

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 AUTOMOBILE ENGINEERING

GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

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Permanently Affiliated to JNTUK, Kakinada.

Chaitanya Knowledge City, Rajanagaram, Rajamahendravaram – 533294. E.G.Dt. - AP.



GR-19

DEPARTMENT OF AUTOMOBILE ENGINEERING

4 YEARS B.Tech. COURSE STRUCTURE & SYLLABUS

With Effective from 2019-20 Batch

GODAVARI INSTITUTE OF ENGG & TECHNOLOGY
APPROVED BY AICTE ACCREDITED BY NBA AFFILIATED TO JNTUK, KAKINADA
NH-5, CHAITANYA KNOWLEDGE CITY, RAJAHMUNDRY, A.P., INDIA
TEL: +91-883-2484828, 29, 30, 31 FAX: +91-883-2484739, HTTP://WWW.GIET.AC.IN

Programme structure of B.Tech. programme in Automobile Engineering I YEAR I SEMESTER

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
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	19193176	PCC	Engineering Graphics	1	0	3	2.5	30	70	100
4	19198103	BSC	Engineering Chemistry	3	0	0	3	30	70	100
5	19192105	ESC	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
6	19198194	MC	Professional Ethics & Human Values	2	0	0	0	30*	-	-
7	19198112	BSC	Engineering Chemistry Laboratory	0	0	3	1.5	50	50	100
8	19198111	HSMC	Communicative English Laboratory	0	0	3	1.5	50	50	100
9	19192113	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		HSMC-4.5	PCC-2.5	ESC-4.5						

I YEAR II SEMESTER

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19198201	BSC	Mathematics-II	3	0	0	3	30	70	100
2	19198205	BSC	Engineering Physics & its Applications	3	0	0	3	30	70	100
3	19195206	ESC	Problem Solving & Programming in C	2	1	0	3	30	70	100
4	19198202	HSMC	Communicative English-II	3	0	0	3	30	70	100
5	19198293	MC	Environmental Studies	2	0	0	0	30*	-	-
6	19193204	PCC	Engineering Mechanics	3	0	0	3	30	70	100
7	19198205	BSC	Engineering Physics Laboratory	0	0	3	1.5	50	50	100
8	19198211	HSMC	Communicative English Laboratory II	0	0	3	1.5	50	50	100
9	19195214	ESC	Problem Solving & Programming in C Lab	0	0	3	1.5	50	50	100
10	19193213	PCC	Basic Engineering Workshop	0	0	3	1.5	50	50	100
TOTAL				16	1	12	21	350	550	900
BSC-7.5		HSMC-4.5	PCC-4.5	ESC-4.5						



An Autonomous Institution
NEA Accredited & NAAC 'A'



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II YEAR I SEMESTER

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19179301	BSC	Mathematics-III	3	0	0	3	30	70	100
2	19170302	PCC	Basic Automobile Engineering	3	0	0	3	30	70	100
3	19170303	PCC	Metallurgy & Materials Science	3	0	0	3	30	70	100
4	19170304	PCC	Mechanics of Solids	3	0	0	3	30	70	100
5	19170305	PCC	Fluid Mechanics & Hydraulic Machinery	3	0	0	3	30	70	100
6	19170386	MC	Design Thinking & Product Innovation	2	0	0	0	30*	-	-
7	19170377	PCC	Computer Aided Engineering Drawing Practice	1	0	3	2.5	30	70	100
8	19170311	PCC	Automobile Chassis Components Lab	0	0	3	1.5	50	50	100
9	19170312	PCC	Mechanics of Solids & Fluid Mechanics Lab	0	0	3	1.5	50	50	100
TOTAL				18	0	9	20.5	280	520	800
BSC-03	PCC-17.5	ESC-0	MC-0							

II YEAR II SEMESTER

S. No.	Course Code	Course Type	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19179401	BSC	Numerical Methods and Probability & Statistics	3	0	0	3	30	70	100
2	19170402	PCC	Kinematics of Machinery	3	0	0	3	30	70	100
3	19170403	PCC	Automotive Engines	3	0	0	3	30	70	100
4	19170404	PCC	Thermodynamics	3	0	0	3	30	70	100
5	19170475	PCC	Machine Drawing	1	0	3	2.5	30	70	100
6	19170466	OEC	Open Elective-I	3	0	0	3	30	70	100
7	19170411	PCC	Engine Components & Testing Lab	0	0	3	1.5	50	50	100
8	19170421	PR	Community service oriented project	0	0	1	0.5	100	-	100
TOTAL				16	0	7	19.5	330	470	800
BSC-03	OEC-03	PCC-13	ESC-0	PR-0.5						

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III YEAR I SEMESTER

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19170501	PCC	Dynamics of Machinery	3	0	0	3	30	70	100
2	19170502	PCC	Manufacturing Processes	3	0	0	3	30	70	100
3	19170503	PCC	Heat Transfer	3	0	0	3	30	70	100
4	19170564A/B/C	PEC	Professional Elective - I	3	0	0	3	30	70	100
5	19170565a/b/c	OEC	Open Elective-II	3	0	0	3	30	70	100
6	19179511	HSMC	Soft Skills Lab	0	0	3	1.5	50	50	100
7	19170512	PCC	Heat Transfer Lab	0	0	3	1.5	50	50	100
8	19170513	PCC	Basic Automobile Components Manufacturing Lab	0	0	3	1.5	50	50	100
9	19170521	PR	Mini Project – 1/Study Project / Internship	0	0	0	2	100	-	100
TOTAL				15	0	9	21.5	400	500	900
PCC-12	PEC-03	HSMC-1.5		OEC-03	PR-02					

III YEAR II SEMESTER

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19170601	PCC	Machine Tools & Metrology	3	0	0	3	30	70	100
2	19170602	PCC	Automotive Pollution & Control	3	0	0	3	30	70	100
3	19170603	PCC	Design of Automotive Elements	3	0	0	3	30	70	100
4	19170604	PCC	Automotive Electrical & Autotronics	3	0	0	3	30	70	100
5	19170665A/B/C	PEC	Professional Elective - II	3	0	0	3	30	70	100
6	19170666a/b/c	OEC	Open Elective - III	3	0	0	3	30	70	100
7	19170687	MC	Constitution of India	2	0	0	0	30*	-	-
8	19170611	PCC	Machine Tools & Metrology Lab	0	0	3	1.5	50	50	100
9	19170621	PR	Accident Analysis	0	0	2	1	100	-	100
TOTAL				20	0	5	20.5	330	470	800
PEC-03	OEC-03	PCC-13.5	MC-0	PR-1						

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IV YEAR I SEMESTER

S. No.	Course Code	Course Type	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
				L	T	P		Int.	Ext.	Total
1	19170701	PCC	Vehicle Dynamics	3	0	0	3	30	70	100
2	19170702	PCC	Hybrid, Electric & Fuel Cell Vehicles	3	0	0	3	30	70	100
3	19170703	PCC	Finite Element Methods	3	0	0	3	30	70	100
4	19170704	PCC	CAD/CAM	3	0	0	3	30	70	100
5	19170765A/B/C	PEC	Professional Elective - III	3	0	0	3	30	70	100
6	19170766a/b/c	OEC	Open Elective – IV(MGMT)	3	0	0	3	30	70	100
7	19170787	MC	Intellectual Property Rights and Patents	2	0	0	0	30*	-	-
8	19170711	PCC	Servicing, Maintenance & Scanning of Automobiles Lab	0	0	3	1.5	50	50	100
9	19170712	PCC	CAD/CAM Lab	0	0	3	1.5	50	50	100
10	19170721	PR	Mini Project – 2 /Study Project / Internship	0	0	0	2	100	-	100
TOTAL				20	0	6	23	380	520	900
PEC-03	OEC-03	PCC-15	PR-02	MC-0						

