar, "Digital Image Processing and Analysis" PHI,2003.
ionzalez, R. E. Woods and Steven L. Eddins, Digital Image Processing
MATLAB, 2nd edition, Prentice Hall, 2009.
nan, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill
ion, 2011.

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- online courses.
S online courses by JNTUK.

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

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

Course Objective(s):

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

Course Outcome(s):

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

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

CO-2: Demonstrate basic principles of Web application security

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

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

UNIT-1

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

UNIT-2

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

UNIT-3

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

UNIT-4

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

UNIT-5

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

Text Books

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

Reference Books

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

CO-PO Mapping:

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

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

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

Course Objectives

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

Course Outcomes

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

Syllabus

UNIT I

Concept of Hazards and Disasters

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

UNIT II

Classification of Hazards

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

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

UNIT III

Approaches and Measures in Disaster Management

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

UNIT IV

Disaster Management

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

UNIT V

Disaster Management in India

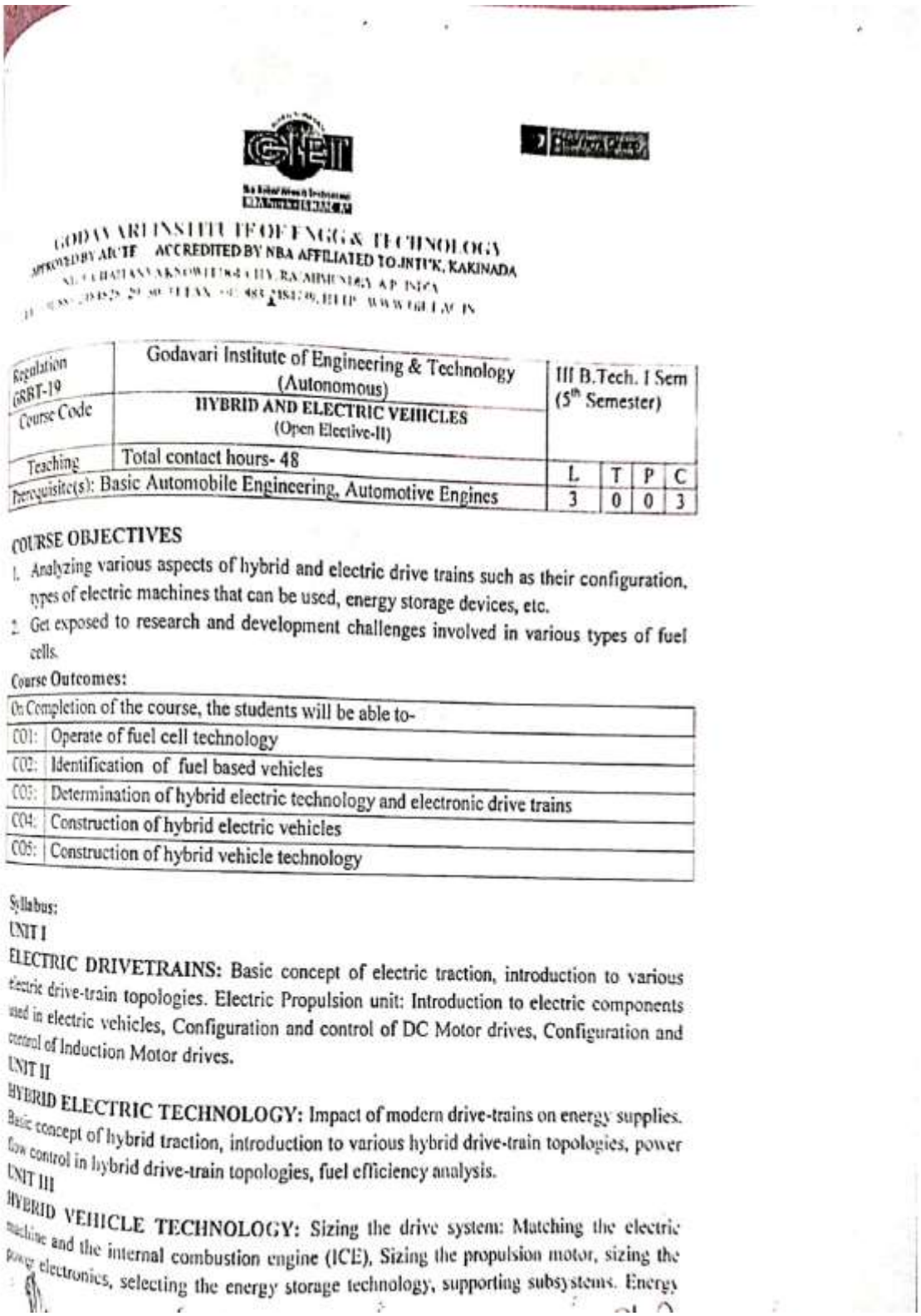
Ecological planning for sustainability & sustainable development in India; Sustainable rural development: A remedy to disasters; Role of panchayats in disaster mitigations; Environmental policies & programmes in India; Institutions & National centers for natural disaster reduction, NDMA, NDRF; Environmental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

Text books

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

Reference Books

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



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

COURSE OBJECTIVES

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

Course Outcomes:

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

Syllabus:

UNIT I

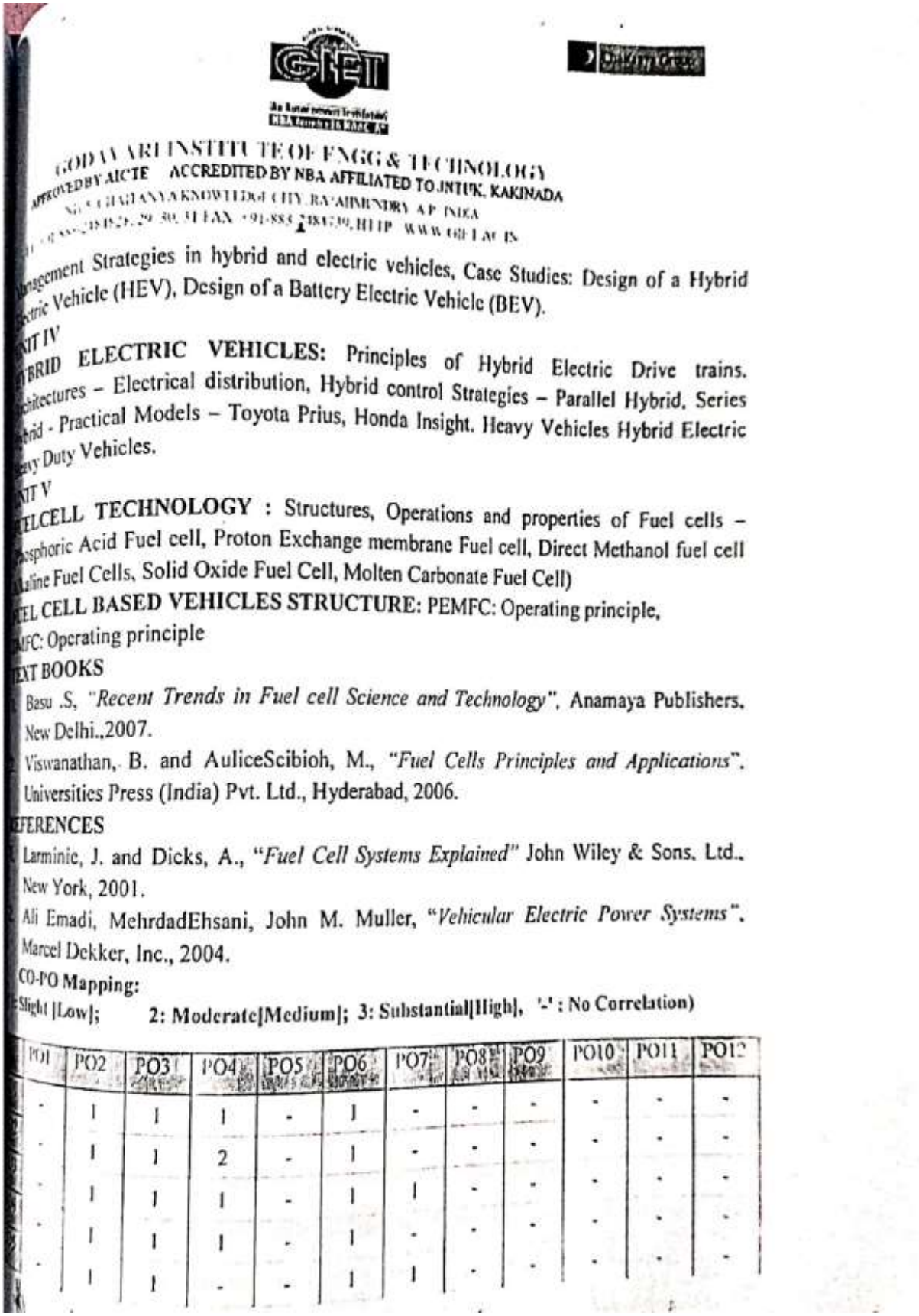
ELECTRIC DRIVETRAINS: Basic concept of electric traction, introduction to various electric drive-train topologies. Electric Propulsion unit: Introduction to electric components used in electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives.

UNIT II

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

UNIT III

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



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

NIT IV

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

NIT V

TLCELL TECHNOLOGY : Structures, Operations and properties of Fuel cells – osphoric Acid Fuel cell, Proton Exchange membrane Fuel cell, Direct Methanol fuel cell kaline Fuel Cells, Solid Oxide Fuel Cell, Molten Carbonate Fuel Cell)

EL CELL BASED VEHICLES STRUCTURE: PEMFC: Operating principle, MFC: Operating principle

EXT BOOKS

Basu .S, *"Recent Trends in Fuel cell Science and Technology"*, Anamaya Publishers, New Delhi..2007.

Viswanathan,. B. and AuliceScibioh, M., *"Fuel Cells Principles and Applications"*. Universities Press (India) Pvt. Ltd., Hyderabad, 2006.

FERENCES

Larminie, J. and Dicks, A., *"Fuel Cell Systems Explained"* John Wiley & Sons. Ltd., New York, 2001.

Ali Emadi, MehrdadEhsani, John M. Muller, *"Vehicular Electric Power Systems"*. Marcel Dekker, Inc., 2004.

CO-PO Mapping:

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

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
-	1	1	1	-	1	-	-	-	-	-	-
-	1	1	2	-	1	-	-	-	-	-	-
-	1	1	1	-	1	1	-	-	-	-	-
-	1	1	1	-	1	-	-	-	-	-	-
-	1	1	-	-	1	1	-	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Theory of Machines Lab**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Engineering mechanics, Theory of machines		0	0	3	1.5

Course Objectives:

- To understand the principles of gyroscope and governors.
- To determine the frictional forces and power of brakes.
- To determine the moment of inertia of flywheel.
- To determine the static and dynamic balancing of rotating mass systems.
- To determine the frequency of free and forced vibrations of spring mass systems.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Assess the gyroscopic effect and angular displacement of cam follower.
CO2:	Analyze the characteristic curves of different governors.
CO3:	Illustrate about different types of gears and four bar mechanism.
CO4:	Evaluate belt drives, mass balancing system.
CO5:	Analyze different types of vibration systems and spring mass systems.

Syllabus:

The following experiments will be carried out:

1. Study the gyroscopic effect of a rotating disc.
2. To find out the angular displacement of various cam follower pairs.
3. Determination of characteristics curves of various governors by universal governor.
4. To study undamped free vibrations of a spring.
5. To calculate equivalent spring stiffness for springs in series.
6. To study the natural vibrations of a spring mass system.
7. To study forced damped vibration of a spring mass system.
8. To study about Simple and Compound Screw Jack and measure various parameters.
9. Determination of moment of inertia of Flywheel.
10. Determination of the whirling speed of shaft.
11. To calculate co-efficient of friction in-between the belt and pulley.
12. Study the types of Gears.
13. Study the Four Bar Mechanism.
14. To show that a two mass system statistically balanced, but not dynamically balanced.
15. To show simple dynamic balancing of a three mass system.
16. To show simple dynamic balancing of a four mass system.
17. To demonstrate balance of four bar system both statically, dynamically.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5^{th} semester)			
Course Code	**Machine Tools Lab**				
Teaching	Total contact hours-55	L	T	P	C
Prerequisite(s): Material Science, Workshop Technology		2	1	0	3

Course Objectives:

- To understand terminology and geometry of tools and various operations on lathe.
- To understand various milling operations.
- To understand operations carried out on drilling, boring and broaching machines .
- To understand operations carried out on grinding machines.
- Familiarize different machine tools used in production floor.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Perform step and taper turning, thread cutting, knurling and boring operations on cylindrical work pieces using lathe machine.
CO2:	Produce prismatic parts with desired surface finish using surface grinding machine and tool angles using tool and cutter grinder machine.
CO3:	Perform indexing to machine spur gears on milling machine.
CO4:	Execute sequence of operations on slotting and shaping machines to generate keyways and splines on the given work piece.
CO5:	Carry out drilling and tapping operations to produce desired hole pattern on the given job.

Syllabus:

The following experiments will be carried out:

1. Step Turning & Taper Turning operation using Lathe Machine.
2. Knurling, Thread cutting and grooving operation using Lathe Machine.
3. Single Start Thread Cutting operation using Lathe Machine.
4. Multi Start Thread Cutting using Lathe Machine.
5. Eccentric Turning operation on Lathe Machine.
6. Surface Grinding operation on reciprocating table type horizontal spindle surface grinder.
7. Slot cutting on a Slotting Machine.
8. Key way cutting using Shaping Machine.
9. Production of Flat surface from round block using Shaping Machine.
10. Cutting Cylindrical work piece into Prismatic Bar on Shaping Machine.

11. Gear cutting using Milling Machine.
12. Contour Milling using vertical milling attachment on universal milling machine.
13. Drilling & Tapping operation using Radial Drilling Machine.
14. Measurement of cutting forces using Tool Force Dynamometer.
15. Grinding of tool angles using Tool and Cutter Grinder
16. Boring operation on Lathe Machine.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II SEM			
Course Code	SOFT SKILLS				
Teaching	Total contact hours -39				
Prerequisite(s): Learner should be equipped with Functional Grammatical skills and interactive ability		L	T	P	C
		-	-	3	1.5

Course Objective: This course aims

To achieve proficiency in formal English usage
To improve both written and spoken communication in connection with professional needs
To make them industry ready in terms of grooming, speaking in in-formal occasions

Course Outcomes

On the 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

UNIT:

Verbal 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

Communication Practice -Debating and Role Playing-Meaning-Do's and don'ts-Voice modulation-Keep it short and sweet-formal discussions-summarizing techniques- Group discussion-do's and don'ts -JAM sessions

Grammar In Use-Tense and aspect-Verb patterns-usage of progressive tense- Types and kinds of sentences-Question tags-Usage of Auxiliaries- Common errors

Vocabulary Building-Affixes- synonyms and antonyms-Phrasal verbs-Homonyms-Eponyms-Verbal Analogies-one word substitutes-Collocations

Professional competency- Interview skills- self introduction-performance management-Strategic planning-Negotiation techniques-visual communication- - delegation-filling information-C.V.preparation-Mock Interviews

SRW Skills-Selected lessons from UNLOCK-2 published by Cambridge University Press, Etiquette, table manners, dressing style

Text Books: UNLOCK SERIES from Cambridge University Press

Book-2: Reading and Writing

Listening and Speaking

References: https://www.englishclub.com/

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

http://learnenglish.britishcouncil.org/

PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	**Design of Transmission Elements**				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): Engineering Mechanics, Mechanics of Solids.		2	1	0	3

(Use of approved design data book is permitted in the end semester examination)

Course Objectives:

- To learn about the types of shafts, keys, coupling joints and their suitability.
- To learn about the Design and selection of journal and ball bearings to suit requirements.
- To learn about the Procedures to design the engine components like piston, connecting rod, and cylinder.
- To learn about the Procedures to design the various types of gears.
- To learn about the concepts of flexible elements.