IV YEAR II SEMESTER

[illegible]



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Streamed Professional Electives

Professional Electives	Manufacturing Courses	Safety & Maintenance Courses	Design Courses	Management Courses	Special Vehicles
PE-I III-1	Product Design & Assembly Automation 19170564A	Automotive Chassis & Suspension 19170564B	Modern Vehicle Design 19170564C	Industrial Engineering & Management 19170564D	Two & Three wheelers 19170564E
PE-II III-2	Unconventional Machining Processes 19170665A	Trouble Shooting, Servicing & Maintenance of Automobiles 19170665B	Automotive Aerodynamics 19170665C	Vehicle Transport Management 19170665D	Special Purpose Vehicles 19170665E
PE-III IV-1	Automation in Automotive Manufacturing 19170765A	Vehicle Maintenance 19170765B	Design for Manufacturing 19170765C	Operations Research 19170765D	Off Road Vehicles 19170765E
PE-IV IV-2	Rapid Prototyping 19170861A	Vehicle Performance & Testing 19170861B	Computational Fluid Dynamics 19170861C	Principles of Entrepreneurship 19170861D	Alternative Energy Sources for Automobiles 19170861E
PE-V IV-2	Computer Integrated Manufacturing 19170862A	Vehicle Body Engineering and Safety 19170862B	Simulation of SI & CI Engines 19170862C	Disaster Management 19170862D	Modern Vehicle Technology 19170862E

Open Electives	Mechanical	CSE	EEE	ECE	Civil Engineering	AME	Mining Engineering
OE-I II-2	Robotics 19170466a	Operating Systems 19170466b	Utilization of Electrical Energy 19170466c	Internet of Things 19170466d	Environmental Pollution & Control 19170466e	Basic Automobile Engineering 19170466f	Elements of Mining Technology 19170466g
OE-II III-1	MEMS 19170565a	Information Security 19170565b	Energy management 19170565c	Digital Image Processing 19170565d	Solid Waste Management 19170565e	Hybrid and Electric Vehicles 19170565f	Disaster Management in Mining 19170565g
OE-III III-2	Nano Technology 19170666a	Human Computer Interaction 19170666b	Renewable Energy Resources 19170666c	Data Communication 19170666d	Global Environment: Problems & Policies 19170666e	Modern Vehicle Technology 19170666f	Remote Sensing & GIS in Mining 19170666g

OE-IV IV-1	MEFA 19179766a	Entrepreneurship Qualities for Engineers 19179766b	Principles of Management 19179766c	Financial Management for Engineers 19179766d	Operations management 19179766e	Digital Marketing 19179766f	Total Quality Management 19179766g	Organizational Behaviour 19179766h	Human Resource Management 19179766i
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GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (A), RAJAHMUNDRY
DEPARTMENT OF AUTOMOBILE ENGINEERING

LAB INTERNAL MARKS	
<u>DAY TO DAY EVALUATION (25)</u> Experiment & Results 15 + Record 10	<u>INTERNAL EXAM</u> Marks on Script (25) Write up 10 + Experiment & Result 10 + Viva 5

Note: 1. The split of 25 marks in internal exam must be shown on all answer script

2. **Write up 10 + Experiment & Result 10 + Viva 5** - This must indicate on first answer script.

LAB EXTERNAL MARKS
<u>Marks on Script (50)</u> Write up/ procedure 10 Experimentation & Calculations 20 Result 5 Record 5 Viva-voce 10

Note: 1. The split of 25 marks in internal exam must be shown on all answer script

2. **Write up/ procedure 10 +Experimentation & Calculations 20+Result 5+Record 5+Viva-voce 10-** This must indicate on first answer script.

Description	GRBT - 19	L	T	P	C
Course Code	Mathematics-I (Calculus & Algebra) Common to all branches of Engineering	3	0	0	3
Teaching	Total contact hours - 40				
Prerequisite(s)	Limits, continuity, Types of matrices				

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

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

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear 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 forms by diagonalisation and orthogonal transformation.

Learning Outcomes:

At the end of this unit, the student will be able to

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix; (L3)
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit II: Mean Value Theorems (6hrs)

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

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)

- analyze the behavior of functions by using mean value theorems (L3)

Unit III: Multivariable calculus

(8 hrs)

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit IV: Multiple Integrals

(10 hrs)

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

Learning Outcomes:

At the end of this unit, the student will be able to

- evaluate multiple integrals in cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)

Unit V: Special Functions

(6 hrs)

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

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate the special function in improper integrals (L4)
- analyze relation between beta and gamma function (L4)

Textbooks:

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

References:

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, 201.

Course Outcomes:

At the end of the course, the student will be able to

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.

Description	GR - 19 (B.Tech.)	L	T	P	C
Course /Code	COMMUNICATIVE ENGLISH –I	2	1	0	2
Teaching	Total contact hours – 64				
Prerequisite (s)	Learner should be equipped with basic language and communication skills like Reading, Writing, Listening and Speaking				

Course Objectives:

- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

UNIT-I

READING:

Learning Objectives: Skimming to get main Idea of the Text, Scanning to get specific piece of Information

Detailed Text: 'Human Resources': from English for Engineers and Technologists

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

GRAMMAR : Concept of word formation : Verbs, adjectives, Wh-questions, Word order in sentences

VOCABULARY: - Content words and function words; Word forms , One Word Substitutes

WRITING SKILLS: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Learning Outcomes

At the end of the unit, the learners will be able to

- employ suitable strategies for skimming & scanning to get the general idea of a text and specific information
- recognize paragraph structure with beginnings/endings
- form sentences using proper grammatical structures and correct word forms

UNIT-II

READING:

Learning Objectives: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together

Detailed Text: Transport: Problems and Solutions' from English for Engineers and Technologists

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

GRAMMAR: Cohesive devices - use of articles and zero article; prepositions.

VOCABULARY: linkers, sign posts and transition signals;

WRITING SKILLS: E-writing -line spacing-font size-indent maintainance-punctuation-Capital Letters

Learning Outcomes

At the end of the unit, the learners will be able to

- understand the use of cohesive devices for better reading comprehension (L2)
- write well structured paragraphs on specific topics (L3)
- make necessary grammatical corrections in short texts (L3)

Unit-III

READING:

Learning Objectives:

Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues strategies to use text clues for comprehension

Detailed Text: 'Evaluating Technology' from English for Engineers and Technologists.

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

GRAMMAR: Verbs - tenses; subject-verb agreement; 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

Learning Outcomes

At the end of the unit, the learners will be able to

- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit-IV

READING:

Learning Objectives: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Detailed Text: 'Alternative Sources of Energy' from English for Engineers and Technologists.

GRAMMAR: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms.

VOCABULARY: Standard abbreviations

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

Learning Outcomes

At the end of the unit, the learners will be able to

- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit – V

READING:

Learning Objectives Reading for comprehension

Detailed Text: 'Our Living Environment' from English for Engineers and Technologists.

GRAMMAR: Editing short texts – identifying and correcting common errors in grammar and usage of articles, prepositions, tenses, Articles and Prepositions

VOCABULARY: Idioms and Phrases

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

Learning Outcome

At the end of the unit, the learners will be able to

- produce a well-organized essay with adequate details
- edit short texts by correcting common errors

Course Outcomes:

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

CO-1. To apply their learning in different fields and can serve the society accordingly.

CO-2. Identify safety measures against different kinds of accidents at home and also in the workplace.

CO-3. Experiment the usefulness of animals for the human society.

CO-4. Appraise writing skills that is required for professional development

REFERENCES:

Detailed textbook:

ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

Non-detailed textbook:

PANORAMA: A COURSE ON READING, Published by Oxford University Press India

REFERENCE BOOKS

- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)* . CUP, 2012.