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Find required sizes of shaft, keys and couplings for the given application.
CO2:	Identify a suitable bearing for the given application.
CO3:	Design of gear for a given application.
CO4:	Design of suitable I.C. engine parts for a given application.
CO5:	Suggest suitable flexible elements required to transmit the desired power.

Syllabus:

UNIT-I

KEYS AND COUPLINGS: Purpose of key, different types of keys, Design – Square and flat keys, Kennedy keys and splines, purpose of shaft couplings, different types of couplings – Design of rigid couplings - muff coupling, split muff coupling and flanged coupling, Design of Flexible couplings - bushed-pin flexible coupling, Oldham's coupling and Universal coupling**.**

SHAFTS: Design of solid and hollow shafts for strength and rigidity – design of shafts for combined bending and axial loads – shaft sizes – BIS code. Use of internal and external circlips, gaskets and seals (stationary & rotary)

UNIT-II

BEARINGS: Classification of bearings- applications, types of journal bearings – lubrication – bearing modulus – full and partial bearings – clearance ratio – heat dissipation of bearings, bearing materials – journal bearing design – ball and roller bearings – static loading of ball & roller bearings, bearing

UNIT- III

DESIGN OF ENGINE PARTS: Connecting Rod-Thrust in connecting rod – Stress due to whipping action on connecting rod ends – Cranks and crank shafts, strength and proportions of over hung and centre cranks – Crank pins, crank shafts. Pistons– forces acting on piston – construction design and proportions of piston, cylinder– cylinder liners.

UNIT-IV

SPUR & HELICAL GEAR DRIVES: Spur gears- helical gears – load concentration factor – dynamic load factor, surface compressive strength – bending strength – design analysis of spur gears – estimation of centre distance, module and face width, check for plastic deformation, check for dynamic and wear considerations**.**

UNIT-V

DESIGN OF FLEXIBLE ELEMENTS: Belts and their construction - Flat belts versus V- belts, Open and cross belt arrangement, Ratio of belt tensions-Centrifugal tension-Effect of centrifugal tension, Design of flat belts and V-belts, Selection of wire rope and Pulleys, Introduction to Chain drive - its merits and demerits, Constructional features of a chain drive.

Text Books:

1.V.B. Bhandari, Machine Design of Machine Elememts, 4/e, Tata McGraw Hill, 2017.
2.Norton, R. L., Machine Design: An Integrated Approach, 5/e, Pearson, 2013.
3.Faculty of Mechanical Engineering, Design Data: Data Book of Engineers, PSG College of Engineering, 2012

References:

1.R.S. Khurmi and J. K. Gupta, Machine design, 25/e, S.Chand Publishers, 2014.
2.T.V. Sundaramoorthy & N.Shanmugam, Machine Design, 6/e, SciTech Publishers, 2010.
3.Shigley, J.E and Mischke, C. R. Mechanical Engineering Design, 8/e, Tata McGraw Hill, 2008.
4.Design data hand book, S. Md. Jalaludeen.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	**Industrial Engineering & Management**				
Teaching	Total contact hours- 62	L	T	P	C
Prerequisite(s): Manufacturing Concepts.		3	0	0	3

Course Objectives:

- To understand the concepts of Industrial Engineering and Principles of Management.
- To understand the methods for improving productivity in manufacturing industries.
- To familiarize various techniques of HRM, Quality Control, Work Study and Project Management.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the various concepts of management techniques.
CO2:	Identify a suitable plant location and layout by considering various industrial aspects.
CO3:	Use work study concepts to improve productivity.
CO4:	Apply the suitable quality management techniques.
CO5:	Assess the project duration and crashing of any network problems.

Syllabus:

UNIT – I

INTRODUCTION:

Industrial Engineering- Role of Industrial Engineer- IE Applications – Productivity – Scope of Industrial Engineering.-Management Concepts, Origin, Importance, functions of management, F W Taylor's Scientific Management, McGregor's theory X and theory Y– Henry Fayol's Management Principles-Human Resource Management: Functions of HRM, Job-evaluation, merit rating

UNIT – II

PLANT - FACILITY LOCATION & LAY-OUT:

Factors governing plant location - Location Economics, types of sites, types of plant, Plant layout techniques

PRODUCTION –Types of Production- Advantages and disadvantages - Aggregate Production Planning. Plant maintenance – Types – Preventive, predictive, breakdown – Reliability - Availability concepts .

UNIT – III

OPERATIONS MANAGEMENT – WORK STUDY:

Work study – Objectives of work study: Role of work study in improving productivity – Method/Motion Study: Procedure, objectives, applications, recording techniques: charts, diagrams, graphs and models – Micro-motion study: Procedure, objectives, applications, Therbligs – Time study/work measurement: Procedure, objectives, applications - Time study techniques: stop watch method, PMTS, work sampling – Concept of allowances, performance rating, estimation of standard time- Introduction to Ergonomics.

UNIT – IV

QUALITY MANAGEMENT:

Introduction to quality - Statistical quality control (SQC): Control Charts, Numerical Examples on X Bar, R Charts, C Charts and P Charts - Sampling plans, Total Quality Management (TQM): DEMING cycle, DMAIC Cycle, Zero Defects, Quality Circles, ISO Quality Systems, 5S, Six Sigma
MATERIALS MANAGEMENT–Inventory, basic EOQ model, Selective Inventory Control techniques – ABC, VED, FSN, XYZ – MRP- ERP- Supply Chain Management-Value Engineering – Value Analysis.

UNIT – V
PROJECT MANAGEMENT: Introduction to Network Diagrams - CPM and PERT - Critical Path Analysis - Activity times and floats, Project completion times. PERT and three Time Estimates, critical path analysis of a PERT network, Probability of completion of project - Simple Numerical Examples on CPM & PERT Project crashing.

Text Books:

1. Industrial Engineering and Management, OP Khanna, Khanna Publishers, 2018-19(17th Edition)
2. Industrial Engineering and Production management, MartandTelsang, S Chand & Co New Delhi, 2006 (2nd edition)

References:

1. Industrial Engineering and Management, M Mahajan, 2014 (2nd Edition)
2. Production and Operations Management – Paneerselvem – PHI.
3. Introduction to Work Study, I.L.O., 4th Revised Edn., 1992
4. Handbook of Industrial Engineering: Technology and Operations Management By GavrielSalvendy, A Wiley-Interscience Publication, 2001 (Third edition)

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	**Heat Transfer**				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): Fundamentals of Engineering Thermodynamics		2	1	0	3

Course Objectives:

- To understand the modes of heat transfer and thermo-physical properties.
- To understand the concepts of various experimental heat transfer correlations in engineering applications.
- To understand velocity and thermal boundary layers in convective heat transfer.
- To learn concepts of heat exchangers.
- To understand the radiation heat transfer.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the basic concepts of heat transfer.
CO2:	Solve the problems involving steady state and transient heat conduction in simple geometries.
CO3:	Analyze the forced and free convective heat transfer through various systems.
CO4:	Analyze the performance of heat exchangers and evaporators using boiling and condensation principles.
CO5:	Illustrate the real time applications of radiation heat transfer.

Syllabus:

UNIT-I

INTRODUCTION: Modes and mechanisms of heat transfer – Basic laws of heat transfer –General discussion about applications of heat transfer.

CONDUCTION HEAT TRANSFER: Fourier rate equation – General heat conduction equation in cartesian, cylindrical and spherical coordinates. Steady, unsteady and periodic heat transfer – Initial and boundary conditions.

ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER: Homogeneous slabs, hollow cylinders and spheres – Overall heat transfer coefficient – Electrical analogy – Critical radius of insulation- Variable thermal conductivity – Systems with heat sources and heat generation.

UNIT -II

Extended surface (fins) heat Transfer: Long fin, fin with insulated tip and short fin, application to error measurement of temperature.

ONE DIMENSIONAL TRANSIENT CONDUCTION HEAT TRANSFER: Systems with negligible internal resistance – Significance of biot and Fourier numbers - Chart solutions of transient conduction systems.

CONVECTIVE HEAT TRANSFER: Classification of convective heat transfer , dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem for forced and free convection, application for developing semi , empirical non- dimensional correlation for convective heat transfer – Significance of non-dimensional numbers – Concepts of continuity, Momentum and Energy Equations.

UNIT- III

FORCED CONVECTION

EXTERNAL FLOWS: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer-flat plates and cylinders.

INTERNAL FLOWS: Concepts about hydrodynamic and thermal entry lengths, division of internal flow based on this– Use of empirical relations for horizontal pipe flow and annulus flow.

FREE CONVECTION: Development of hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for vertical plates and pipes.

UNIT -IV

BOILING: Pool boiling – Regimes, calculations on nucleate boiling, critical heat flux and film boiling.

CONDENSATION: Film wise and drop wise condensation –Nusselt's theory of condensation on a vertical plate - Film condensation on vertical and horizontal cylinders using empirical correlations.

HEAT EXCHANGERS: Classification of heat exchangers –Overall heat transfer coefficient and fouling factor – Concepts of LMTD and NTU methods – Problems.

.

UNIT -V

RADIATION HEAT TRANSFER:

Emission characteristics and laws of black ,body radiation – Irradiation – total and monochromatic quantities – Laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– Heat exchange between two black bodies – Concepts of shape factor – Emissivity – Heat exchange between grey bodies – Radiation shields – Electrical analogy for radiation networks.

Text books:

1. Heat Transfer/JP HOLMAN/TMH/10th editon
2. Heat Transfer/P.K.Nag,/TMH/3rd edition /2011

Reference books:

1.Heat and Mass Transfer/Yunus A Cengel; Afshin J. Ghajar/McGraw-Hill/ 5th edition/ 2017
2. Heat and Mass Transfer/ D.S. Kumar, S.K. Kataria&Sons./2013
3. Heat and Mass Transfer/Arora and Domkundwar,Dhanpatrai& sons/2007
4. Fundamentals of Engg. Heat and Mass Transfer/R.C.Sachdeva/New Age Science/2009
5.Heat and Mass Transfer/R.K.Rajput/S. Chand Publishing/2019

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	**Metrology and Instrumentation**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

1. To understand selection of fits and tolerances in manufacturing industry.
2. To develop the basic knowledge on linear and angular measurements and their standards of measurements.
3. To learn about different techniques to measure surface finish, flatness, gear and screw thread parameters.
4. To understand principle and operation of comparators and machine tool alignment tests.
5. To understand the construction and working principle of measuring instruments of displacement, temperature, speed, flow and pressure.
6. To understand the construction and working principle of stress and strain measuring instruments and concept of control systems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Examine the tolerances, limits and fits of engineering components.
CO2:	Describe linear, angular measuring instruments comparators and limit gauges.
CO3:	Discuss surface roughness, gear and screw thread measurements.
CO4:	Explain instruments for measurement of displacement, temperature, pressure, speed and flow parameters.
CO5:	Use instruments for measurement of stress and strain, fluid flow, torque and power.

Syllabus

UNIT-I

SYSTEMS OF LIMITS AND FITS: Introduction - limits, fits – tolerances ,deviations, Unilateral and bilateral tolerance system, hole and shaft basis systems- interchangeability and selective assembly - International standard system of tolerances.

LIMIT GAUGES AND GAUGE DESIGN: Taylor's principle – design of go and no go gauges - plug, ring, snap, gap, taper, profile and position gauges.

COMPARATORS: Working principle and uses - Types ,mechanical, optical, electrical and electronic, pneumatic comparators.

UNIT-II

LINEAR MEASUREMENTS: Line standards, end standards - slip gauges, calibration of the slip gauges, dial indicators, micrometers, vernier calipers.

MEASUREMENT OF ANGLES AND TAPERS: Bevel protractor, angle slip gauges, angle dekkor, spirit levels, sine bar, rollers and spheres used to measure angles and tapers.

FLATNESS MEASUREMENT : Measurement of flatness of surfaces- straight edges,surface plates, auto collimator.

UNIT – III

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness –Numerical assessment of surface finish, Centre line average, Root mean square method, Method of measurement of surface finish – Profilograph, Talysurf, ISI symbols for indication of surface finish.

GEAR MEASUREMENT: Nomenclature of gear tooth, tooth thickness measurement with gear tooth vernier & flange micro meter, pitch measurement, rolling gear tester, involute profile checking.

SCREW THREAD MEASUREMENT: Elements of screw parameters – errors in screw threads-measurement of effective diameter, two wire and three wire methods.

MACHINE TOOL ALIGNMENT TESTS: Requirements of alignment tool tests -instruments used - Alignment tool tests on lathe, drilling and Milling machines.

UNIT – IV

Definition – Basic principles of measurement – measurement systems– Types of errors.

MEASUREMENT OF DISPLACEMENT: Working principle of transducers, types, LVDT, piezo electric, inductive, capacitance, resistance transducers.

MEASUREMENT OF TEMPERATURE: Classification, principles of measurement – expansion, electrical resistance, thermistor ,thermocouple, pyrometers, temperature indicators.

MEASUREMENT OF PRESSURE: Working principle of Manometers, Bourdon pressure gauges, bellows – diaphragm gauges and Low pressure measurement, thermal conductivity gauges ,McLeod pressure gauge.

MEASUREMENT OF SPEED: Mechanical tachometers – electrical tachometers – stroboscope, non-contact type of tachometers, principles of seismic instruments – vibrometer and accelerometer using this principle.

UNIT – V

FLOW MEASUREMENT: Magnetic, ultrasonic, turbine flow meter, hotwire anemometer, laser Doppler anemometer (LDA).

STRESS STRAIN MEASUREMENTS: Working principle of Electrical strain gauges – method of usage of resistance strain gauge for bending compressive and tensile strains , strain gauge rosettes.

MEASUREMENT OF FORCE, TORQUE AND POWER: Principle and working of Elastic force meters, load cells, torsion meters, dynamometers, proving ring.

ELEMENTS OF CONTROL SYSTEMS: Introduction, importance – classification – open and closed systems.

Text Books:

1. R.K.Jain, Engineering Metrology",Khanna Publishers, New Delhi 2018.
2. Dr.D.S.Kumar ,Mechanical Measurement and Control, Metropolitan book co,New Delhi 2019.

References

1. Doeblin Earnest, O.Adaptation, Manik, Dhanesh,Measurement systems: Application and Design Tata McGraw– Hill, New Delhi, Fifth edition, 2007.
2. J.P.Holman, Experimental Methods for Engineers, McGraw- Hill,New Delhi Eight edition, 2011.
3. M. Mahajan, Text book of Metrology, DhanapatiRai publications, New Delhi 2007.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	Refrigeration and Air-Conditioning (Department Elective-II)				
Teaching	Total contact hours- 64	L	T	P	C
Prerequisite(s): Thermodynamics and Thermal Engineering		2	1	0	3

Course Objectives:

- To learn the fundamental concepts of refrigeration and air conditioning.
- To study various refrigeration cycles and evaluate their performance using Mollier charts.
- To compare properties, applications and environmental issues of different refrigerants.
- To understand the basic concepts of air conditioning processes and its applications.
- To study the various equipments of refrigeration air conditioning systems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the concepts and applications of refrigeration systems.
CO2:	Compare & contrast the performance of vapor compression and absorption refrigeration system.
CO3:	Explain steam jet refrigeration system and their components.
CO4:	Discuss various refrigerants and components used in refrigeration plants.
CO5:	Classify air conditioning systems and assess their performance.

Syllabus:

UNIT-I

INTRODUCTION TO REFRIGERATION: Necessity and applications – unit of refrigeration and COP.–Mechanical refrigeration – types of ideal cycles of refrigeration. Air refrigeration: Bell-Coleman cycle - open and dense air systems – refrigeration systems used in air-crafts and problems.

UNIT- II

VAPOUR COMPRESSION REFRIGERATION: Simple vapour compression refrigeration cycle – COP – representation of cycle on T-s and P-h charts – effect of sub-cooling and super heating – cycle analysis – use of p-h charts – numerical problems.

VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of NH3 – water system and Li Br –water (Two shell & Four shell) System, principle of operation three fluid absorption system.

UNIT- III

STEAM JET REFRIGERATION SYSTEM: Working Principle and basic components. Principle and operation of (i) Thermoelectric refrigerator (ii) Vortex tube.

REFRIGERANTS: Desirable properties – classification of refrigerants -azeotrops– nomenclature – secondary refrigerants –effect on ozone depletion– lubricants.

REFRIGERATION EQUIPMENTS: Compressors- Types of compressors. Condensers – Types of condensers. Evaporators – Types of Evaporators. Expansion Devices – Types of expansion devices.

UNIT – IV

INTRODUCTION TO AIR- CONDITIONING: Psychometric Properties & Processes– Relations– Characterization of Sensible heat and latent heat loads – Heat load concepts: RSHF, GSHF –Problems. Requirement of the human comfort – Concept of Effective Temperature – Comfort Chart – Comfort Air-Conditioning, Need for ventilation, Consideration of Infiltrated air.

UNIT – V

AIR-CONDITIONING EQUIPMENTS AND APPLICATIONS: Humidifiers–Dehumidifiers – Air filters–fans and blowers, grills and registers, ducts–supply ducts–outlets–return outlets.
A/C SYSTEMS - Summer A/C,Winter A/C, Year round A/C, Central A/C, Unitary A/C systems.

Text Books:

1. "A Course in Refrigeration and Air Conditioning", S.C. Arora & Domkundwar, DhanapatRai Publications, New Delhi.
2. "Refrigeration and Air Conditioning", C.P. Arora, Tata McGraw Hill.

References:

1. "A Text book of Refrigeration and Air-Conditioning", R S Khurmi, S C Chand Publications.
2. "Refrigeration and Air Conditioning", Manohar Prasad, New Age Publishers.
3. "Refrigeration and Air Conditioning", Wilbert F. Stoecker, Jerold W. Jones, McGraw Hill, 1982.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} Semester)			
Course Code	**Mechatronics (Department Elective-II)**				
Teaching	Totalcontacthours-64	L	T	P	C
Prerequisite(s): Basic Electrical and Electronics Engineering		3	0	0	3

Course Objectives:

- To understand the elements and techniques involved in mechatronics systems.
- To learn the concepts of actuators and their uses.
- To understand the applications of microprocessors and microcontrollers in mechanical systems.
- To learn architecture and system interface of analog and digital convertors.
- To understand the concept of PLC system and its programming, and its significance.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the key elements of mechatronic system.
CO2:	Outline various sensors and actuators for an engineering application.
CO3:	Describe various microprocessors and microcontrollers.
CO4:	Use appropriate microprocessor and microcontroller for interfacing sensors, actuators and other mechatronic elements.
CO5:	Construct PLC program and implementation of real life systems.

Syllabus:

UNIT- I

INTRODUCTION: Mechatronics systems – Elements & levels of mechatronics system, mechatronics design process - System, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, static and dynamic characteristics of sensor - Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors.

UNIT –II

ACTUATORS : Hydraulic and pneumatic systems, components, control valves, electro- pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems, basic principles and elements. Electrical actuating system, types of stepper and servo motors – Construction – Working Principle – Advantages and Disadvantages.

UNIT- III

MICROPROCESSOR AND MICROCONTROLLER: Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set – Timing diagram of 8085 – Concepts of 8051 microcontroller – Block diagram.

UNIT -IV

SYSTEM INTERFACING: Introduction – Architecture of 8255, keyboard interfacing, LED display interfacing, analog to digital convertor and digital to analog convertor interface – Temperature Control – Stepper Motor Control – Traffic Control interface.

UNIT -V

PLC AND MECHATRONIC SYSTEM DESIGN : Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC.Design process-stages of design process – Traditional and mechatronics design concepts – Case studies of mechatronics systems – Pick and place robot – Engine management system – Automatic car park barrier.

Text Books:

1. Bolton, "Mechatronics", 5 th Edition, Pearson Education India, 2011
2. Ramesh S Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 6 th Edition, Penram International Publishing Pvt. Ltd, 2013.

References:

1. Bradley D.A, Dawson D, Buru N.C and Loader A.J, "Mechatronics", Chapman and Hall, 1993.
2. Clarence W, de Silva, "Mechatronics" CRC Press, First Indian Re-print, 2013
3. Devadas Shetty and Richard A. Kolk, "Mechatronics Systems Design", PWS publishing company, 2007.
4. Krishna Kant, "Microprocessors & Microcontrollers", Prentice Hall of India, 2007.
5. Michael B.Histand and Davis G.Alciatore, "Introduction to Mechatronics and Measurement systems", McGraw Hill International edition, 2007.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	Advanced Foundry and Welding Technology (Department Elective-II)				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Manufacturing Technology		3	0	0	3

Course Objectives:

- Familiarize the concepts related to moulding techniques.
- To understand the industrial practice, and their comparative merits and demerits.
- To gain knowledge on various advanced welding processes so that the students can apply them in engineering industry applications.
- To gain knowledge on the design of welded joints and the quality control of weldments.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe various moulding techniques.
CO2:	Explain the principles of solidification and melting.
CO3:	Apply the knowledge of solid state welding process for engineering applications.
CO4:	Discuss the various advanced welding techniques.
CO5:	Identify the optimal welding process parameters for any welded joint.

Syllabus:

Unit-I

Moulding and Casting: Development of metal castings- Materials for moulding- Foundry sand control, core making processes- Materials for core making- Different types of cores- Moulding and core making machines. Recent developments in core and mould making- Cold set process, Investment casting- Shell moulding- Continuous casting; Hot box method- Shaw process. Vacuum moulding for mass production.

Unit-II

Melting and Solidification: Furnaces used in foundry for melting ferrous and nonferrous metals- principals of operation of cupola and charge calculations. Principles of Solidification: Nucleation- Crystal growth- Morphology and structure of cast metals and alloys- Pure metals- Single phase alloys and eutectics. Solidification in sand and chill moulds. Family of cast irons, Production of malleable and S.G. Irons- Methods of alloying and inoculants and their effects on the structure and properties of cast iron.

Foundry Mechanization: Layout for ferrous and nonferrous foundries- Description of equipment used for mechanization- Sand conditioners- Conveyors- Cranes- Equipment for handling moulds, Cores and molten metal- Knock out of moulds- Fettling equipment.

Unit-III

SOLID STATE WELDING PROCESSES: Fundamental principles- Survey of the various pressure welding processes and their applications-Friction, friction stir, explosive, diffusion, and Ultrasonic welding – Principles of operation- Process characteristics and application.

Unit-IV

ELECTRON AND LASER BEAM WELDING: Heat generation and regulation- Equipment details in typical set-up -Electron beam welding in different degrees of vacuum, advantages and disadvantages, applications- Laser Welding: Principles of operation, advantages and limitations, applications.

PLASMA WELDING : Special features of plasma arc- transferred and non-transferred arc, key hole and puddle-in mode of operation - Micro low and high current plasma arc welding and their applications, plasma cutting, surfacing and app.

Unit -V

TESTING AND DESIGN OF WELDMENTS: Design and quality control of welds - Edge preparation types of joints, welding symbols. Stresses in butt and fillet welds – weld size calculations - Design for fatigue - Testing – tensile, bend hardness - Impact, notch and fatigue tests -Life assessment of weldments.

Text Books:

1. Principles of Foundry Technology, by Jain P.L-TMH Publications,2017.
2.Welding Engineering and Technology, by R.S. Parmar -Khanna Publications,2013.

References:

1. Foundry Engineering by R. L Agarwal,T. R Banga-Khanna Publications,1987.
2. Foundry Engineering by Howard F. Taylor& Others-Wiley Publications,1993.
3.Principles of Metal Castings by Heine & Others(2017).
4. Modern Welding Technology by Howard B. Cary, Scott Helzer- Pearson publications,2004.
5. Welding Metallurgy S.Kou, 2nd edition, John Wiley and Sons, New York, NY ,2003.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6^{th} semester)			
Course Code	Non Destructive Evaluation (Department Elective-II)				
Teaching	Total contact hours - 64	L	T	P	C
Prerequisite(s):	Engineering Physics	2	1	0	3

Course Objectives:

- To learn about the basic principles and techniques of various NDE methods such as Visual, Penetrant Testing, Magnetic Particle Testing, Ultrasonic Testing, Radiography, Eddy Current.
- To learn the advantages, limitations and applications of Non-destructive testing methods.
- To identify the appropriate NDE methods.
- To create awareness related to recent developments and future trends in NDE.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Compare destructive testing and non destructive evaluation methods.
CO2:	Discuss working principle and construction details of magnetic particle, liquid penetrant and eddy current test.
CO3:	Explain the working principle and construction details and methods of ultrasonic test.
CO4:	Describe the working principle and construction details and methods of radiography test.
CO5:	Plan the suitable NDE methods based on the required application.

Syllabus:

UNIT – I

Introduction to Non-destructive testing: Introduction to Material Testing, classification of material testing, comparison between destructive testing and NDT –Discontinuities, origin and classification of discontinuities – Importance of NDT, scope and limitations of NDT – Visual inspection, unaided and aided, visual inspection aids.

Liquid Penetrant Test: Basic Principle – Liquid penetrant system, types and properties of liquid penetrant and developers – TestProcedure – Interpretation of results – Effectiveness and Limitations of Liquid Penetrant Testing – Applications of Liquid Penetrant Testing.

UNIT – II

Magnetic Particle Testing- Theory of magnetism – Magnetization of Materials, different methods of Magnetization – Demagnetization of Materials – Magnetic Particle Test principle, equipment, test procedure **–** Interpretation and evaluation of test indications **–** Effectiveness and Limitations of Magnetic particle testing, Applications.

UNIT – III

Ultrasonic Testing: Basic principles of sound wave propagation, types of sound waves, sound field – Principle of ultrasonic testing – Ultrasonic transducers, piezoelectric materials, various types of transducers/probe – Equipment for ultrasonic testing **–** Pulse-echo method, transmission method, resonance method – Different ultrasonic inspection techniques – Data representation, A/Scan, B/scan, C/scan– Applications and limitations.

UNIT – IV

Radiography Testing: Basic Principle – Sources of X and Gamma Rays and their interaction with Matter – Imaging, film and film less techniques – Types and use of filters and screens – geometric factors, inverse square law – Characteristics of films, graininess, density, speed, contrast, characteristic curves, penetrameters – Exposure charts – Radiographic equivalence– Fluoroscopy, Xero-Radiography, Computed Radiography, Computed Tomography.

UNIT – V

Eddy Current Testing: Generation of eddy currents – Properties of eddy currents – Eddy Current Test System, Sensing elements, Probes, Instrumentation, Types of arrangement – Interpretation/Evaluation of test results – Applications, effectiveness and limitations.

Industrial Applications of NDT: Comparison and selection of NDT methods –Span of NDT Activities and its industrial applications.

TEXT BOOKS:

1. "Practical Non-Destructive Testing", Baldev Raj, T. Jayakumar, M.Thavasimuthu, Narosa Publishing House, 3rd Edition, 2019.
2. "Non-destructive test and evaluation of Materials," J Prasad, GCK Nair, TMH Publishers, 2nd ed., 2011.

REFERENCES:

1. "ASM Handbook: Non Destructive Evaluation of Materials" Aquil Ahmed and Leonard J Bond, ASM International, Volume 17, 2018.
2. "Non-destructive Hand Book" – R. Hamchand, McGraw-Hill Education; 2ndedition, 2012.
3. "Ultrasonic Nondestructive testing of Materials", Karl Langenberg, Klaus Mayer, CRC Press; 4th edition, 1st edition,2017.
4. "Non-destructive testing", Warress, JMCGonmade, AIRWALK PUBLICATIONS, 1 edition, 2017.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)				
CourseCode 19116761	GLOBAL ENVIRONMENT PROBLEMS & POLICIES (OPEN ELECTIVE III)				IV B.Tech. I Sem (7th semester)
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s): Basics of Environmental science		3	0	0	3

Course Objectives:

a) *To study the explain the scientific basis of the global environmental issues.*
b) *To discuss social, psychological, economic and political issues surrounding each of the global environmental issues.*
c) *Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.*
d) *Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.*
e) *Appreciate the concern of environmental agreement.*

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	To Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
CO2	To Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO3	To Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	To know environmental laws and grasp the concept of environmental legislation and itsapplication in international environmental agreement.
CO5	To appreciate the concern of environmental agreement.

Syllabus:

Unit – I

Unit-I: Environmental problems and protection:

Environmental pollution and its consequences – Air pollution, water pollution, land pollution, nuclear pollution, Ozone depletions – Urbanization and its impacts on environment – Deforestation and its impacts on environment – Ways of protecting, Management of Environment, Preserving and Restoring of environment.

Unit – II

India and Environmental Issues and Policies:

Environmental Awareness – Environmental problems of India - Environmental ethics - Nature conservation education movement – Social forestry scheme. Conservation of biodiversity :Meanings and need conservation of natural resources – soil, forest, water and wildlife In-situ conservation -National parks and sanctuaries – Biosphere Reserves –Man and Biosphere programme (MAP) –Ex –situ conservation, in –situ conservation, IUCN Red list categories, hot spots

Unit – III

Human population and environment:

Population growth, Indian population situations population explosion – family welfare programme – environment and Human health.-Factors affecting environment-Acid rain, green house effect-Extinction

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

of species-soil erosion and energy crisis.

Unit – IV

International Efforts for Environmental Protection:

The Stockholm conference 1972 – Brundtland commission 1983 – Nairobi conference 1982 – The RioSummit 1992 – the Rio Declaration at the earth charter – Major achievement of the Rio Summit – Mainfeatures of the Rio Declaration – Kyoto conference and part on Global Warming 1997 – presentdevelopments.

Unit – V

Environmental laws in India:

Environmental Legislation, Acts, Rules, Notifications and Amendments. International Environmental Agreements. Role of mass media and technology in developing awareness about environmental problems and its prevention; Role of NGO's and Government organization in developing Environmental education. Environmental Movements and Developments: Environmental movements in India: Silent Valley movement, Chipko movement, Narmada Bachao, Andolan, National Test Range at Balipal, Orissa. - Conditions for achieving the goals of sustainable development Strategies for sustainable development in India.

Text books:

1. Agarwal s.k. (1997). Environmental Issues themes New Delhi: APH PublishingCorporation.
2. C.E.E (1994) Essential Learning in Environmental Education. Ahmadabad. C.E.E. Publication
3. Garg, B. & Tiwana. (1995) Environmental Pollution and Protection, Deep & Deep publication,New Delhi.

References:

1. Karpagam M. (1991) Environmental Economics – A text book. New Delhi. Sterling Publishers.
2. Kelu.P (2000) Environmental Education – A conceptual Analysis Calicut: Calicut University
3. Nanda V.K. Environmental Education, New Delhi: Anmol Publications PVT LTD.

Web references:

1. http://www.bdu.ac.in/cde/docs/ebooks/B-d/II/ENVIRONMENTAL%20EDUCATION.pdf
2. https://www.terisas.ac.in/uploads/1551863268_980872_NRE%20155.pdf
3. http://moef.gov.in/.