WEB REFERENCES:

All Skills

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

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

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

Grammar/ Vocabulary

English Language Learning Online

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

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

BBC Vocabulary Games

Free Rice Vocabulary Game



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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. 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 P. 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	-	-

Description	GR - 19 (B.Tech.)	L	T	P	C
Course Code	ENGINEERING CHEMISTRY	3	0	0	3
Teaching	Total contact hours - 65				
Prerequisite (s)	Knowledge of theoretical and experimental from +2 level, Application of Chemistry theory and calculations to required course.				

ENGINEERING CHEMISTRY
(COMMON for CSE, ECE (COMMON for MECH , AME, CIVIL and MINING))

COURSE OBJECTIVES

- To acquaint the students with soft and hard water types and softening methods.
- To introduce the basic concepts of electrochemical cells and photovoltaic cells.
- To familiarize the students with engineering materials, their properties and applications.
- To impart knowledge on corrosion and its significance.
- To explain nano and smart materials and their uses.

Unit- I

WATER TECHNOLOGY

8T+6 P

Introduction –Hard and Soft water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge-priming and foaming, 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.

Learning outcomes:

After the completion of the Unit I, the student will be able to

- **differentiate** between temporary and permanent hardness of water. (L-1)
- **explain** the principles of reverse osmosis and electrodialysis. (L-2)
- **compare** the quality of drinking water with BIS and WHO standards. (L-2)
- **illustrate** problems associated with hard water. (L-2)
- **demonstrate** the Industrial water treatment processes. (L-2)

Unit- II

ENERGY SOURCES AND APPLICATIONS

9T+6 P

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-MnO₂) – fuel cell, hydrogen-oxygen fuel cell, Solar energy, photovoltaic cell and applications.

Learning outcomes:

After the completion of the Unit II, the student will be able to

- **define** electrode potential. (L-1)
- **explain** Nernst's equation. (L-2)
- **outline** the difference between primary and secondary cells. (L-2)
- **identify** the applications of solar energy. (L-2)
- **construct** different cells. (L-3)

Unit- III

CORROSION ENGINEERING

8T

Corrosion: Definition – theories of corrosion, dry corrosion and electro chemical corrosion – factors affecting corrosion, nature of the metal and nature of the environment.

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).

Learning outcomes:

After the completion of the Unit III, the student will be able to

- **explain** theories of corrosion. (L-2)
- **classify** different corrosion methods. (L-2)
- **identify** the various factors affecting corrosion. (L-3)
- **choose** different organic coatings. (L-3)
- **apply** the principles of corrosion control. (L-3)

UNIT- IV

ENGINEERING MATERIALS AND POLYMERS

9T+3P

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

Polymers: Introduction, differences between thermoplastic and thermo setting resins, Preparation, properties and uses of polystyrene and HDPE, LDPE.

Learning outcomes:

After the completion of the Unit IV, the student will be able to

- **illustrate** the chemical reactions involved in the manufacturing of cement. (L-2)
- **identify** preparation and properties of inorganic polymers. (L-3)
- **distinguish** between thermoplastic and thermo setting resins. (L-4)

Unit- V

NANO AND SMART MATERIALS

8T+3 P

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

Smart Materials: Introduction – Types of smart materials-self healing materials. Shape memory alloys and Uses of smart materials.

Learning outcomes:

After the completion of the Unit V, the student will be able to

- **classify** nanomaterials. (L-2)
- **explain** the synthesis and characterization methods of nano materials. (L-2)
- **identify different** types of smart materials. (L-2)
- **compare** the principles of BET and TEM. (L-4)

COURSE OUTCOMES

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

- **distinguish** between temporary and permanent hardness of water. (L-1)
- **illustrate** the principles and applications of solar energy. (L-2)
- **identify** different organic coatings. (L-3)
- **analyze** the importance of nano and smart materials. (L-4)
- **distinguish** the principles of BET and TEM. (L-4)

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).
6. K. Sesha Maheshwaramma and Mridula Chugh, Engineering Chemistry, Pearson India Edn services, (2016).

Weblink:

1. <https://www.btechguru.com/courses--nptel--chemistry-and-biochemistry-video-lecture--cbc.html>
2. chem.tufts.edu
3. www.chem1.com

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	Total contact hours-45	L	T	P	C
Prerequisite(s): Basics of Physics		3	0	0	3

Course Objective:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyze the various electrical networks
CO2:	Understand the operation of DC machines, 3-point starter and conduct the Swinburne's Test.
CO3:	Analyze the performance of transformer, operation of 3-phase alternator and 3-phase induction motors.
CO4:	Analyze the operation of half Wave, full wave rectifiers, op-amps.
CO5:	Explain the single stage CE amplifier and concept of feedback amplifier.

Syllabus:

UNIT -I Electrical Circuits

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

UNIT -II DC Machines

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

UNIT -III AC Machines

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

UNIT –IV Rectifiers & Linear Integrated Circuits

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

UNIT –V Transistors

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

Text books:

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

Reference Books:

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

Web Links:

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

CO-PO Mapping:

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

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

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

Course Objectives:

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

Course outcomes:

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

UNIT I: Human values

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

UNIT II: Engineering ethics:

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

UNIT III: Engineering as social experimentation:

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

UNIT IV: Engineers' responsibility for safety and risk:

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

UNIT V: Engineer's responsibilities and rights:

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

TEXT BOOKS

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

Reference:

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

Web Links:

1. . www.nptel.com

CO-PO Mapping:

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

Regulation	GR - 19(B.Tech.)	L	T	P	C
Course/ Code	ENGINEERING CHEMISTRY LABORATORY /19198213	0	0	3	1.5
Teaching	Total contact hours 45				
Prerequisite (s)	Basic knowledge of Engineering Chemistry Applications				

ENGINEERING CHEMISTRY LABORATORY
(COMMON SYLLABUS for MECH, AME, CIVIL and MINING)

COURSE OBJECTIVES

- To impart training for handling of different instruments.
- To familiarize with digital and instrumental methods of analysis.

LIST OF EXPERIMENTS

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

COURSE OUTCOMES

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

- **estimate** the metal content in different ores (Fe, Cr & Cu). (L-3)
- **compare** viscosities of different oils. (L-2)
- **analyze** the quality of ground water sample. (L-4)

TEXT BOOKS

1. Mendham J, Denney RC, Barnes JD, Thomas 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).

Description	GR - 19 (B.Tech.)	L	T	P	C
Course/ Code	COMMUNICATIVE ENGLISH LAB- I	0	0	3	1.5
Teaching	Total contact hours – 48				
Prerequisite (s)	Learner should be equipped with basic language and communication skills like Reading, Writing, Listening and Speaking				

COURSE OBJECTIVES:

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

UNIT 1: BASIC AURAL & ORAL SKILLS

(12H)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Phonetics-Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and other

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Ask and answer general questions on familiar topics

UNIT 2: CONVERSATIONAL SKILLS

(12H)

Listening: After 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

Learning Outcomes

At the end of the module, the learners will be able to

- Comprehend short talks on general topics
- Speak clearly on a specific topic using suitable discourse markers in informal discussions

UNIT 3: LANGUAGE IN USE

(12H)

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

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

2. Apologizing, Advising, Suggesting, Agreeing and Disagreeing

Learning Outcomes

At the end of the module, the learners will be able to

- Summarize the content with clarity & precision from short talks
- Report what is discussed in informal discussions

UNIT 4: LANGUAGE APPLICATION

(6H)

Listening: Making predictions while listening to conversations/ transactional dialogues; Listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Learning Outcomes

At the end of the module, the learners will be able to

- Infer & predict about content of spoken discourse
- Engage in formal/informal conversations understanding verbal & non-verbal features of Communication

UNIT 5: FORMAL INTERPRETATION

(6H)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - with the use of PPT slides.

1. Movie review

2. Documentary-understanding sub titles

Learning Outcomes

At the end of the module, the learners will be able to

- Take notes while listening to a talk/lecture to answer questions
- Make formal oral presentations using effective strategies

Course Outcomes:

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

CO-1. Appraise the importance of functional English

CO-2. Relate the knowledge to the competitive world.

CO-3. Identify the necessity to follow native speakers' accent

CO-4. Experiment how the communicative items in the laboratory will help the students to be effective communicators

PRESCRIBED LAB MANUAL FOR SEMESTER I:

Prepared by Dept.HBS-English, GIET

Reference Books:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd

• **Bailey, Stephen.** *Academic writing: A handbook for international students.* Routledge, 2014.

• **Chase, Becky Tarver.** *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.

- Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- Unlock, Listening and speaking skills 2, Cambridge University Press
- A Practical Course in effective English speaking skills, PHI
- Word power made handy, Dr Shalini verma, Schand Company
- Professional Communication, Aruna Koneru, Mc Grawhill Education
- **Sample Web Resources**
- Grammar/Listening/Writing
- 1-language.com
- <http://www.5minuteenglish.com/>
- <https://www.englishpractice.com/>

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

Course Objective:

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

Course Outcomes:

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

List of Experiments:

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

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

CO-PO Mapping:

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

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

Description	GM - 19 (B.Tech.)	L	T	P	C
Course & Code	Mathematics-II (ODE, PDE and Multivariable Calculus) (Common to all branches of Engineering except CSE)	3	0	0	3
Teaching	Total contact hours - 40				
Prerequisite (s)	Fundamentals of ODE,PDE and Vectors				

Course Objectives:

- 1) To enlighten the learners in the concept of differential equations and multivariable calculus.
- 2) 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.

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.

Learning Outcomes:

At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients (L3)
- solve the linear differential equations with constant coefficients by appropriate method (L3)

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.

Learning Outcomes:

At the end of this unit, the student will be able to

- classify and interpret the solutions of linear differential equations (L3)
- formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT III: Partial Differential Equations – First order

8 hrs

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.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (L3)
- outline the basic properties of standard PDEs (L2)

UNIT IV: Multivariable Calculus (Vector differentiation)

Scalar and vector point functions, vector operator ∇ , ∇ applies to scalar point functions-Gradient, ∇ applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply ∇ to Scalar and vector point functions (L3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

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), volume integral, Divergence theorem (without proof).

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Textbooks:

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

References:

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. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

Course Outcomes:

At the end of the course, the student will be able to

- solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- estimate the work done against a field, circulation and flux using vector calculus (L6)

Description	GR - 19 (B.Tech.)	L	T	P	C
Course /Code	ENGINEERING PHYSICS & its applications (Civil, Mechanical, Mining and Automobile Branches)	5	0	3	4.5
Teaching	Total contact hours – 44				
Prerequisite (s)	Knowledge of theoretical and experimental physics from +2 Level				

Course Objectives:

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

The course is designed

1. 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)
2. To apply Newton's second law for inertial and non-inertial frame of reference and to relate the effect of the Earth's rotation to the formation and movement of winds such as typhoons and cyclones by using Foucault pendulum.
3. To explain how sound is propagated in buildings and to analyze acoustic properties of typically used materials in buildings
4. To recognize sound level descriptors and their use in architectural acoustics and to identify the use of ultrasonics in different fields.
5. To interpret stress and strain curve and to develop the relationship between elastic constants
6. To identify the different modes of heat, transfer and to determine the thermal conductivity of metals and nonmetals
7. To identify different types of sensors and applications and to explain physics behind the working principles of sensors with different applications.

Unit-1: MECHANICS

Objective: To introduce basic concepts of Mechanics and apply for solving advanced engineering problems related to Earth's rotation in designing and launching missiles. (CO 1 and CO 2)

Syllabus: Basic laws of vectors and scalars, rotational frames-conservative forces $F = \text{grad } V$, 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-2: ACOUSTICS AND ULTRASONICS

Objective: To introduce basic and advanced concepts of acoustics and ultrasonics and apply the principles of acoustics for noise cancellation and for medical and defense related applications (CO 2 and CO 3)

Syllabus: Classification of Sound, decibel, Weber–Fechner law – Sabine’s formula (qualitatively) - Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods, Non-Destructive Testing – pulse echo system through transmission and reflection modes, A, B and C – scan displays, Medical applications.

Unit-3: ELASTICITY

Objective: To analyze the elastic behavior of different materials and to identify the fracture / yielding of materials along with the relationship between elastic constants loads (CO 5)

Syllabus: 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-4: HEAT TRANSFER

Objective: To introduce basic concepts of heat transfer and thermodynamics and to classify the different modes of transfer of heat energy to evaluate the thermal conductivity of different materials. (CO 6)

Syllabus: Transfer of heat energy – thermal expansion of solids and liquids – expansion joints -bimetallic strips -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

Objective: To introduce basic concepts and working of different sensors and to identify the sensors for various engineering applications. (CO 7)

Syllabus: Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive 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 text books:

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

Description	GR - 19 (B.Tech.)	L	T	P	C
Course/ Code	PROBLEM SOLVING & PROGRAMMING IN C Common to ALL	2	1	0	3
Teaching	Total contact hours - 60				
Prerequisite (s)	Basic knowledge about Computer, Algorithm and Flowchart.				

Course Objective(s):

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

Unit-1: Introduction to Problem Solving:

Objective: To identify the basic operations of CPU, notion of Algorithm, Pseudo code Flowchart, program, and different languages in computer programming. (CO1, CO2)

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

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

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

Unit-2: Control Structures

Objective: To Understanding the concept of various control structures, branching and different decision making techniques. (CO3)

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

Objective: To understand the concept of array, string and accessing the values of memory allocation in the program. (CO4)

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

Objective: To understanding the concept of Pointers, Modular programming and Scope of a variable. (CO5)

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

Objective: To understanding the concept of structure, union, files. (CO4)

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

Files: Definition, Input and output operation into file.

Course Outcomes:

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

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

Text Books

- 1. "Programming in ANSI C" by E. Balagurusamy, McGraw Hill Publications.
- 2. "Programming in C" by Ashok N. Kamthane, 2/e Pearson, 2013.
- 3. "The C – Programming language" B.W. Kernighan, Dennis M. Ritchie. PHI.
- 4. "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.

Course Code : Computer Programming-1 (16199205)													
Course designed By:Department of Computer Science and Engineering													
	Program Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course Outcomes	CO1	✓											
	CO2			✓									
	CO3					✓							
	CO4					✓							
	CO5					✓							
Category		General Humanities			Basic Sciences		Engineering Sciences and Technical			Professional Subjects			
							✓						
Mode of Evaluation:Quiz, Assignment, Seminar, Written Examination.													

Description	GR - 19 (B.Tech.)	L	T	P	C
Course/ Code	COMMUNICATIVE ENGLISH –II	2	1	0	2
Teaching	Total contact hours – 64				
Prerequisite (s)	Learner should possess the primary communicative abilities suitable for global exposure				

Course Objectives

- Impart critical reading strategies for comprehension of complex texts
- 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

UNIT 1:

LEARNING OBJECTIVE: Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style.

READING: Detailed Text: ' The Greatest Resource- Education' from English Encounters

Non-Detailed Text: ' A P J Abdul Kalam' from The Great Indian Scientists by cengage publications

GRAMMAR: Sentence structures-simple complex and compound

VOCABULARY: Formal/academic words and phrases.

WRITING SKILLS: Paraphrasing; using quotations in writing; using academic style - avoiding colloquial words and phrases.

LIFE SKILLS: Attitude

Learning outcomes:

- prioritize information from reading texts after selecting relevant and useful points
- paraphrase short academic texts using suitable strategies and conventions
- cultivate awareness about plagiarized content and academic ethics

UNIT 2:

LEARNING OBJECTIVE: Understand formal and informal styles; recognize the difference between facts and opinions.