CO-PO Mapping:

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

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

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY GRMT-.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-19	Godavari Institute of Engineering & Technology (Autonomous)	Open Elective - III			
Course/ Code	RENEWABLE ENERGY RESOURCES	L	T	P	C
Teaching	Total contact hours - 45	3	0	0	3
Prerequisite(s): Power Systems					

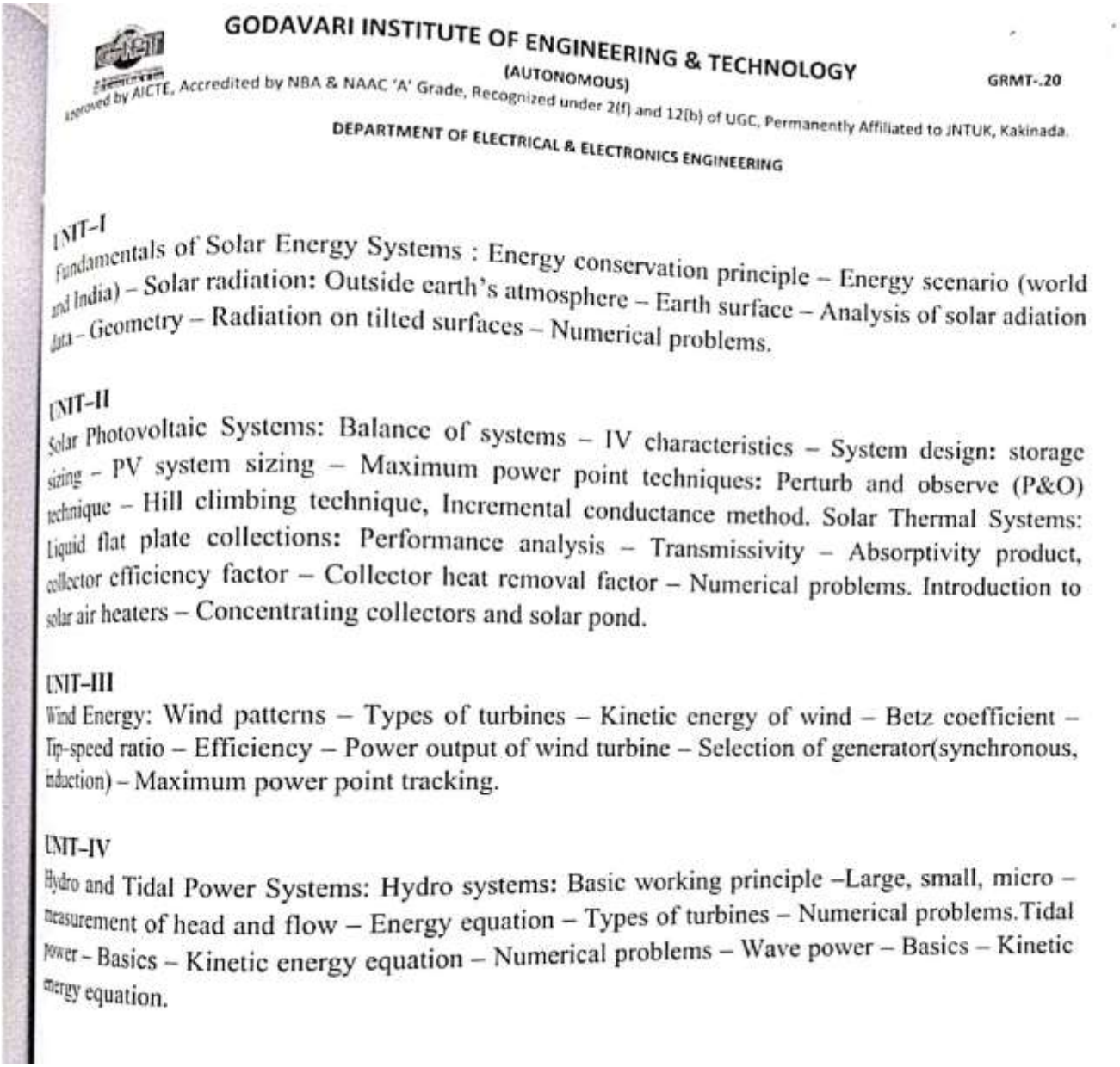
Course Objectives:

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

1. To understand the various forms of conventional energy resources.
2. Learn the present energy scenario and the need for energy conservation
3. Explain the concept of various forms of renewable energy
4. Outline division aspects and utilization of renewable energy sources for both domestics and industrial application

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
CO2:	Design solar thermal collections.
CO3:	Develop maximum power point techniques in solar PV and wind
CO4:	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations



GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY
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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT-I

Fundamentals of Solar Energy Systems : Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar adiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II

Solar Photovoltaic Systems: Balance of systems – IV characteristics – System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique, Incremental conductance method. Solar Thermal Systems: Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity product, collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT-III

Wind Energy: Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip-speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

UNIT-IV

Hydro and Tidal Power Systems: Hydro systems: Basic working principle –Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems.Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT-V

Biomass, Fuel Cells and Geothermal Systems: Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat– Different digesters and sizing.Fuel cell: Classification – Efficiency – VI characteristics.

Geothermal: Classification – Dry rock and acquifer – Energy analysis.

Text Books:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis -second edition, 2013.
3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford

Reference Books:

1. Renewable Energy- Edited by Godfrey Boyle-oxford university, press, 3rd edition, 2013.
2. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
3. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
4. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI. Non conventional energy source –B.H. Khan- TMH-2nd edition.

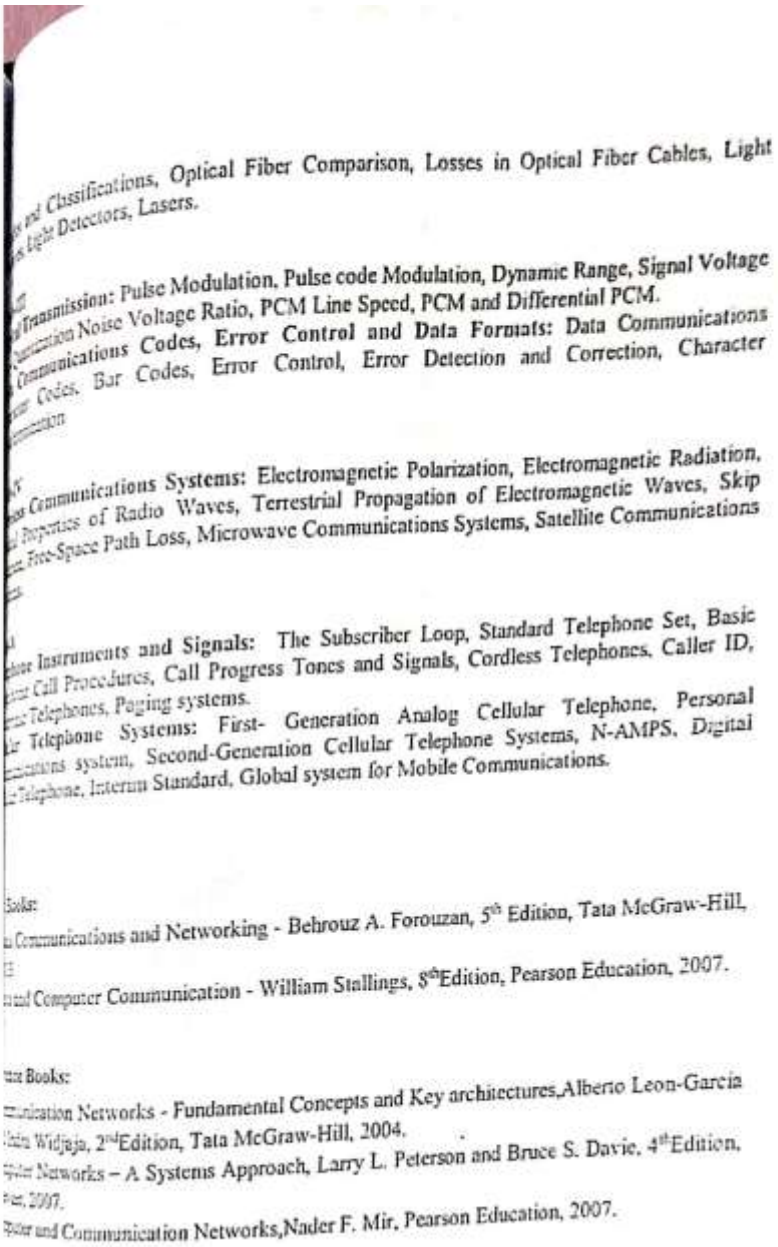
Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th Semester)			
DATA COMMUNICATION (Open Elective)				
Total Contact Hours - 50	L	T	P	C
Electronic Devices & Circuits, Switching Theory and Logic, Circuit Analysis.	3	-	-	3

Objectives:
- comprehend the transmission technique of digital data between two or more computers and computer network that allows computers to exchange data.
- explain the basics of data communication and various types of computer networks.
- illustrate TCP/IP protocol suite and switching criteria.
- demonstrate Medium Access Control protocols for reliable and noisy channels.
- expose wireless and wired LANs along with IP version.

Completion of the course, students will be able to	
	Understand and explain Data Communications System and its components.
	Enumerate the layers of the OSI model and TCP/IP and explain function(s) of each layer.
	Apply error detection and correction techniques to determine the error rate.
	Identify the different types of network topologies and protocols.
	Familiarity with the basic wireless networks, and how they can be used to assist in network design and implementation.

...ction: Data Communications Circuits, Serial and parallel Data Transmission, Data ...ication Networks, Alternate Protocol Suites.
...Noise, **Modulation, And Demodulation:** Signal Analysis, Electrical Noise and Signal-to-..., Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and *M*-ary ... Digital Modulation.

...Cable Transmission Media: Metallic Transmission Lines, Transverse Electromagnetic ... Characteristics of Electromagnetic Waves
...Fiber Transmission Media: Advantages of Optical Fiber cables, Disadvantages of Optical ..., Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, ... Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber



and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light
Detectors, Lasers.

Transmission: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage
Noise Voltage Ratio, PCM Line Speed, PCM and Differential PCM.
Communications Codes, Error Control and Data Formats: Data Communications
Codes, Bar Codes, Error Control, Error Detection and Correction, Character

Communications Systems: Electromagnetic Polarization, Electromagnetic Radiation,
Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip
Free-Space Path Loss, Microwave Communications Systems, Satellite Communications

Instruments and Signals: The Subscriber Loop, Standard Telephone Set, Basic
Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID,
Telephones, Paging systems.
Telephone Systems: First- Generation Analog Cellular Telephone, Personal
system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital
Telephone, Interim Standard, Global system for Mobile Communications.

Books:
Communications and Networking - Behrouz A. Forouzan, 5th Edition, Tata McGraw-Hill,

and Computer Communication - William Stallings, 8thEdition, Pearson Education, 2007.

Books:
Communication Networks - Fundamental Concepts and Key architectures,Alberto Leon-Garcia
Widjaja, 2ndEdition, Tata McGraw-Hill, 2004.
Networks – A Systems Approach, Larry L. Peterson and Bruce S. Davie, 4thEdition,
2007.
and Communication Networks,Nader F. Mir, Pearson Education, 2007.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem. (7 semester)			
Course Code 19150701	**HUMAN COMPUTER INTERACTION (OPEN ELECTIVE)**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Fundamentals of Programming		3	0	0	3

Course Objective(s):

- How to design and evaluate interactive technologies.

Course Outcome(s):

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

CO-1: Explain the capabilities of both humans and computers from the viewpoint of human information processing.

CO-2: Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.

CO-3: Apply an interactive design process and universal design principles to designing HCI systems.

UNIT-1

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing **Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

UNIT-2

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT-3

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing **Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

UNIT-4

Balancing Function and Fashion: Introduction, Error Messages, Non-anthropomorphic Design, Display Design, Web Page Design, Window Design, Color.
User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

UNIT-5

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces
Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Text books

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books

1. Human Computer, Interaction Dan R.Olsan, Cengage, 2010
2. Designing the user interface. 4/e, Ben Shneidermann, PEA.
3. User Interface Design, SorenLauesen , PEA
4. 4.Interaction Design PRECE, ROGERS, SHARPS, Wiley.

Web Links:

https://nptel.ac.in/courses/106/103/106103115/

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B. Tech. II Sem. (6th Semester)			
Course Code	**Remote Sensing & GIS In Mining** (Open Elective-3)				
Teaching	Total contact hours - 50	L	T	P	C
Prerequisites: Basic computer knowledge and Basic physics, Mine surveying		3	0	0	3

Course Objectives

1. To discuss the basic principles of Remote Sensing.
2. To elaborate the concepts of visual and digital image analysis.
3. To illustrate the concepts of GIS.
4. To impart the knowledge on the concept of spatial analysis.
5. To communicate the applications of remote sensing and GIS.

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Outline the basic principles of Remote Sensing.
CO2:	Develop the concepts of visual and digital image analysis.
CO3:	Summarize the basic concepts of GIS.
CO4:	Perform spatial analysis.
CO5:	Apply knowledge of remote sensing and GIS in various fields.

Syllabus

UNIT –I

Introduction to remote sensing

Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere; energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms

Introduction, types of sensors; airborne remote sensing, space borne remote sensing; image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential; IRS, LANDSAT, SPOT, Advanced sensors and its applications.

UNIT –II

Image analysis

Introduction, elements of visual interpretations, digital image processing- image pre-processing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT -III

Geographic Information System

Introduction, key components, application areas of GIS, map projections.

Data entry and preparation

Spatial data input, raster data models, vector data models.

UNIT -IV

Spatial data analysis

Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT -V

Applications of Remote sensing and GIS

Land cover and land use pattern, forestry, geology, geomorphology and mining operations.

Text books

1. Bhatta B, Remote sensing and GIS, Oxford University Press, 2008.
2. Narayan LRA, Remote Sensing and its Applications, Universities Press, 2012.

Reference Books

1. Lilles and, T.M, R.W. Kiefer and J.W. Chipman, Remote Sensing and Image Interpretation, Wiley India Pvt. Ltd., New Delhi, 2013.
2. Chor Pang Lo and A K W Yeung, Concepts and Techniques of Geographical Information System, Prentice Hall (India), 2006.
3. Kand Tsung Chang, Introduction to Geographic Information Systems, McGraw Hill Higher Education, 2009.
4. George Joseph, Fundamentals of Remote Sensing, Universities Press, 2013.
5. Demers, M.N, Fundamentals of Geographic Information Systems, Wiley India Pvt. Ltd, 2013.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6th semester)			
Course Code	MODERN VEHICLE TECHNOLOGY Open Elective – III				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		3	0	0	3

Course Objectives:

1. To make the student to design and develop modern vehicles
2. To make the student to analyze and control the exhaust emissions and noise
3. To make the student to analyze the vehicle operation and incorporate and develop the electronic control systems
4. To make the student to distinguish and choose the fuel injection system

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Design and develop modern vehicles
CO2:	Analyze and control the exhaust emissions and noise
CO3:	Analyze the vehicle operation and incorporate and develop the electronic control systems
CO4:	Distinguish and choose the fuel injection system
CO5:	Classify the design analysis of injection systems

Syllabus:

UNIT-I

Trends in Automotive Power Plants: Hybrid Vehicles - Stratified charged / lean burn engines -Hydrogen Engines-Electric vehicles-Magnetic track vehicles solar powered vehicle Combined power source vehicle, types of hybrid drives, Toyota hybrid system.

UNIT-II

Suspension: Interconnected air and liquid suspensions, Hydrolastic suspension system, Hydra gas suspension.

Braking systems and safety: Modern rear wheel brake, indirect floating caliper disc brake, self energizing disc brake, brake limiting device, anti-slide system, Ford Escort and Orion anti lock system. Closed loop suspension; Regenerative braking; Passenger comfort.

IT-III

...ion and Noise Pollution Control: Introduction, Engine emissions, types of catalytic ...ersion, open loop and closed loop operation to the oxidizing catalytic converter, ...rative emissions, Internal and External Noise, Identification of Noise sources, Noise ...rol Techniques. SCR, DPF and DOC.

IT-IV

...cle Operation and Control: Fundamentals of Automotive Electronics - sensors, ...ators, Processors. Computer Control for pollution, noise and for fuel economy - ...ronic Fuel Injection and Ignition system.

IT-V

...Injection Systems: SPFI, MPFI, DI, Pilot Injection, Unit Injection. CRDI; Two ...eeler Technology: DTS- i, DTS - Fi, DTS - Si; Four Wheeler Technology: WT, Cam less ...ine, GDI.