READING: Detailed Text: ' A Dilemma' from English Encounters

GRAMMAR: Transformation of sentences- Reported speech-Direct to Indirect.

VOCABULARY: Phrasal prepositions; phrasal verbs, Redundancies

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

LIFE SKILLS: Self –Management

Learning outcomes:

- distinguish facts from opinions while reading
- write formal letters and emails
- use a range of vocabulary in formal speech and writing

UNIT 3:

LEARNING OBJECTIVE Identifying claims, evidences, views, opinions and stance/ position.

READING: Detailed Text: 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

GRAMMAR: Tense and Aspect

VOCABULARY: Verbs and Idioms

WRITING SKILLS: Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences, Speech writing

LIFE SKILLS: Body Language

Learning outcomes

- comprehend complex texts identifying the author's purpose
- produce logically coherent argumentative essays
- use appropriate vocabulary to express ideas and opinions

UNIT 4:

LEARNING OBJECTIVE: Reading for inferential comprehension

READING: Detailed Text: 'The Lottery' from English Encounters.

Non-Detailed Text: 'Jag dish Chandra Bose' from The Great Indian Scientists.

GRAMMAR: Common Errors with Adjectives, **Active and passive voice – use of passive verbs in academic writing.**

VOCABULARY: Clitches and Idioms

WRITING SKILLS: Applying for internship/ job - Writing one's CV/Resume and cover letter.

LIFE SKILLS: Being Assertive

Learning outcomes:

- develop advanced reading skills for deeper understanding of texts
- prepare a CV with a cover letter to seek internship/ job
- understand the use of passive voice in academic writing

UNIT 5:

LEARNING OBJECTIVE: Develop social consciousness and habituate social communication

READING: Detailed Text: 'The Health Threats of Climate Change' from English Encounters.

Non-Detailed Text: 'Prafulla Chandra Ray' from the Great Indian Scientists.

GRAMMAR: Reinforcing learning; editing short texts; correcting common errors in grammar and usage. Common errors with Prepositions-misplaced modifiers

VOCABULARY: Word roots

WRITING SKILLS: 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

LIFE SKILLS: Goal Setting

Learning Outcomes:

- understand the structure of Project Reports
- use grammatically correct structures with a wide range of vocabulary

Course Outcomes

- At the end of the course, the learners will be able to
- prioritize information from reading texts after selecting relevant and useful points
- paraphrase short academic texts using suitable strategies and conventions
- make formal structured presentations on academic topics using PPT slides with relevant Graphical elements

DETAILED TEXTBOOK: English Encounters Published by **Maruthi Publishers**.

DETAILED NON-DETAIL: The Great Indian Scientists Published by **Cengage learning**

Reference Books

● Bailey, Stephen. *Academic writing: A handbook for international students* . Routledge, 2014.

● Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.

● Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.

● Hewings, Martin. *Cambridge Academic English (B2)* . CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD

WEB SOURCES:

Grammar/ Vocabulary

English Language Learning Online

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

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

BBC Vocabulary Games

Free Rice Vocabulary Game

Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

All Skills

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

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

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

Online Dictionaries

Cambridge dictionary online

MacMillan dictionary

Oxford learner's dictionaries

Description	GR - 19 (B.Tech.)	L	T	P	C
Course Code	ENVIRONMENTAL STUDIES	3	0	0	0
Teaching	Total contact hours - 65				
Prerequisite (s)	Knowledge of environment science				

L-T-P-C
3-0-0-0

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.

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

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

LEARNING

Students will be able to

1. articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values shape the viewer's perception of environmental problems and solutions.

OUTCOMES

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-spots of biodiversity – Threats

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

LEARNING OUTCOMES

Students will be able to

1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.
4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

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.

LEARNING OUTCOMES UNIT-3

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

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.

LEARNING OUTCOMES:

Students will be able to

1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation

4. understand solid waste management.

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..

LEARNING OUTCOMES

Students will have

1. knowledge about watershed management and environmental ethics.
2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.

TEXT BOOKS :

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

REFERENCES :

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

Course Outcomes: At the end of the course, the student 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.
CO6	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.



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. 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., 4thEdn - , 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/>

ENGINEERING PHYSICS laboratory
(Civil, Mechanical, Mining and Automobile Branches)

Learning Outcomes:

The students will be able to

- **estimate** the mechanical properties of materials (L5)
- **determine** moment of inertia of a flywheel (L3)
- **compare** heat transfer in different material (L4)
- **determine** thermal conductivity of good and bad conductors (L3)
- **measure** the elastic constants of the material (L5)

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. Sonometer
5. 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. p-n Junction Diode characteristics
10. To determine the resistivity of semiconductor by Four probe method
11. Hall Effect
12. Thermo Couple-Seebeck Effect
13. Thermal expansion of solids – bimetallic strip
14. Verification of newtons law of cooling of different materials and liquids

References:

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017
2. <https://www.egr.msu.edu/.../HeatExchanger/Double%20Pipe%20HE%20Write%20U..>
3. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=354&cnt=1>
4. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1>

Description	GR - 19 (B.Tech.)	L	T	P	C
Course /Code	COMMUNICATIVE ENGLISH LAB- II	0	0	3	2
Teaching	Total contact hours - 48				
Prerequisite (s)	Learner should be equipped with basic language and communication skills like Reading, Writing, Listening and				

Course Objectives

- Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions.
- Facilitate active listening to enable inferential learning through expert lectures and talks

UNIT 1:

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

Speaking: Formal presentations using PPT slides without graphic elements

Argumentative skills- Debating

UNIT 2:

Following an argument/ logical flow of thought; answering questions on key concepts after listening to extended passages of spoken academic discourse

Conversational skills-formal and informal conversations

UNIT 3:

Listening: 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.

Co-ordinating skills-Group Discussion

UNIT 4:

Listening: Understanding inferences; processing of information using specific context clues from the text.

Speaking: Group discussion; reaching consensus in group work (academic context).

Interview Skills-industry readiness

UNIT 5:

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

Speaking: Formal team presentations on academic/ general topics using PPT slides.

Course Outcomes:

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

- paraphrase short academic texts using suitable strategies and conventions
- make formal structured presentations on academic topics using PPT slides with relevant
- graphical elements
- participate in group discussions using appropriate conventions and language strategies
- prepare a CV with a cover letter to seek internship/ job
- collaborate with a partner to make presentations and Project Reports

PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. A Practical Course in effective english speaking skills, PHI
4. Word power made handy, Dr shalini verma, Schand Company

WEBREFERENCES

Listening:

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

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

BBC Learning English – Pronunciation tips

Merriam-Webster – Perfect pronunciation Exercises

All Skills

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

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

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

Online Dictionaries

Cambridge dictionary online

MacMillan dictionary

Oxford learner's dictionaries

Description	GR - 19 (B.Tech.)	L	T	P	C
Course/ Code	PROBLEM SOLVING & PROGRAMMING IN C Common to ALL Lab	0	0	3	1.5
Teaching	Total contact hours - 50				
Prerequisite (s)	Basic knowledge about Computer, Algorithm and Flowchart.				

Course Objective(s):

- To impart adequate programming skills to solve mathematical problems
- To develop programming skills using the fundamentals and basics of C language.
- To enable effective usage of arrays, strings, functions, pointers and files.

Programs:

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

$$\text{Area} = (s(s-a)(s-b)(s-c))^{1/2}, \text{ where } s = (a+b+c)/2$$
 - 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 from the user, Performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
4. Write a C Program to print the following patterns
 - a) Floyd's triangle
 - b) Pyramid
 - c) Pascal Triangle
5. Write a C program to
 - a) Check whether the given number is Armstrong number or not.
 - b) Check whether the given number is palindrome or not.
 - c) Find the sum of individual digits of a positive integer and find the reverse of the given number.
 - d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
 - e) Generate all the prime numbers between 1 and n, where n is a value supplied by the user.
6. Write a C Program to
 - a) Print the multiplication table of a given number n up to a given value, where n is entered by the user.
 - b) Enter a decimal number, and calculate and display the binary equivalent of that number.
 - c) Enter a binary number, and calculate the decimal equivalent of that number.

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

Course Outcomes:

After successful completion of this course, a successful student 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.

Course Code : Problem Solving & Programming in C													
Course designed By: Department of Computer Science and Engineering													
	Program Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course Outcomes	CO1	✓											
	CO2		✓	✓									
	CO3					✓							
	CO4			✓									
	CO5					✓							
Category		General Humanities		Basic Sciences		Engineering Sciences and Technical			Professional Subjects				
						✓							
Mode of Evaluation: Viva Voce and Written Examination.													



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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	Basic 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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DEPARTMENT OF MECHANICAL ENGINEERING

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

2. Stair case connection
3. Parallel connection
4. Series connection

Workshop Manual is to be given

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

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

Description	GRBT - 19	L	T	P	C
Course Code	Mathematics-III (Applications of PDE, Complex Variables and Transform Techniques) (MECH and CIVIL, AME, MINING)	3	0	0	3
Teaching	Total contact hours - 40				
Prerequisite(s)	Derivatives, integration and complex numbers				

Course Objectives:

- 1) To familiarize the techniques in partial differential equations and complex variables.
- 2) To equip the students to solve application problems in their disciplines.

Unit 1: Complex Variables

10 hrs

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate. Contour integrals, Cauchy theorem (without proof), Cauchy integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series, residues, Cauchy residue theorem (without proof).

Learning Outcomes:

After completion of this unit student able to

- define continuity and differentiability for complex functions (L1)
- apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
- evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues (L5)
- make use of the Cauchy residue theorem to evaluate certain integrals (L3)

Unit 2: Laplace transforms

6 hrs

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

Learning Outcomes:

After completion of this unit student able to

- examine the properties of Laplace transformation (L4)

- apply the Laplace and inverse Laplace transformations for different types of functions (L5)
- evaluate ordinary differential equations by using Laplace transformation technique (L5)

Unit 3: Fourier series

10 hrs

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

Learning Outcomes:

After completion of this unit student able to

- evaluate the Fourier series expansion for different periodic functions (L5)
- understand the nature of the Fourier series that represent even and odd functions and how derivation of a Fourier series can be simplified in this way (L4)

Unit 4: Fourier transforms

8 hrs

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

Learning Outcomes:

After completion of this unit student able to

- examine the properties of Fourier transformation (L4)
- apply Fourier transformation for different functions (L3)

Unit 5: Applications of Partial Differential Equations

6 hrs

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.

Learning Outcomes:

After completion of this unit student able to

- classify the nature of the partial differential equations (L4)
- solve the boundary value problems (related to heat diffusion, one dimensional wave equation) (L3)

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.

References:

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.

Course Outcomes:

At the end of the course students will be able to

- differentiation and integration of complex functions used in engineering problems (L5)
- apply the Laplace transform for solving differential equations (continuous systems) (L3)
- find the Fourier series of periodic signals (L3)
- Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
- find the general solution of the PDEs bearing applications (L1)

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech 1 Sem (3 semester)			
CourseCode 19170302	BASIC AUTOMOBILE ENGINEERING				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Basic knowledge of Mathematics, Physics and Chemistry principles		3	0	0	3

Course Objectives:

To make the student able to

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

Course Outcomes:

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

UNIT-I

Introduction to Automobiles & Engines:

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

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

UNIT-II

Transmission Systems:

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

Steering, Braking and Suspension 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:

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], '-' : 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. 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 alloy systems, 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, Cu-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, Spheroidal 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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DEPARTMENT OF MECHANICAL ENGINEERING

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

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 & Baalashubrahmanyam
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/>

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	-	-	-	2	-	-	3	-	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	1	-	-	1
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	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 on a 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 Hooke'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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DEPARTMENT OF MECHANICAL ENGINEERING

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

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 statically 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://nit.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	-	-	-	-	-
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)	II B.Tech. III Sem (3 semester)			
Course Code	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



GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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DEPARTMENT OF MECHANICAL ENGINEERING

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

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 – manometric head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH. **RECIPROCATING PUMPS:** Working, Discharge, slip, indicator diagrams.

Text Books:

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

Reference Books:

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

Useful Web-links:

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



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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech 1 Sem (3 semester)			
Course Code 19170396	Design Thinking & Product Innovation				
Teaching	Total contact hours:	L	T	P	C
Prerequisite(s):	Engineering Physics, Engineering Chemistry, Mathematics	2	0	0	0

Course Objectives:

To make the student able to

1. Recognise the latest and future issues and challenges in innovation.
2. Expose the student with ideas , concepts and solutions related to design and execution of innovation .
3. Develop an advance innovation.
4. Recognize and specify the best solutions for any complex problem.
5. Propose a concrete, feasible, viable and relevent innovation challenge.

Course Outcomes:

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

CO1:	Immerse into the world of innovation.
CO2:	Provide a thinking space for new alternatives products.
CO3:	Generate low risk ideas.
CO4:	Negotiate with organisation.
CO5:	Deliver more valued and successful solutions.

UNIT-I

Introduction to Design Thinking :

Strategy of Design Thinking , Creative Idea , Ceativity and Problem Solving ,Barriers to Creative Thinking , Brainstorming, Idea Generating Techniques Beyond Brainstorming , Creative Method For Design, Systematic Methods For Designing.

UNIT-II

Innovation for New Products:

Product innovation include introducing new products, enhanced quality and improving its overall performance. Product innovation, alongside cost-cutting innovation and process innovation.

UNIT-III

Design Prototyping:

Guidelines for Prototyping, low-fidelity prototypes, Pros of Low-Fidelity Prototyping, Cons of Low-Fidelity Prototyping, High-Fidelity Prototyping Pros of High-Fidelity Prototyping, Cons of High-Fidelity Prototyping.

UNIT-IV

Introducing to Ergonomics

Ergonomics/ Human factors / Human physical dimension concern , Posture and movement Behaviour and perception Environments Ergonomic design process , Performance support and design intervention , Design Ergonomics in India: scope for exploration

UNIT- V

Ergonomics in Automotive Design

Introduction to Automotive Ergonomics, Anthropometric and biomechanical data in automotive design Occupant Packaging, Automobile control and displays, In vehicle and external visibility of the driver Entry and exit by drivers and passengers, Driver distraction and driving performance measurement, Driver Workload Measurement Virtual Ergonomics evaluation technique and its application in automotive design, Automotive craftsmanship

TEXT BOOKS:

1. Design Thinking ,Hestad Monika , Brand Valley Design Ltd
2. Design Thinking in the Classroom, Lee David , Ulysses Press
3. Bhise, V.D., 2016. Ergonomics in the automotive design process.CRC Press.

REFERENCES:

1. The Art of Design Thinking , Jose Betancur
2. Creative Thinking, John E. Arnold
- 3.Design Thinking Michael G. Luchs ,K Scott Swan & Abbie Griffin, Wiley
- 4.Gkikas, N., 2016. Automotive Ergonomics: Driver-Vehicle Interaction. CRC Press

CO-PO Mapping:

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2: Moderate [Medium];

3: Substantial [High],

4 : No Correlation)

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 rd semester)			
Course Code 19170376 7	COMPUTER AIDED ENGINEERING DRAWING PRACTICE				
Teaching	Total contact hours - 60	L	T	P	C
Prerequisite(s): Engineering Drawing		1	-	3	3

Course Objective:

1. Demonstrate the importance of Engineering Graphics.
2. Examine the basic principles of Technical/Engineering Drawing.
3. Construct the different steps in producing drawings according to BIS.
4. Design the basic engineering drawing formats.
5. Formulate the engineering designs according to conventions.