...T BOOKS:

Crouse/Anglin "Automotive Mechanics"
...Newton, W.Steeds "The Motor Vechicle"

...ERENCES

K.K. Ramalingam, "Automobile Engineering", Scitech Publications Pvt. Ltd., 2005
Dr. N.K. Giri, "Automobile Mechanic", Khanna Publishers, 2006
Heinz Heisler "Advanced Vehicle Technology" ELSEVIER

...O Mapping:

...ght [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

GRBT19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	CONSTITUTION OF INDIA (Common To All Branches)				
Teaching	Totalcontacthours-48				
		L	T	P	C
		3	0	0	0

Course Objectives:

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

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand historical background of the constitution making and its importance for building a democratic India.
CO2:	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO3:	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO4:	Analyze the decentralization of power between central, state and local self-government.
CO5:	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

UNIT I

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

UNIT II

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

UNIT III

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

UNIT VI

ocal Administration - District's Administration Head - Role and Importance. Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles. CEO ZilaPanchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women.

References:

1.Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi

2.SubashKashyap, Indian Constitution, National Book Trust

3.J.A. Siwach, Dynamics of Indian Government & Politics

4.D.C. Gupta, Indian Government and Politics

5.H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

6.J.C. Johari, Indian Government andPolitics Hans

7.J. Raj IndianGovernment and Politics

8.M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

9.Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

Web Links:

1.nptel.ac.in/courses/109104074/8

2.nptel.ac.in/courses/109104045/

3.nptel.ac.in/courses/101104065/

4.www.hss.iitb.ac.in/en/lecture-details

5.www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	**Heat Transfer Lab**				
Teaching	Total Contact hours-55	L	T	P	C
Prerequisite(s): Thermo Dynamics and Fluid Mechanics		0	0	0	3

Course Objectives:

- To understand the various modes of heat transfer and their applications in real life problems.
- To understand the concepts of overall heat transfer coefficient in various geometries using conduction heat transfer.
- To learn the estimation of heat transfer in free and forced convection.
- To learn the concepts of radiation heat transfer.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Evaluate the conduction, convection and radiation heat transfer through experiments.
CO2:	Analyze the problems involving steady state and transient heat conduction in simple geometries.
CO3:	Evaluate heat transfer coefficients for natural convection and forced convection.
CO4:	Estimate the LMTD of heat exchanger.
CO5:	Evaluate the Stefan Boltzmann constant and emissivity of different bodies in radiation.

Syllabus:

1. Determination of overall heat transfer co-efficient of a composite slab.
2. Determination of heat transfer rate through a lagged pipe.
3. Determination of thermal conductivity of a metal rod.
4. Determination of heat transfer coefficient in natural convection.
5. Determination of heat transfer coefficient in forced convection.
6. Determination of effectiveness of parallel and counter flow heat exchangers.
7. Determination of emissivity of a given surface.
8. Determination of Stefan Boltzmann constant.
9. Determination of heat transfer rate in drop and film wise condensation.
10. Determination of critical heat flux.
11. Demonstration of heat pipe.
12. Study of two – phase flow.
13. Determination of thermal conductivity of an insulating powder.
14. Determination of the heat transfer coefficient, fin efficiency and temperature distribution of a pin-fin in natural convection.
15. Determination of the heat transfer coefficient, fin efficiency and temperature distribution of a pin-fin in forced convection.
16. Determination of Heat transfer coefficient of horizontal tube in natural convection.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6^{th} semester)			
Course Code	**Metrology and Instrumentation Lab**				
Teaching	Total Contact hours-55	L	T	P	C
Prerequisite(s): Engineering Physics, Metrology and Instrumentation.		0	0	0	3

Course Objectives:

- Able to learn the use of various measuring instruments like sine bar , bevel protractor, slip gauges , dial indicators and spirit level
- Able to learn the calibration process of measuring instruments.
- Able to measure the parameters of temperature, pressure, fluid flow and displacement by using different instruments.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Measure the linear and angular dimensions of components using vernier calipers, outside micrometers , bevel protractor, sine bar and transducers etc.
CO2:	Assess the accuracy and errors of measuring instruments.
CO3:	Check the machine tool alignment using dial indictors and spirit level.
CO4:	Calibrate instruments to measure fluid flow, temperature, speed, pressure and displacement.
CO5:	Investigate the vibration parameters using vibrometers.

Note: The students have to conduct at least 8 experiments from each lab.

METROLOGY LAB

1. Measurement of lengths, heights, diameters using vernier callipers, micrometers.
2. Measurement of gear parameters using gear tooth vernier.
3. Measurement of cylinder bore using inside micrometers and bore gauge.
4. Machine tool alignment test on the lathe.
5. Machine tool alignment test on drilling machine.
6. Machine tool alignment test on milling machine.
7. Angle and taper measurements with bevel protractor, Sine bar.
8. Use of spirit level in finding the straightness of a bed and flatness of a surface.
9. Measurements using Optical Projector / Toolmaker Microscope.

INSTRUMENTATION LAB

1. Calibration of transducer for temperature measurement.
2. Study and calibration of LVDT transducer for displacement measurement.
3. Calibration of strain gauge.
4. Calibration of thermocouple.
5. Calibration of capacitive transducer.
6. Study and calibration of photo and magnetic speed pickups.
7. Calibration of resistance temperature detector.
8. Study and calibration of a rotameter.
9. Study and calibration of Mcleod gauge for low pressure.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
Course Code	**Finite Element Methods**				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): Engineering Mathematics, Strength of Materials, , Heat transfer, CAD/CAM.		2	1	0	3

Course Objectives:

- To learn basic concepts of finite element analysis.
- To learn the theory and characteristics of finite elements that represent engineering structures.
- To Learn the method of solving a characteristic equation of given problem.
- To learn and apply finite element solutions to structural, thermal and dynamic problems.
- To impart skills needed to effectively evaluate finite element analyses.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Illustrate the concepts behind variational and weighted residual methods in FEM.
CO2:	Analyze the applications and characteristics of finite element modeling.
CO3:	Investigate element characteristic equation and generate global stiffness matrix.
CO4:	Apply suitable boundary conditions to a global structural matrix equation and reduce it to solvable form.
CO5:	Identify an appropriate FEM approach to solve problems involving dynamics and heat transfer.

Syllabus:

UNIT-I

INTRODUCTION TO FINITE ELEMENT METHODS: Stresses and Equilibrium – Strain-Displacement Relations – Stress-Strain Relations, Plane Stress and Plane Strain Conditions – Variational and Weighted Residual Methods – Concept Of Potential Energy.

STATIC ANALYSIS: One Dimensional Problems – Discretization Of Domain, Element Shapes – Discretization Procedures – Assembly Of Stiffness Matrix, Band Width, Node Numbering – Mesh Generation – Interpolation Functions – Local and Global Coordinates, Convergence Requirements – Treatment Of Boundary Conditions.

UNIT -II

ANALYSIS OF TRUSSES: Finite Element Modeling – Coordinates and Shape Functions – Assembly Of Global Stiffness Matrix and Load Vector – Finite Element Equations – Treatment of Boundary Conditions – Stress, Strain And Support Reaction Calculations.

ANALYSIS OF BEAMS: Element Stiffness Matrix for Hermite Beam Element – Derivation Of Load Vector For Concentrated And Udl – Simple Problems On Beams.

UNIT- III

TWO DIMENSIONAL PROBLEMS: Finite Element Modeling of Two Dimensional Stress Analysis with Constant Strain Triangles And Treatment of Boundary Conditions.

AXISYMMETRIC PROBLEMS: Introduction – Axisymmetric Formulation – Finite Element modeling: Types of elements, triangular element.

UNIT -IV

HIGHER ORDER AND ISO-PARAMETRIC ELEMENTS: One Dimensional Quadratic and Cubic Elements in Natural Coordinates – Two Dimensional Four Noded Iso-Parametric Elements and Numerical Integration.

UNIT -V

STEADY STATE HEAT TRANSFER ANALYSIS: One Dimensional Analysis of A Fin and Two Dimensional Analysis of Thin Plate – Analysis of A Uniform Shaft Subjected To Torsion.

DYNAMIC ANALYSIS: Formulation of Finite Element Model – Element Consistent and Lumped Mass Matrices – Evaluation of Eigen Values and Eigen Vectors – Free Vibration Analysis.

Text Books:

1. Introduction to Finite Elements in Engineering, Tirupathi R. Chandrupatla, Ashok D.Belegundu, Fourth Edition, Pearson education, 2011.
2. Finite Element Analysis by Md.S.Jalaluddin.
3. The Finite element method in engineering, S.S.Rao, 5th edition, Elsevier publications, 2010.

References:

1. Finite element analysis, S.S. Bhavikatti, New Age International, 2005.
2. Finite Element Analysis: Theory and Programming, C.S. Krishnamoorthy, Tata McGrawHill Education, 1995.
3. An introduction to the Finite element method, JN Reddy, McGraw Hill Education, 3rd edition, 2005.

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
Course Code	**CAD/CAM**				
Teaching	Totalcontacthours-60	L	T	P	C
Prerequisite(s): Computer Graphics		3	0	0	3

Course Objectives:

- To learn the basic concepts of computer aided design / manufacturing.
- To understand geometric modeling and manipulation methods.
- To familiarize with the part programming of NC and CNC machines.
- To Understand and concepts of Group Technology, CAQC, FMS and CIM.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the basic concepts of CAD and Computer graphics.
CO2:	Use the mathematical models to represent various geometries.
CO3:	Compose the part programs for engineering components.
CO4:	Explain the concepts of Group Technology and Computer Aided Quality Control.
CO5:	Discuss the elements of Flexible Manufacturing Systems and Computer Integrated Manufacturing .

Syllabus:

UNIT – I

Computers in industrial manufacturing, product cycle, CAD / CAM Hardware, basic structure, CPU, memory types, input devices, display devices, hard copy devices, storage devices.

COMPUTER GRAPHICS: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT -II

GEOMETRIC MODELING: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

DRAFTING AND MODELING SYSTEMS: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – III

PART PROGRAMMING FOR NC MACHINES: NC, NC modes, NC elements, CNC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Automatically Programmed Tools(APT),Computer Aided Part Programming, Direct Numerical Control, Adaptive Control.

UNIT –I V

GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, types and advantages. Computer aided processes planning – importance, types **COMPUTER AIDED QUALITY CONTROL:** Terminology used in quality control, use of computers in Quality control. Inspection methods- contact and noncontact types, computer aided testing.

UNIT – V

FLEXIBLE MANUFACTURING SYSTEMS: Introduction to FMS– Development of manufacturing systems – Benefits – Major elements – Types of flexibility – FMS application.

COMPUTER INTEGRATED MANUFACTURING SYSTEM: Types of manufacturing system, material handling systems, material requirement planning, computer control systems, human labor in manufacturing systems, CIM benefits.

Text Books:

1."CAD/CAM" E Zimmers & M.P Groover, Pearson,1st edition,2003.
2."Automation, Production systems & Computer integrated Manufacturing**"** M.P Groover, Pearson,4th edition,2016.

References:

1."CAD / CAM Theory and Practice", Ibrahim Zeid & R. Sivasubrmnin, Mc grw Higher Ed, 1st edition, 2003.
2."Principles of Computer Aided Design and Manufacturing", Farid Amirouche,Prentice Hall, , 2nd edition, 2004.
3."Computer Numerical Control Concepts and programming", Warren S Seames, Delmar Cengage Learning, 4th edition,2001.
4." Product manufacturing and cost estimation using CAD/CAE", Kuang Hua Chang, Elsevier, 1st edition, 2013.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} semester)			
Course Code	**Power Plant Engineering (Department Elective-III)**				
Teaching	Total contact hours- 64	L	T	P	C
Prerequisite(s): Thermal Engineering		3	0	0	3

Course Objectives:

- To gain the basic knowledge on power plants operating with various energy sources.
- To understand diesel, gas and hydro electric power plant elements and their operations.
- To discuss the nuclear power plant operation using various reactors.
- To compare various combined plants and usage of instruments to measure various pollutants.
- To understand power plant economics and impact on environment.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Illustrate various power plant layouts and their working principles.
CO2:	Describe various elements involved in different power plants.
CO3:	Explain Nuclear power plants with various reactors.
CO4:	Analyze various combined plants and find importance of measurement of pollutants.
CO5:	Evaluate economic parameters and pollutants and their prevention.

Syllabus

UNIT - I

INTRODUCTION: Introduction to the sources of energy - Resources and Development of power in India – Power generation concepts.

STEAM POWER PLANT: Plant layout, design of plant layout, working of different circuits, fuel and handling equipment's, coal handling, coal storage, ash handling systems. Coal combustion: Properties of coal - Overfeed and Underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, advantages & disadvantages, - Ball mills – Bowl mills - Combustion needs and draught system, cyclone furnace, design and construction, dust collectors, ESPs - Cooling towers - and Feed water treatment..

UNIT - II

DIESEL POWER PLANT: Plant layout with auxiliaries - Fuel supply system, air starting equipment, super charging – Advantages and Disadvantages.

GAS TURBINE PLANT: Introduction – Components of gas turbine - Classification – Gas power plant layout with auxiliaries, combined cycle power plants and comparison.

HYDRO ELECTRIC POWER PLANT: Water power - Hydrological cycle - Flow measurement - Drainage area characteristics - Hydrographs - Storage and Pondage - Classification of dams and spill ways – Typical hydro electric power plant operation.

HYDRO PROJECTS AND PLANT: Classification - Typical layouts - Plant auxiliaries - Plant operation - Pumped storage plants.

UNIT – III

NUCLEAR POWER STATION: Nuclear Energy-Fission, fusion reaction nuclear fuel- Breeding and fertile materials - Nuclear reactor - Reactor operation. Environmental considerations.

REACTORS: Types- Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor, homogeneous reactor, gas cooled reactor, radiation hazards and shielding - Radioactive waste disposal.

UNIT - IV

COMBINED OPERATIONS OF DIFFERENT POWER PLANTS:

Introduction, advantages of combined working, load division between power stations, storage type hydro-electric plant in combination with steam plant, run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant, co-ordination of hydro- electric and gas turbine stations, co-ordination of hydro-electric and nuclear power stations, co-ordination of different types of power plants.

POWER PLANT INSTRUMENTATION AND CONTROL: Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O_2 and CO_2 measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

UNIT – V

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: General arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor - Related calculations. Costs associated with power production. Effluents from power plants and their Impact on environment - Pollutants and pollution standards - Methods of pollution control.

Text Books:

1. "A course in Power Plant Engineering," Arora and Domkundwar, Dhanpatrai & Co, 6 ed, 2013.
2. "Power Plant Engineering," P.C. Sharma/ S.K. KatariaPub, 2013.

References:

1. "Power Plant Engineering,"P.K. Nag,TMH Pub, 2 ed,2006.
2. "Power station Engineering," ElWakil, McHill.
3. "An Introduction to Power Plant Technology,"G.D.Rai,Khanna Pub; 3 ed, 1987.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} semester)			
Course Code	**Mechanical Vibrations (Department Elective-III)**				
Teaching	Totalcontacthours-62	L	T	P	C
Prerequisite(s): Engineering Physics, Engineering mechanics		3	0	0	3

Course Objectives:

- To understand the fundamentals of different motions and vibrations.
- To study about damped and un-damped vibrations under single degree of freedom.
- To study about un-damped vibrations under two and multi degrees of freedom and also torsional vibrations.
- To learn various vibration measuring instruments.
- To understand the concepts of modal analysis and condition monitoring.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the types of vibrations with simple harmonic motion.
CO2:	Explain the un-damped vibration systems with single degree of freedom.
CO3:	Discuss the damped and forced vibration systems with single degree of freedom.
CO4:	Analyze the torsional vibrations of multi degree of freedom and its measurement.
CO5:	Examine the modal analysis and condition monitoring of vibration systems.

Syllabus:

UNIT-I

Introduction: Definitions, Types of vibrations, Simple Harmonic Motion (S.H.M.), Work done by harmonic force, Principle of super position applied to SHM, Beats, Fourier theorem and problems.

UNIT-II

Un-damped (Single Degree of Freedom) Free Vibrations: Derivations for spring mass systems, Methods of Analysis, Natural frequencies of simple systems, Springs in series and parallel, Torsional and transverse vibrations, Effect of mass of spring and Problems.