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Construct the diagrams in engineering
C02:	Modify the drawings using modern engineering software tools
C03:	Produce the drawings based on ISO and BIS standards
C04:	Design various components of an automobile
C05:	Reconstruct the drawings and invent new designs of components

Syllabus:

UNIT-I:

Projections of Planes & Solids: Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Development And Interpenetration Of Solids: Development of Surfaces of Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT-II:

Isometric Projections : Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions.

Perspective Projections: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

UNIT III:

Introduction to Computer aided Drafting: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling.

UNIT IV:

View points and view ports: view point coordinates and view(s) displayed, examples to exercise different options, restore, delete, joint, single option.

UNIT V:

Computer aided Solid Modeling: Isometric projections, orthographic projections of isometric projections, modeling of simple solids, Modeling of Machines & Machine Parts.

Text books:

1. Engineering Graphics, K.C. John, PHI Publications
2. Engineering drawing by N.D Bhatt, Charotar publications.

Reference Books:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad – T Jeyapoovan, vikas

Web Links:

1. <http://nptel.ac.in/courses.php>.
2. <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	2	1	1	-	2	-	-	-	1	1	-	-
CO2	1	1	1	-	3	-	-	-	-	-	-	-
CO3	1	1	3	-	1	-	-	-	-	-	-	-
CO4	1	3	2	-	2	-	-	-	-	-	-	-
CO5	1	2	2	1	1	-	-	-	-	-	1	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 rd semester)			
Course Code 19170312	MECHANICS OF SOLIDS & FLUID MECHANICS LAB				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s):	Engineering Mechanics, Fluid properties and principles	0	0	3	1.5

Course Objective:

To make the student able to

1. Determine the strength of the materials
2. Analyze the failure.
3. Analyze the behavior of the fluid in flow conditions
4. Analyze the performance of hydraulic machines
5. 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-	
C01:	Distinguish properties of different types of materials
C02:	Investigate different failures of machine components
C03:	Apply different materials for different applications
C04:	Illustrate different property measuring machines
C05:	Apply hydraulic principles to various systems of automobiles such as fuel, lubricant, cooling and aerodynamic

Syllabus:

(A) MECHANICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test on
 - a) Simple supported
 - 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
8. Punch shear test

(B) FLUID MECHANICS LAB

1. Impact of jets on Vanes.
2. Performance Test on Single Stage Centrifugal Pump.
3. Performance Test on Reciprocating Pump.
4. Calibration of Venturimeter.
5. Calibration of Orifice meter.
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.

Note: Any 6 of the above 8 experiments are to be conducted

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[illegible]

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

Course Objective:

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

Course Outcomes:

On Completion of the course, the students will be able to-	
C01:	Apply the knowledge of approximating and find the roots of polynomial and transcendental equation in practical engineering problems.
C02:	Apply the Knowledge of different algorithms for approximating the solution of ordinary differential equations in practical Engineering problems.
C03:	Demonstrate the knowledge of Probability distributions.
C04:	Enhance knowledge of a classical hypothesis techniques.
C05:	Enhance Knowledge in inferential methods based on small and large sampling tests.

Syllabus:

Unit I :

Solutions of Algebraic, Transcendental Equations and Interpolation

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

UNIT II:

Numerical Integration and Solution of Ordinary Differential Equations

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

Unit III:

Probability

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

Unit IV:

Testing of Hypothesis

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

UNIT V:

Small Sample Tests

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

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. P.Kandasamy, K.Thilagavathy K.Gunavathi, Numerical Methods, S.Chand & Company, 2/e, Reprint 2012.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
4. Miller and Freunds, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
5. 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. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
3. N.P. Bali and Manish Goyal, A text Book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Web Links:

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

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



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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, Kutzbach criterion 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 Russell – 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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DEPARTMENT OF MECHANICAL ENGINEERING

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

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 Coriolis'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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DEPARTMENT OF MECHANICAL ENGINEERING

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

Useful 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	-	3	-	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	3

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. 2 Sem (4 semester)			
CourseCode 19170404	AUTOMOTIVE ENGINES				
Teaching	Totalcontacthours-	L	T	P	C
Prerequisite(s): Chemistry of combustion, Modes of heat transfer, Fluid Mechanics, Engineering Materials , Lubrication		3	0	0	3

Course Objectives:

To make the student able to

1. Impart knowledge on basics of automotive SI and CI engines consisting of types, construction, working
2. Understand the actual engine working principle and its thermochemistry of fuel-air mixtures
3. Learn the properties of gasoline and diesel fuel and combustion process involved in diesel engines
4. Solve basic design problems of various operating parameters of the engine
5. Analyze the performance and pollution characteristics of SAI and CI engine and learn modern developments in IC engine

COURSE OUTCOMES

On completion of the course, the students will be able to-	
CO1:	Analyse and conduct the experiments of the automotive SI and CI engines
CO2:	Investigate the thermochemistry of air-fuel mixtures
CO3:	Compare the properties and combustion of gasoline, diesel fuel processes
CO4:	Design and solve the problems of various operating parameters of the engine
CO5:	Analyse and plot the performance and pollution characteristics of IC engines

UNIT-1

Introduction:

Historical development of Automobiles, Different Types of Automotive Power plants, principles of I.C engines, supercharging and turbo charging.

Two stroke and four stroke engines: different types of scavenging systems, scavenging efficiency. Valve and Port timing diagrams, Special types of I.C engines like Stirling, Wankle rotary, Variable compression ratio engines and Variable valve timing engines.

Automobile engine components: Classification, Function, Materials, Constructional details and Manufacturing process of various engine components.

UNIT-2

Lubrication systems: Characteristics of lube oils, Functions of the lubrication system, classification of lubricating oils, lubricating systems- wet sump lubrication- dry sump lubrication, oil filters, oil pumps, crankcase ventilation, oil additives.

Cooling systems: Air and water cooling systems, thermos siphon and forced water cooling systems. Types of fans- Viscous fan / EMFC, Characteristics of coolant oil.

UNIT-3

SI engine fuel systems: Mixture requirements in S.I engines, fundamental of carburetion flow characteristics of carburetion, Methods of mixture correction, calculation of throat and jet sizes of a carburetor, Types of carburetors and working. Timed and continuous injection systems, multipoint fuel injection system, Introduction to Gasoline Direct Injection (GDI).

Advantages of petrol injection, need to have a closed loop control over air fuel ratio in S.I engines for emission reduction, cylinder port and the manifold injection systems

UNIT-4

C.I engine fuel systems: Fuel filters, transfer pumps, injection pumps, injection nozzles, their functions, Diesel fuel pumps: principle delivery characteristics of fuel pumps, effects of ignition lag on injection, pressure waves in fuel lines, rotary distributor pumps. Factors affecting atomization and vaporization.

Fuel spray characteristics: Types of injection nozzles and their characteristics, Multihole, Pintle and Pintaux nozzles. Unit injectors. Common Rail Direct Injection.

Governors: Maximum and minimum speed governors. Mechanical and pneumatic governors, Electronic Governors.

UNIT-5

Combustion in IC engines:

Combustion in S.I engines: Normal combustion and Abnormal combustion- Importance of flame speed and effect on engine variables- Types of abnormal combustion, pre-ignition and knocking (explanation of)- Fuel requirements and fuel ratings, Anti-knock additives- Combustion chamber- Requirements, types.