UNIT-III

Damped free vibrations (Single Degree of Freedom): Types of damping, Analysis with viscous damping - Derivations for over, critical and under damped systems, Logarithmic decrement and Problems.

Forced Vibrations (Single Degree of Freedom): Introduction, Analysis of forced vibration with constant harmonic excitation - magnification factor, rotating and reciprocating unbalances, excitation of support (relative and absolute amplitudes), force and motion transmissibility, Energy dissipated due to damping and Problems.

UNIT-IV

Vibration Measuring Instruments and Whirling of shafts: Seismic Instruments Vibrometers, Accelerometer, Frequency measuring instruments and Problems. Whirling of shafts with and without damping, critical speed of shafts and Problems.

Systems with two degrees of Freedom: Principle modes of vibrations, Normal mode and natural frequencies of systems (without damping) – Simple spring mass systems, masses on tightly stretched strings, double pendulum, torsional systems, combined rectilinear and angular systems, geared systems and Problems. Undamped dynamic vibration absorber and Problems.

UNIT- V

Numerical Methods for multi degree freedom of systems: Introduction, Maxwell's reciprocal theorem, Influence coefficients, Rayleigh's method, Dunkerley's method, Stodola method, Holzer's method, Orthogonality of principal modes, method of matrix iteration and Problems

Modal Analysis and Condition Monitoring: Signal analysis, dynamic testing of machines and structures, Experimental modal analysis, Machine condition monitoring and diagnosis.

Text Books:

1.Elements Of Vibration Analysis 2nd Edition by Meirovitch L , McGraw Hill, March 2014.
2.Mechanical Vibrations by V.P.Singh.

Reference Books:

1.Mechanical Vibrations / SS Rao / Pearson
2.Mechanical Vibrations /Rao V. Dukkipati , J Srinivas/ PHI
3.Mechanical Vibrations by Shcam Series.
4.Vibration Analysis by Nakra.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} semester)			
Course Code	**Automobile Engineering (Department Elective-III)**				
Teaching	Total contact hours – 64	L	T	P	C
Prerequisite(s): Internal Combustion Engines		3	0	0	3

Course Objectives:

- To study basic and advanced automobile systems and subsystems.
- To impart knowledge on the construction and operating principle of automobile engine and auxiliary systems.
- To Understand the Vehicle Noise, Vibrations, Harshness, Comfort and Safety Systems.
- To analyze the feasibility of alternate fuels / power source and emission control.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe various functional components of an Automobile.
CO2:	Explain engine auxiliary systems used in SI and CI engine.
CO3:	Compare manual transmissions systems with automatic transmission systems.
CO4:	Illustrate the working of steering, braking and the suspension systems.
CO5:	Justify the importance of alternative fuels.

Syllabus:

UNIT-I

INTRODUCTION: Components of a four-wheeler automobile, types of automobiles, Chassis types, power unit, power transmission, rear wheel drive, front wheel drive, Four wheel drive, Advantages and disadvantages, types of automobile engines, cylinder liners-dry and wet, naturally aspirated engines, turbo charging and super charging.

LUBRICATION SYSTEM: Necessity, functions of lubrication, properties of lubricants and grading, lubrication systems and types, oil filters, oil pumps, crankcase ventilation, waste oil disposal methods.

UNIT -II

S.I. ENGINE FUEL SYSTEM: Fuel supply systems, Mechanical and electrical fuel pump, filters, simple carburetor and its functions, modern carburetors – Zenith & Solex, Air Filters, Gasoline Direct Injection (GDI), Multipoint Fuel Injection system (MPFI), Selection of fuel injection system.

C.I. ENGINE FUEL SYSTEM: Requirements of diesel injection systems, types of injection systems, fuel pump- types, fuel injectors-types, Common Rail Direct Injection System (CRDI).

COOLING SYSTEM: Cooling requirements, air cooling, liquid cooling, Types, cooling thermo, and forced circulation System, Radiators-Types, Cooling Fan, water pump, thermostat, antifreeze solutions.

UNIT- III

IGNITION SYSTEM: Function of an ignition system, battery ignition system, auto transformer, contact breaker points, condenser and spark plug, magneto coil ignition system, electronic ignition system (CDIS & TACIS), Ignition Timings- Ignition advance and its necessity, Centrifugal Spark Advance Mechanism, Vacuum advance mechanism.

ELECTRICAL SYSTEM: Charging system, cut-off relay, starting system, Bendix drive, Horn, wiper, Fuel gauge, oil pressure gauge, and Engine temperature indicator electrical circuit of automobile.

UNIT -IV

TRANSMISSION SYSTEM: Types of clutches -single plate, multi plate, and centrifugal clutches, fluid fly wheel, gear box- types, sliding mesh, constant mesh, synchromesh, over drive,torque converter, Propeller shaft – Hotchkiss drive, Torque tube drive, universal joint, differential, rear axles.

UNIT -V

STEERING SYSTEM: Steering geometry – camber, castor, king pin rake, combined angle toe-in, toe out, center point steering. Steering gears – types, steering linkages, Stub axle, power steering.

SUSPENSION SYSTEM: Elements of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension systems (Wishbone, Macpherson Strut).

BRAKING SYSTEM: Types - Mechanical, hydraulic, pneumatic & vacuum suspended servo-brake system, brake fluids and properties.

Text Books:

1. Kirpal Singh, Automobile Engineering, Volume-I & Volume-II, Tata McGraw Hill, New Delhi,2012.
2. V.M Domkundwar, Automobile Engineering, Dhanpatrai& Co,1/e, New Delhi, 2008.

References:

1. Dr. N. K. Giri, Automobile Mechanics, 5/e, Khanna Publications, 2014
2. Heitner J, Automotive Mechanics, 2/e, CBS Publications, 2000.
3. William H Crouse, Automotive Mechanics, McGraw Hill Education (India)Private Limited, 10th edition.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
Course Code	**Advanced Manufacturing Processes (Department Elective-III)**				
Teaching	Total contact hours-55	L	T	P	C
Prerequisite(s): Production Technology and Metal Cutting and Machine Tools.		3	0	0	3

Course Objectives:

- To understand Surface Treatments methods for different applications.
- To learn about Non-Traditional Machining techniques.
- To understand working principle of Electric Discharge Machining and WEDM.
- To study the concepts of IBM, LBM, EDM and PAM.
- To learn about concepts and manufacturing of composites.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Select suitable surface treatment technique for any given application.
CO2:	Describe working principles of mechanical energy based nontraditional machining processes.
CO3:	Discuss different electro chemical and discharge machining processes and also their applications.
CO4	Describe working principles and applications of IBM, LBM, EBM and PAM.
CO5	Explain various manufacturing techniques of composites.

Syllabus

UNIT - I

Surface Treatment: Scope, Cleaners, Methods of cleaning, Surface coating types - Ceramic and organic methods of coating, Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, diamond coating and cladding, economics of coating.

UNIT - II

Non-Traditional Machining: Classification of unconventional machining processes and their capabilities, Ultrasonic Machining(USM), Abrasive jet machine(AJM),Water jet machining(WJM) .
Mechanism of material removal, Process Parameters –Effects on material removal rate and surface finish,
Electro Chemical Machining – Principle of working, equipment, performance characterization, Applications.

UNIT - III

Electric discharge machining (EDM), Wire EDM – Mechanism of material removal, Process Parameters – Effects on material removal rate and surface finish, Electro chemical discharge grinding.

UNIT – IV

Ion Beam Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.
Laser Beam Machining – Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.
Plasma Arc Machining – Principle of working, equipment, Material removal rate, Process parameters,

performance characterization, Applications.
Electron Beam Machining - Principle of working, equipment, Material removal rate, Process parameters, performance characterization, Applications.

UNIT - V
Manufacturing of Composites: Reinforcements and its types- Classification of composites, MMC, Polymer matrix composites, manufacturing methods, stir casting, laser melt technique, friction stir processing, hand layup process and other techniques.

Text Books:

1. Manufacturing Engineering and Technology, Kalpakijian, Adisson Wesley, 7th edition 2018.
2. Process and Materials of Manufacturing, R. A. Lindburg, 4th edition, PHI 2015.

References:

1. Advanced Machining Processes, V.K.Jain, Allied Publications.
2. Introduction to Manufacturing Processes, John A Schey, McGraw Hill.
3. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), By Autar K. Kaw, CRC Publisher, 2006.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
Course Code	**Gas Dynamics and Jet Propulsions (Department Elective-IV)**				
Teaching	Total contact hours-62	L	T	P	C
Prerequisite(s): Thermodynamics, Fluid Mechanics		2	1	0	3

Course Objectives:

- To learn the fundamental concepts of Thermodynamics and fluid mechanics.
- To solve problems of fluid flow through ducts with and without heat flow including friction.
- To describe the changes in fluid flow properties across shock waves in various flow regions.
- To find performance parameters of jet propulsion engines.
- To examine Space (Rocket) propulsion engines and their performance parameters.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Solve basic problems of thermodynamics and fluid mechanics.
CO2:	Solve fluid flow problems through ducts with and without heat flow including friction.
CO3:	Analyze the change in flow properties across shock waves in different flow regions.
CO4:	Examine performance of jet propulsion engines.
CO5:	Find the performance of Rocket engines using principles of gas dynamics.

Syllabus:

UNIT -I

BASIC CONCEPTS AND ISENTROPIC FLOWS: Energy and momentum equations of compressible fluid flows – Stagnation states, Mach waves and Mach cone – Effect of Mach number on compressibility – Isentropic flow through variable ducts – Nozzle and Diffusers – Use of Gas tables.

UNIT -II

FLOW THROUGH DUCTS: Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow) – variation of flow properties – Use of tables and charts – Generalised gas dynamics.

UNIT -III

NORMAL AND OBLIQUE SHOCKS: Governing equations – Variation of flow parameters across the normal and oblique shocks – Prandtl – Meyer relations – Use of table and charts – Applications.

UNIT- IV

JET PROPULSION: Theory of jet propulsion principle of operation, cycle analysis – Thrust equation – Thrust power and propulsive efficiency, use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines.

UNIT -V

SPACE PROPULSION: Types of rocket engines, theory of rocket propulsion – Propellants-feeding systems – Ignition and combustion –Performance study – Staging – Terminal and characteristic velocity – Applications – Space flights.

Text Books:

1. Anderson, J.D., Modern Compressible flow, McGraw Hill, 2017.
2. S.M. Yahya, fundamentals of Compressible Flow, New Age International (P) Limited, New Delhi, 2003.

References:

1. P. Hill and C. Peterson, Mechanics and Thermodynamics of Propulsion, Addison – Wesley Publishing company.
2. G.P. Sutton, Rocket Propulsion Elements, John wiley, New York.
3. V. Ganesan, Gas Turbines, Tata McGraw Hill Publishing Co, New Delhi.
4. PR.S.L. Somasundaram, Gas Dynamics and Jet Propulsions, New Age International Publishers.
5. V. Babu, Fundamentals of Gas Dynamics, ANE Books India, 2008.
6. Ethirajan Rathakrishnan, Applied Gas Dynamics, Wiley-India Edition.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B. Tech. I Sem. (7^{th} Semester)			
Course Code	**Micro Electro Mechanical Systems (Department Elective-IV)**				
Teaching	Totalcontacthours-64	L	T	P	C
Prerequisite(s):	Engineering Physics, Basic Electronics.	3	0	0	3

Course Objectives:

- To understand the operation of major classes of MEMS devices/systems.
- To learn the fundamentals of standard micro fabrication techniques and processes.
- To understand the unique demands, environments and applications of MEMS devices.

Course Outcomes:

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

Syllabus

Unit – I

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

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

Unit – II

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, – 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 – III

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

Unit – IV

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

Unit – V

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

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

Text Books:

1."MEMS", NitaigourPremchandMahalik, TMH Publishers, 1st Edition, 2008.

References:

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
Course Code	**Design for Manufacturing (Department Elective-IV)**				
Teaching	Total contact hours - 56	L	T	P	C
Prerequisite(s): Fundamentals of Production Technology and Metal cutting and Machine tools		3	0	0	3

Course Objectives:

- To understand the complex interrelationships between design and manufacturing.
- To explore and understand basic manufacturing processes.
- To identify the various process parameters of manufacturing processes.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the design rules for manufacturability with economical aspects.
CO2:	Investigate different machining processes to attain design tolerances.
CO3:	Identify the suitable casting method and process parameters for a given component.
CO4:	Design of weldments and bulk forming processes.
CO5:	Recommend the design parameters for sheet metal forming and processing of plastics .

Syllabus:

UNIT - I

Design Philosophy: Design for assembly and evaluation, minimum part assessment. Design for minimum number of parts, development of modular design, minimizing part variations, design of parts to be multi-functional, multi-use, ease of fabrication.

General design rules for manufacturability-Basic principles of designing for economical production - Creativity in design.

UNIT –II

Machining processes: Overview of various machining processes-General design rules for machining-Surface finish, review of relationship between attainable tolerance grades and different machining processes. Analysis of tapers, screw threads, applying probability to tolerances.

Design for machining - Ease –Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT – III

Metal casting: Appraisal of various casting processes, selection of casting process- General design considerations for casting-Casting Tolerance, solidification, simulation in casting design - Product design rules for sand casting. Redesign of castings based on parting line considerations, redesigning cast.

UNIT –IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – General design guidelines-Pre and post treatment of welds effects of thermal stresses in weld joints-Design of brazing and soldering joints.

Forging: Design factors for forging – Closed die forging design – Parting lines of dies – Drop forging die design – General design recommendations. Keeler Goodman forging line diagram.

UNIT - V

Extrusion: Design guide lines extruded sections, Design factors for direct, indirect and hydraulic extrusion **Sheet metal work** : Design principles for piercing, blanking, bending Die design for blanking and piercing. Design factors of drawing process.

Plastics: Visco elastic and creep behaviour in plastics-design guidelines for plastic components-Design considerations for injection moulding – Design guidelines for machining and joining of plastics.

Text Books:

1. "Product Design for Manufacture and Assembly", Geoffrey Boothroyd, Peter Dewhurst, Winston A Knight, CRC Press, 3rd Edition, 2010.
2. "Design for Manufacture: Strategies, Principles and Techniques", John Corbett, Mike Dooner, John Meleka, Christopher Pym, Pearson Education.

References:

1."Design for Manufacturability Handbook", James G. Bralla, McGraw Hill, 2nd Edition, 1998
2. "ASM Handbook – Material Selection and Design", George E Dieter, ASM International, Vol. 20, 1997.
3.Spotts M.F., "Dimensioning and Tolerance for Quantity Production", Prentice Hall Inc., 1983.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7^{th} Semester)			
Course Code	**Automation in Manufacturing (Department Elective-IV)**				
Teaching	Totalcontacthours-55	L	T	P	C
Prerequisite(s): Production Technology		3	0	0	3

Course Objectives:

- To attain the knowledge on basic concepts of Automation.
- To learn about line balancing methods.
- To understand the concepts of material handling systems.
- To learn the concepts of adaptive control systems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the different fundamental concepts of automation and its tools.
CO2:	Analyze the automated flow lines & line balancing methods.
CO3:	Classify the automated material handling, automated storage and retrieval systems in industries.
CO4:	Explain the working of adaptive control systems for temperature, vibration, forces etc.
CO5:	Describe various automated inspection methods.

Syllabus:

UNIT – I

INTRODUCTION: Types and strategies of automation - Pneumatic and hydraulic components, circuits - Automation in machine tools, mechanical feeding and tool changing and machine tool control.

AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, buffer storage-control function, Design and fabrication considerations.

UNIT –II

ANALYSIS OF AUTOMATED FLOW LINES - General terminology and analysis of transfer lines without and with buffer storage-partial automation, implementation of automated flow lines-Geneva mechanism.

ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – III

AUTOMATED MATERIAL HANDLING AND STORAGE SYSTEMS: Types of equipment, functions-analysis and design of material handling systems, conveyor systems, automated guided vehicle systems Automated storage and retrieval systems-work in process storage, interfacing handling and storage with manufacturing.

UNIT –IV

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, adaptive control with constraints-application of adaptive control in machining operations.

Consideration of various parameters such as cutting force, temperatures, vibration and acoustic emission in the adaptive controls systems.

UNIT – V

AUTOMATED INSPECTION: Fundamentals types of inspection methods, procedure, accuracy and equipment, Coordinate Measuring Machines - Constructional detail, Programming and Operation, Machine Vision.

Text Books:

1.Automation, Production Systems and Computer Integrated Manufacturing : M.P.GROOVER,/PE/PHI
2.Numerical Control and Computer Aided Manufacture by Pressman and Williams/john wiley/1977

References:

1.Computer Control of Manufacturing Systems by YoramCoren ,McGraw Hill Education India
2. CAD / CAM by Mikell P Groover and Emory W Zimmers/prentice hall/1 dec 1983
3.Manufacturing and Automation Technology by R. Thomas Wright/good heart –willcox pub/ june 2006

Regulation GRIET-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
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	-	-	3

Course Objective:

The objective of this course is

1.To acquaint the students regarding various accounting concepts and its application in managerial decision making.

2.To enable the students to analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.

3.To introduce prospective managers of new ventures to prepare and analyse financial statements.

4.To enable the students understand how organizations make important investment and financing decisions

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Analyze the scope of managerial economics
CO2	Analyze various aspects of managerial economics, production & cost analysis, markets & pricing strategies
CO3	Develop an ability to identify, formulate, and solve engineering problems by applying the subject knowledge of Managerial economics.
CO4	Apply capital budgeting, financial analysis techniques in evaluating various investment opportunities
CO5	Enhance their capabilities in the interpretation of balance sheets are followed in industries, organizations & institutes.

Syllabus:

UNIT –I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT –II

Production and Cost Analyses:
Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns toscale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT –III

Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features, Introduction to e-commerce – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT –IV

Types of Business Organization and Business Cycles:
Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle – Capital Budgeting Techniques.(simple problems)

UNIT –V

Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Subsidiary books- Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

Text books:

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis',
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial

Reference Books:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis,Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.

4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Cengage Publications, New Delhi – 2011
9. Analysis', Ravindra Publication.

CO-PO Mapping:

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

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

GRBT19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	ENTREPRENEURSHIP SKILLS FOR ENGINEERS (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
		3	-	-	3

Course Objectives:

To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

Course Outcomes:

On Completion of the course, the students	
CO1:	Can know the importance of entrepreneurship in economic developments, ethics and its social responsibility
CO2:	Can understand the business plan its scope, implementation in marketing and Launching.
CO3:	Can able to know the finance resources, motivating, marketing and internet advertising.
CO4:	Can understand the problems related to selection of layout.
CO5:	Can know the production techniques, inventory and quality control in global aspects.

UNIT -I:

Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur. Creating and Starting the Venture, Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and developmentprocess.

UNIT- II:

The Business Plan Nature and scope of Business plan, Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities.

UNIT -III:

Financing and managing the new venture, Sources of capital, venture capital, angel investment, Record keeping, recruitment, motivating and leading teams, and financial controls. Marketing and sales controls. E-commerce and Entrepreneurship, Internet advertising.

UNIT- IV:

New venture Expansion Strategies and Issues, Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits. Choosing location and layout, Issues related to Selection of layout.

UNIT V:

Production and Marketing Management Thrust of production management, Selection of production Techniques, plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing. Global aspects of Entrepreneurship.

Text Books:

2. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5thEdition
3. Dollinger: Entrepreneurship,4/e, Pearson,2004.

References:

1. Vasant Desai: Dynamics of Entrepreneurial Development and management, Himalaya Publishing House,2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Robert J.Calvin: Entrepreneurial Management, TMH,2004.
4. GurmeetNaroola: The Entrepreneurial Connection, TMH,2001.
5. Bolton & Thompson: Entrepeneurs- Talent, Temperament, Technique, Butterworth Heinemann,2001.
6. Agarwal: Indian Economy, WishwaPrakashan2005.
7. Dutt&Sundaram: Indian Economy. S. Chand,2005.
8. Srivastava: Industrial Relations &Labour Laws, Vikas,2005.
9. ArunaKaulgud: Entrepreneurship Management by. Vikas publishing house,2003.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	**Principles Of Management (Open Elective)**				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s):Knowledge of General Management		4	0	0	4

Course Objectives:

The course is to give a basic perspective of Management. This will form foundation to study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Management.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain the knowledge of basic concepts, tested principles emerging ideas.evolving theories and latest techniques.
CO2	Understand the importance of critical decisions that ensure growth and sustainability of the organization.
CO3	Understand theoretical aspects and its application to modern management practice
CO4	Demonstrate critical thinking when presented with managerial issues and problems
CO5	Understand the importance of Professional Management for effective utilization of resources in organizations.

UNIT I

Introduction to Management: Nature and scope of Management, Functions of Management Management as a Science, Art and Profession - Management & Administration - Principles of Management- Managerial roles: Mintzberg Model - Contributions of F.W.Taylor and Henry Fayol

UNIT II

Planning: Planning premises, types of plans and Planning process, Decision making meaning and importance- types of decision- steps in decision making. Forecasting techniques.

UNIT III

Organization: Structure, types of organizations, principles of organizing, Authority and span of control, delegatio and decentralization, Line and staff relationship.

UNIT VI

Directing& Controlling: Nature and scope. Leadership- styles of Leadership; Co-ordination- types of interdependence. Controlling: Process of controlling- making controlling effective,-techniques of controlling.

UNIT – V

Contemporary issues – (Brief Study) Quality circle-Total Quality Management - Business Process Reengineering (BPR)- Six sigma.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Harold Koontz, Heinz Weihrich,A.R.Aryasri, Principles of Management, TMH, 2010.
2. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
3. Kumar, Rao, Chhaalill "Introduction to Management Science" Cengage Publications,New Delhi
4. V.S.P.Rao, Management Text and Cases, Excel, Second Edition, 2012.
5. K.Anbuvelan, Principles of Management, University SciencePress, 2013.
6. K.Aswathappa " Organisational Behaviour-Text, Cases andGames", Himalaya Publishing House, New Delhi,2008.
7. Steven L Mc Shane, Mary Ann Von Glinow, Radha R Sharma: "Organisational Behaviour", TMH Education, NewDelhi,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	-	-	-	-	-	-	-	-	-	-	1	-
CO2	-	-	2	-	-	3	-	3	-	1	-	-
CO3	3	-	-	1	-	-	3	3	-	-	1	-
CO4	-	-	2	-	-	3	-		-	-	1	-
CO5	-	-	2	-	2	-	-	3	1	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Cours. Code	**Financial Management for Engineers (Open Elective)**				
Teaching	Total contact hours-48	L	T	P	C
		4	0	0	4

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	The students would be able to understand and define basic terminology used in finance and accounts
CO2:	The students would be able to prepare& appraise Financial Statements and evaluate a company in the light of different measurement systems.
CO3:	The students would be able to analyse the risk and return of alternative sources of financing.
CO4:	Estimate cash flows from a project, including operating, net working capital, and capital spending.
CO5:	To estimate the required return on projects of differing risk. to estimate the cash flows from an investment project. calculate the appropriate discount rate, and determine the value added from the project, and make a recommendation to accept or reject the project.

Unit I

Introduction to Financial Accounting, Book keeping & Recording - Meaning, Scope and importance of Financial Accounting. Financial Accounting - concepts and conventions, classification of accounts, Rules and principles governing Double Entry Book-keeping system. Meaning, Preparation of Journal, Ledger , Cash book & Trial balance. (Practical application on tally)

UNIT II

Financial Statement Preparation, analysis& Interpretation– Preparation of financial statement and Profit & Loss Account, Balance Sheet. , Ratio Analysis - classification of various ratios. (Calculation on Excel)

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

UNIT III

Introduction To Financial Management- Concept of business finance, Goals & objectives of financial management, Sources of financing - LONG TERM: shares, debentures, term loans, lease & hire purchase, retained earnings, public deposits, bonds (Types, features & utility), SHORT TERM: bank finance, commercial paper, trade credit & bills discounting, INTERNAL: Retained earnings.

Unit-IV

Working Capital Management- Concept of working Capital, significance, types. Adequacy of working capital, Factors affecting working capital needs, Financing approaches for working capital, Methods of forecasting working capital requirements, meaning & importance of accounts receivable. (Excel based)

Unit-V

Time Value of Money & Capital Budgeting- Concept of time value of money, Compounding & discounting; Future value of single amount & annuity, present value of single amount & annuity; Practical application of time value technique. Capital budgeting - Nature and significance, techniques of capital budgeting –Pay Back Method, Accounting rate of return, Internal Rate of Return, DCF, Net Present Value and profitability index. (Application on Excel)

Relevant cases have to be discussed in each unit and in examination case is compulsory

from any unit.

References

1. Financial , Cost & Management Accounting by Dr.P.Pariasamy, HH Publication

Suggested Readings:

1. Financial Management by Khan & Jain, Tata Mcgraw Hill
2. Financial Management by Dr. P.C.Tulsian ,S Chand.
3. Financial Management by Ravi Kishore, Taxmann

GRIET-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	OPERATIONS MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s):		3	-	-	3

Course Objective:

Objective: This Course is designed to make student understand the strategic significance of Operation management, to acquaint them with application of discipline to deal with real life business problem.

Course Outcomes:

On Completion of the course, the students	
CO1:	Are able to understand the basic concepts in operations and production activities.
CO2:	Can identify factors influencing plant location and plant layout.
CO3:	Can identify the production process and execute the customer order timely.
CO4:	Can manage the materials, manpower effectively by using appropriate inventory and time study techniques.
CO5:	Can improve the productivity by using effective quality control standards and techniques.

Introduction to Operation Management: Nature & Scope of Operation/ Production Management, Relationship with other functional areas, Recent trend in Operation Management, Manufacturing & Theory of Constraint, Types of Production System, Just in Time (JIT) & lean system.

UNIT -II:Product Design & Process Selection: Stages in Product Design process, Value Analysis, Facility location & Layout: Types, Characteristics, Advantages and Disadvantages, Work measurement, Job design.

UNIT- III:Forecasting & Capacity Planning: Methods of Forecasting, Overview of Operation Planning, Aggregate Production Planning, Production strategies, Capacity Requirement Planning, MRP, Scheduling, Supply Chain Management, Purchase Management, Inventory Management. Unit- IV: Productivity: Factors, Affecting Productivity – Job Design – Process Flow Charts – Methods Study – Work Measurement – Engineering and Behavioral Approaches.

UNIT -V:Quality Management: Quality- Definition, Dimension, Cost of Quality, Quality Circles-Continuous improvement (Kaizen), ISO (9000&14000 Series),
Statistical Quality Control: Variable & Attribute, Process Control, Control Charts - Acceptance Sampling Operating Characteristic Curve (AQL, LTPD, Alpha & Beta risk), Total Quality Management (TQM).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References: 1. Krajewski&Ritzman (2004). Operation Management -Strategy and Analysis. Prentice Hall of India.
2. PannerSelvem, Production and Operation Management, Prentice Hall of India.
3. Chunnawals, Production & Operation Management Himalaya, Mumbai
4. Charry, S.N (2005). Production and Operation Management- Concepts, Methods Strategy. John Willy& Sons Asia Pvt Limited.
5. K Aswathappa& Sridhar Bhatt, Production & Operations Management, Himalaya, Mumbai.

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	DIGITAL MARKETING (Open Elective)				
Teaching	Totalcontacthours-63	L	T	P	C
		3	-	-	3

Course Objective:
The objective of this course is to understand the importance of digital marketingand its applications.

Course Outcomes:

On Completion of the course, the students	
CO1:	Would be able to learn about model approach of Marketing.
CO2:	Would be able to learn various methods and channels of digital marketing
CO3:	Would be introduced to Digital Marketing planning execution
CO4:	Get concept of SEO's is introduced for the benefit of students aspiring startups
CO5:	Can learn advertising strategies of Digital Marketing have been introduced

Syllabus:

UNIT - I:
Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

UNIT - II:
Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels.

UNIT - II:
Marketing in the Digital Era: Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

UNIT - III:
Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues,Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan andImplementing the Plan.

UNIT - IV:

Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising,Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-click),Display Ads - choosing a Display Ad Format, Landing Page and its importance.

UNIT - V:

Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube,Social Media for Customer Reach, Acquisition and Retention.
Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Suggested Readings:

1. Michael Miller, B2B Digital Marketing, 1e, Pearson, 2014.
2. Vandana Ahuja, Digital marketing, Oxford University Press 2015
3. Michael R Solomon, Tracy Tuten, Social Media Marketing, Pearson, 1e, 2015.
4. Judy Strauss & Raymond Frost, E-Marketing, Pearson, 2016
5. Richard Gay, Alan Charles worth and Rita Esen, Online marketing – A customer led approach
6. Oxford University Press 2007.
7. Arup Varma, Pawan S. Budhwar, Angelo S. De Nisi, Digital Marketing, Wiley, 2016.

CO-PO Mapping:

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

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

DEPARTMENT OF MECHANICAL ENGINEERING

4 Years B.Tech. (Mechanical Engineering) Course Structure: (2019-20)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	TOTAL QUALITY MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours–64	L	T	P	C
Pre-requisites/Exposure : Exposure of Supply Chain and Operations		4	0	0	4

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	To realize the importance of significance of quality.
CO2:	Manage quality improvement teams
CO3:	Identify requirements of quality improvement programs
CO4:	Develop a thinking towards Quality systems and Thinking.
CO5:	Acknowledge the strategic value of leading practices and therefore their implementation • Efficiently designing the effective performance measurement system.

OBJECTIVES: To facilitate the understanding of Quality Management principles and process.

UNIT-I

INTRODUCTION: Introduction – Need for quality – Evolution of quality – Definitions of quality – Dimensions of product and service quality – Basic concepts of TQM – TQM Framework – Contributions of Deming, Juran and Crosby – Barriers to TQM – Quality statements – Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention – Costs of quality.

UNIT-II

TQM PRINCIPLES: Leadership – Strategic quality planning, Quality Councils – Employee involvement – Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDCA cycle, 5S, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT-III

TQM TOOLS AND TECHNIQUES: The seven traditional tools of quality – New management tools – Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT-IV

TQM TOOLS AND TECHNIQUES II: Control Charts – Process Capability – Concepts of Six Sigma – Quality Function Development (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures.

UNIT-V

QUALITY SYSTEMS: Need for ISO 9000 – ISO 9001-2008 Quality System – Elements, Documentation, Quality Auditing – QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors.. TOTAL: 45 PERIODS OUTCOMES : x The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXTBOOK:

1. Dale H. Besterfiled, et at., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint 2006.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.

2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

3. Janakiraman. B and Gopal .R.K., "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

CO- PO Mapping

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	3	-	-	-	3	-	-	-	1	-	2
CO 2	3	-	-	-	2	-	-	-	1	-	1	2
CO3	-	-	2	-	1	3	2	-	-	-	3	-
CO 4	2	-	3	-	-	2	-	-	1	-	-	2
CO 5	3	-	2	-	3	-	-	-	-	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	ORGANISATIONAL BEHAVIOUR (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
		3	-	-	3

Course Objective:
The main objective of Organizational Behavior is to understand the human interactions in an organization, find what is driving it and influence it for getting better results in attaining business goals.

Course Outcomes:

By studying this course students are able to -	
CO1:	Understand the basic concepts in organizational behavior.
CO2:	Protect the cause and effect relationship of the people in a work place.
CO3:	Understand the group behaviour and its impact on work performance and organization.
CO4:	Understand the managerial strategies in achieving the goals of organizations.
CO5:	Improve the results- performance outcome through human behaviour and organizational behaviour can aid them in their pursuit of the goals.

UNIT-I
Focus and Purpose: Definition, need and importance of organizational behavior – Nature and scope – Frame work – Organizational behavior models.

UNIT-II
Individual Behavior: Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behavior modification.Misbehavior – Types – Management Intervention.Emotions - Emotional Labor – Emotional Intelligence – Theories.Attitudes – Characteristics – Components – Formation – Measurement- Values.Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

UNIT-III
Group Behavior: Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

V

UNIT-V

Dynamics of Organizational Behavior: Organizational culture and climate – Factors affecting organizational climate – Importance.Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life.Organizational development – Characteristics – objectives –. Organizational effectiveness.

TEXT BOOKS

1. Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCES

1. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding OrganizationalBehavior, 2nd Edition, Oxford Higher Education, 2004.
3. Mc Shane & Von Glinov, OrganizationalBehavior, 4th Edition, Tata Mc Graw Hill, 2007.
4. Hellrigal, Slocum and Woodman, Organizational Behavior, Cengage Learning, 11th Edition 2007.
5. Ivancevich, Konopaske & Maheson, OrganizationalBehavior& Management, 7th edition, Tata McGraw Hill, 2008.

CO-PO Mapping:

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

GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	**HUMAN RESOURCE MANAGEMENT (Open Elective)**				
Teaching	Totalcontacthours-48	L	T	P	C
		3	-	-	3

Course Objective:

To equip the students with basic concepts of Human Resource Management and the various functions of HRM including Industrial Relations in the liberalized, socialism environment.

Course Outcomes:

On Completion of the course, the students	
CO1:	Integrated perspective on role of HRM in modern business. Ability to plan human resources and implement techniques of job design
CO2:	Can conduct job analysis and scientific recruitment and selection process for the higher productivity
CO3:	Can get competency to recruit, train, and appraise the performance of employees
CO4:	Can learn rational design of compensation and salary administration
CO5:	Are able to handle employee issues and evaluate the new trends in HRM

UNIT -I

HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department –aligning HR strategy with organizational strategy - HRM –changing , global perspective challenges, environment – crosscultural problems – emerging trends in HRM.

UNIT -II

Investment perspectives of HRM: HR Planning – Demand and Supply forecasting - Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques - Training and Development – Methods and techniques– Job design , evaluation and Analysis - Management development - HRD concepts.

UNIT -III

Performance Appraisal: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation - Concepts and Principles Influencing Factors- Current Trends in Compensation- Methods of Payments in detail - Incentives rewards compensation mechanisms.

UNIT -IV

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame WorkDeterminants of Payment of Wages- Wage Differentials - Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures.

UNIT -V

Managing Industrial Relations: Trade Unions - Employee Participation Schemes- Collective Bargaining– Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms - Managing work place stress. Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. K Aswathappa: "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "Human Resource Management and Industrial Relations", Himalaya Publishing House, Mumbai.
3. Mathis, Jackson,Tripathy:"Human Resource Management:Asouth-Asin Perspective", Cengage Learning, New Delhi, 2013.
4. Subba Rao P: "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
5. MadhurimaLall, Sakina QasimZasidi: "Human Resource Management", Excel Books, New Delhi, 2010

CO-PO Mapping:

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	INTELECTUAL PROPERTY RIGHTS & PATENTS				
Teaching	Total contact hours - 30	L	T	P	C
Prerequisite(s): Basic knowledge of Real Property and Personal Property Intellectual Property and Patents and Trand marks.		3	0	0	3

Course Objectives:

Objectives of intellectual property refer to the purposes of protection granted to creators of innovative intellectual creations. Intellectual property (IP) rights serve the important purpose of ensuring that creators will be recognized for their efforts and protected from infringement. When they are sure that their works are protected, creators are more likely to come up with more new creations. As such, IP also helps to promote creativity and innovation. There are many different forms of IP, each of which is protected by a certain type of IP rights.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	to understand the concept of intellectual property rights.
CO2:	Develops procedural knowledge to Legal System and solving the problem relating to intellectual property rights.
CO3:	Skill to pursue the professional programs in Company Secretaryship, Law, Business International Affairs, Public Administration and Other fields.
CO4:	Employability as the Compliance Officer, Public Relation Officer and Liaison Officer.
CO5:	Establishment of Legal Consultancy and service provider.cyber crime

UNIT I Introduction to Intellectual Property Rights

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

UNIT II Copyrights

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

UNIT III Patent Rights and Laws

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

UNIT IV Trade Marks

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

UNIT V Trade Secrets and Cyber Laws

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement –Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.Introduction to Cyber Law – Information Technology Act - Cyber Crime and – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime.

Text Books:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections

Reference:

1. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
2. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
3. M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Publications.
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi

Web Links:

1. . www.nptel.com
2. www.mooks.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	-	--	-	-	--	-	-	-	-	-	1	-
CO2	--	-	2	-	--	3	-	3	-	-		-
CO3	-	-		1	-	-	-	3	-	-	1	--
CO4	-	-	2	-	-	3	-		-	-	1	-
CO5	-	-	2	-	-	-	-	3	-	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 Semester)			
Course Code	**CAD/CAM Lab**				
Teaching	Totalcontacthours-55	L	T	P	C
Prerequisite(s): Computer Aided Design and Finite Element Methods.		3	0	0	3

Course Objectives:

- To familiarize the fundamentals of CAD/CAM software.
- To provide necessary skills for numerical analysis of structural, heat transfer and fluid flow problems using analysis package.
- To understand the NC codes for simple turning and milling operations through simulation package.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze various types of 2D and 3D trusses by static and dynamic analysis using ANSYS.
CO2:	Solve the static problems involving corner bracket and cylinder components.
CO3:	Examine the beams with various end conditions subjected to static load.
CO4:	Analyze various thermal properties of bodies with different geometries.
CO5:	Compose NC code for turning and pocket milling operations.

List of Experiments

1. Static analysis of 2D truss
2. Static analysis of 3D truss
3. Static analysis of corner bracket
4. Static analysis of an Axis-symmetric component (Cylinder).
5. Dynamic analysis of 2D truss
6. Dynamic analysis of 3D truss
7. Static Analysis of 3D structure
8. Structural Analysis of a Cantilever Beam
9. Structural Analysis of a Fixed Beam
10. Structural Analysis of a Overhanging Beam
11. Steady state heat transfer analysis on Circular rod
12. Steady state heat transfer analysis on rectangular plate with a central circular hole
13. Transient heat transfer analysis on rectangular plate with a central circular hole
14. Generation of NC code for turning operation
15. Generation of NC code for pocket milling operation

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8^{th} semester)			
Course Code	**Operations Research**				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): Probability theory		2	1	0	3

Course Objectives:

- To impart knowledge on various concepts of Operations Research.
- To understand mathematical models used in Operations Research.
- To understand the techniques constructively for making effective decisions.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the various operations research models and their applications.
CO2:	Solve the 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
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- Traveling salesman 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: Introduction, Deterministic inventory models – Static economic order quantity models, Dynamic economic order quantity models - Probabilistic Inventory Models – Continuous review models, single period models and multi period 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, linear programming problem.

SIMULATION: Definition, types of simulation models, phases of simulation, applications of simulation, inventory and queuing 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.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8th Semester)			
Course Code	**Computational Fluid Dynamics (Department Elective-V)**				
Teaching	Total contact hours-60	L	T	P	C
Prerequisite(s): Engineering Mathematics, Fluid Mechanics & Heat Transfer		2	1	0	3

Course Objectives:

- To familiarize the concepts of Computational Fluid Dynamics
- To learn numerical techniques for solving the partial differential equations governing the fluid flow.
- To learn the methods to solve complicated problems by using the techniques of CFD
- To learn the concept of finite difference and finite volume methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify different application of CFD.
CO2:	Analyze governing equations of fluid dynamics using CFD.
CO3:	Examine the behavior of hyperbolic, parabolic and elliptic equations by using explicit and implicit approaches.
CO4:	Evaluate the transformed governing equations using boundary conditions.
CO5:	Asses the linear 3D FVD schemes in fluid flow problems.

Syllabus:

UNIT-I

INTRODUCTION: History and Philosophy of "Computational Fluid Dynamics(CFD)" –CFD as a design Tool–Applications of CFD in engineering.

UNIT -II

GOVERNING EQUATIONS OF FLUID DYNAMICS: Models of the flow– The substantial derivative– Physical meaning of the divergence of velocity–The continuity equation–The momentum equation– The energy equation–Governing equations for fluid dynamics, Navier-Stokes equations for viscous flow, Euler equations for inviscid flow – Physical boundary conditions – Governing equations suited for CFD, conservation form of the equations, shock fitting and shock capturing–Time marching and space marching.

UNIT- III

MATHEMATICAL BEHAVIOR OF PARTIAL DIFFERENTIAL EQUATIONS: Classification of quasi-linear partial differential equations –General behaviour of hyperbolic, parabolic and elliptic equations.

BASIC ASPECTS OF DISCRETIZATION: Introduction to finite differences–Finite difference equations using Taylor series expansion and polynomials– Explicit and implicit approaches–Errors and an analysis of stability.

UNIT –IV

GRIDS WITH APPROPRIATE TRANSFORMATION: General transformation of the equations – Metrics and Jacobians –The transformed governing equations of the CFD–Boundary fitted coordinate systems– Algebraic and elliptic grid generation techniques–Adaptive grids.

FINITE DIFFERENCE FORMULATIONS: Parabolic partial differential equations, elliptic equations and hyperbolic Equations.

UNIT -V

FINITE VOLUME METHOD FOR UNSTRUCTURED GRIDS: General description of the finite volume method, Cell Centered and Nodal point schemes – Two - Dimensional Heat conduction with Triangular Elements – Flux vector splitting scheme.

Text Books:

1. Anderson, J.D.(Jr), Computational Fluid Dynamics The Basics with Applications, McGraw-Hill,Inc. ,2017.
2. Hoffman, K.A., and Chiang, S.T., Computational Fluid Dynamics, Vol. I, II andIII, Engineering Education System, Kansas, USA, 2000.

References:

1.Versteeg, H.K. and Malalasekara, W., An Introduction to Computational Fluid Dynamics: The Finite Volume Method, 2nd Edition, Pearson Education, 2008.
2.Chung, T.J., Computational Fluid Dynamics,2nd Edition ,Cambridge University Press, 2010.
3.Richard Pletcher, John Tannehill and Dale Anderson, `Computational Fluid Mechanics and HeatTransfer, 3rd Edition, CRC Press, 2013.

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech.II Sem (8^{th} Semester)			
Course Code	**Nano Technology (Department Elective-V)**				
Teaching	Total contact hours-53	L	T	P	C
Prerequisite(s): Metallurgy and Material Science		3	0	0	3

Course Objectives:

- To study the classification of nano materials.
- To understand the properties of nano materials.
- To gain the knowledge on characterization techniques like SEM, TEM and XRD.
- To impart the knowledge on the synthesis methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the applications of nano materials in engineering and few other fields.
CO2:	Describe the mechanical, electrical, thermal and physical properties of nano materials.
CO3:	Explain the synthesis and fabrication techniques of nano particles.
CO4:	Discuss the uses of characterization techniques such as spectroscopy, SEM, TEM and XRD.
CO5:	Describe carbon nano technology and its various applications.

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-Applications of nano structured thin fins, applications of quantum dots.

UNIT-II

PROPERTIES OF MATERIALS: Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials.

UNIT-III

SYNTHESIS AND FABRICATION: 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.k chattopadhyay/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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8^{th} Semester)			
Course Code	Additive Manufacturing				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Computer Aided Design		3	0	0	3

Course Objectives:

- To understand the importance of rapid prototyping in manufacturing.
- To understand slicing methods for rapid prototyping.
- To learn liquid, powder and solid based rapid prototyping processes.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe rapid prototyping and tooling systems.
CO2:	Recommend the part orientation and slicing methods for rapid prototyping of given part.
CO3:	Identify process parameters of liquid based rapid prototyping to improve the quality.
CO4:	Illustrate powder and solid based rapid prototyping processes.
CO5:	Identify process parameters for powder and solid based rapid prototyping.

Syllabus:

UNIT-I

Introduction to Rapid Prototyping/Tooling: Definition - History and development - Classification of Rapid Prototyping/Tooling systems - Indirect Rapid Tooling - Applications of RP/T.

UNIT -II

Data processing for Rapid Prototyping: Data interfacing for Rapid Prototyping/Tooling - Part orientation and support generation - Model slicing and contour data organization, direct and adaptive slicing.

UNIT- III

Liquid based Rapid Prototyping Systems: Principles and Processes - Stereo Lithography Apparatus (SLA), Solid Ground Curing (SGC), Solid Creation System (SCS), E-DARTS system, Perfactory, Multi Jet Modeling and Rapid Freeze prototyping.

UNIT -IV

Solid based Rapid Prototyping Systems: Principles and Processes –Laminated Object Manufacturing (LOM), Fused Deposition Modeling (FDM), Paper Lamination Technology (PLT), CAM–LEM's CL, Offset Fabbers system, Shape Deposition Manufacturing process (SDM) and Ultrasonic Consolidation (UC).

UNIT -V

Powder based Rapid Prototyping Systems: Principles and Processes – Selective Laser Sintering (SLS), Three Dimensional Printing (3DP), Laser Engineering Net Shaping (LENS), Direct Shell Production Casting (DSPC), Multiphase Jet Solidification (MJS), and Electron Beam Melting (EBM).

Text Books:

1.C K Chua, K F Leong, C S Lim, Rapid Prototyping: Principles and Applications, 2/e, World Scientific, 2003.

2.P.K. Venu Vinod and Weiyin Ma, Rapid Prototyping – Laser based and other Technologies, 1/e, Springer Science+ Business Media, LLC, 2004.

References:

1.Rafiq I. Noorani, Rapid Prototyping: Principles and Applications, 1/e, John Wiley & Sons, 2006

2.Paul F. Jacobs, Rapid Prototyping and Manufacturing: Fundamentals of Stereolithography, 1/e, Society of Manufacturing Engineers, 1992

3.D T Pham, S S Dimov, Rapid Manufacturing, 1/e, Springer Verlog, 2001

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8^{th} semester)			
Course Code	**Production Planning and Control**				
Teaching	Total contact hours - 60	L	T	P	C
Prerequisite(s): Industrial Engineering and Management and Operations Research		3	0	0	3

Course Objectives:

- To understand the concepts of production and service systems.
- To learn about various forecasting techniques.
- To learn various inventory concepts and models.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the elements of production planning and control.
CO2:	Investigate various forecasting techniques for manufacturing and service sectors.
CO3:	Use the appropriate inventory model for various industrial circumstances.
CO4:	Create the optimized route and schedule for the product to achieve the desired objectives.
CO5:	Discuss the dispatch and control activities for production process, and also applications of computers in production planning and control.

Syllabus:

UNIT – I
INTRODUCTION: Definition – Objectives and functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

UNIT – II
Forecasting – Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – Qualitative methods and quantitative methods.

UNIT – III
Inventory management – Functions of inventories – Relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P-Systems and Q-Systems– Introduction to MRP I, MRP II, ERP, LOB (Line of Balance), JIT and KANBAN system.

UNIT – IV
Routing – Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing procedure, schedule –Definition – Difference with loading Scheduling policies – Techniques, standard scheduling methods - Line Balancing, aggregate planning, chase planning.

UNIT – V
PRODUCTION CONTROLLING ASPECTS

Dispatching – Activities of dispatcher – Dispatching procedure, expediting – Follow up – Definition – Reason for existence of functions – Types of follow up – Applications of computer in production planning and control.

Text Books:

1.Elements of Production Planning and Control, Samuel Eilon, 1962.

2.Manufacturing, Planning and Control, Partik Jonsson Stig-Arne Mattsson, Tata McGraw-Hill, 2011.

References:

1.Inventory Control Theory and Practice, Martin K. Starr and David W.Miller, 1962

2.Production Planning and Control, Mukhopadhyay, PHI, 2015

3.Production Control A Quantitative Approach, John E. Biegel, 1971 (2nd edition)

4.Production Control, Moore, 1959 (2nd edition)