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. Types of turbochargers

TEXTBOOKS:

1. M L MATHUR & R P SHARMA- A course in Internal combustion engines- Dhanpat Rai
2. V. GANESAN- TMH- I.C ENGINES
3. K. NEWTON and STEEDS- The Motor Vehicle, SAE Publications

REFERENCES BOOKS:

1. B.P. OBERT I C ENGINES & AIR POLLUTION- Harper & ROW Publications
2. BOSCH GASOLINE & DIESEL MANAGEMENT- Bosch Publication

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

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

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 – Vander Waals Equation of State – Compressibility charts – variable specific Heats, Mixtures of perfect Gases – Mole Fraction, Mass fraction 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

AIR STANDARD 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, Michael 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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. I Sem (3 rd semester)			
Course Code 19170477	MACHINE DRAWING				
Teaching	Total contact hours - 60	L	T	P	C
Prerequisite(s): Engineering Drawing, Computer Aided Engineering Drawing Practice		3	-	-	3

Course Objective:

1. Adapt International standards
2. Assemble the parts of an any mechanical component
3. Communicate through the drawings
4. Model simple assembly drawings and prepare detailed part drawings with geometric dimensioning and tolerance
5. Differentiate the components in an automobile

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Memorize the International standards
CO2:	Construct the part drawing of mechanical components
CO3:	Produce the drawings based on ISO and BIS standards
CO4:	Design and assemble various components of an automobile
CO5:	Reconstruct the drawings and invent new designs of components

Syllabus:

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

- a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- d) Title boxes, their size, location and details - common abbreviations & their liberal usage
- e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportion.

- a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- b) Keys, cottered joints and knuckle joint.
- c) Rivetted joints for plates
- d) Shaft coupling, spigot and socket pipe joint.
- e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

- Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
- Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
- Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

Text books:

- Machine Drawing – Dhawan, S.Chand Publications
- Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/
Publishers

Reference Books:

- Machine Drawing – N.Siddeswar, K.Kannaiah & V.V.S.Sastry - TMH
- Machine Drawing – P.S.Gill,
- Machine Drawing – Luzzader
- Machine Drawing – Rajput
- Machine Drawing – N.D. Junnarkar, Pearson
- Machine Drawing – Ajeeth Singh, McGraw Hill
- Machine Drawing – KC John, PHI
- Machine Drawing – B Battacharya, Oxford.
- Machine Drawing – Gowtham and Gowtham, Pearson

Web Links:

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

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	2	-	-	-	1	-	-
CO2	1	1	1	-	1	-	-	-	-	1	-	-
CO3	1	1	1	-	1	2	-	-	-	-	-	-
CO4	1	3	2	-	2	1	-	-	1	-	1	-
CO5	1	2	2	1	1	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. II Sem (4 semester)			
Course Code	Robotics				
Teaching	Total contact hours – 42	L	T	P	C
Prerequisite(s): Kinematics of machines /Dynamics of machines /Mathematics: Matrices, Differential Equations		3	0	0	3

Course Objectives:

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

Course Outcomes:

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

Syllabus:

UNIT-I

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

UNIT-II

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

UNIT- III

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

UNIT-IV

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



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DEPARTMENT OF MECHANICAL ENGINEERING

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

UNIT-V

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

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

Course Outcomes:

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

- CO-1. Identify various robot configuration and components. (PO4)
- CO-2. Select appropriate actuators and sensors for a robot based on specific application. (PO6)
- CO-3. Solve kinematic and dynamic problems for simple serial kinematic chains. (PO7)
- CO-4. Plan trajectory for a manipulator for avoiding obstacles. (PO5)

Text Books:

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

References:

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

CO-PO Mapping:

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

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

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

Course Objective(s):

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

Course Outcome(s):

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

CO-1: Describe the general architecture of computers

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

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

UNIT-1

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

UNIT-2

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

UNIT-3

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

UNIT-4

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

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

UNIT-5

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

Text Books

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

Reference Books

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

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	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-	
C01:	identify most appropriate heating or welding techniques for suitable applications
C02:	understand various level of luminosity produced by different illuminating sources
C03:	identify a suitable motor for electric drives and industrial applications
C04:	Plot speed-time curves for different services.
C05:	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, Dhanpat Rai & 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
C01	-	2	-	-	-	-	-	-	-	-	-	-
C02	-	1	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	2	-	-	-	-	3	-	-	-	-
C05	-	-	-	-	-	-	-	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, CoAP, 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.

Reference Books:

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

Web Links:

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

CO-PO Mapping:

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

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

Environmental Pollution and Control

(Open Elective)

Course Objectives:

The objective of this course is:

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

Unit – I

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

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

Unit – II

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

Unit – III

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

Unit IV

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

Unit – V

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

Course Outcomes

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

1. Identify the air pollutant control devices
2. Have knowledge on the NAAQ standards and air emission standards
3. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
4. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
5. Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
6. Appreciate the importance of sustainable development while planning a project or executing an activity.

Text Books:

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

References:

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

Web-Resources: www.nptel.com



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 th semester)			
Course Code	BASIC AUTOMOBILE ENGINEERING Open Elective – I				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

To make the student able to

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

Course Outcomes:

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

Syllabus:

UNIT-I

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

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

UNIT-II

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

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UNIT-III

Control Systems: Steering geometry-camber, castor, king pin rake, combined angle toe-in, center point steering, types of steering mechanism-Ackerman steering mechanism, steering gears-types, steering linkages. Mechanical, hydraulic, pneumatic & vacuum brakes-brief description, anti lock brake system (ABS) and electromagnetic retarder. Telescopic suspension, Rigid axle suspension and independent suspension, Shock absorbers, Torsion bar, Stabilizer, Different types of springs used in automobile suspension.

UNIT-IV

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

UNIT-V

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

Different pollutants, formation, Effects of pollution on environment, human. Regulations, Emission standards, Pollution control methods. Electric Vehicles and Hybrid Vehicles.

TEXT BOOKS:

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

REFERENCES:

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

CO-PO Mapping:

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

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

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-	
C01:	Know the various Elements of Mining and stages/phases in Mining
C02:	Know the concepts of Mining Methods.
C03:	Know the Drilling methods.
C04:	Understand the explosives.
C05:	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/e04e05fbc48920b_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.Tech. I Sem (3 rd semester)			
Course Code 19170411	ENGINE COMPONENTS & TESTING LAB				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Chemistry of combustion, Modes of heat transfer, Fluid Mechanics, Engineering Materials, Lubrication principles .		0	0	3	1.5

Course Objective:

To make the student able to

1. Understand different principles of working of various engine components
2. Find various engine performance measuring methods
3. Analyze different settings of engine systems which controls engine performance
4. Conduct the tests on fuels and lubricants and determine its properties

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Assemble and Dis-assemble the engines
CO2:	Conduct performance test and Analyse the performance of an various engines
CO3:	Can fix different systems which controls performance of engine
CO4:	Decide the valve and port timing
CO5:	Conduct the tests on fuels and lubricants and determine its properties

Syllabus:

LIST OF EXPERIMENTS:

1. Dismantling and Assembly of 2 Stroke and 4 Stroke Engines.
2. Testing of IC Engine –Measurement of Speed, Fuel flow, Air consumption and measurement of BHP.
3. Determination of IHP, BHP, Mechanical efficiency, brake thermal efficiency, indicated thermal efficiency, volumetric efficiency, SFC and drawing heat balance sheet for petrol and diesel engines.
4. Test on multi cylinder engines, Morse test
5. Valve and port timing diagrams, determination of compression ratio
6. Tests on fuels and lubricants.
 - a. Viscosity-Viscometer Redwood
 - b. Viscosity Index – Saybolt Viscometer
 - c. Flash and Fire Points of fuels Flash and Power points of Lubricants
 - d. Calorific Value of Liquid Fuels Calorific Value of Gaseous Fuels

e. Density Test of Petrol/ Diesel

7. Performance test on VCR (Variable Compression Ratio) Engine.

CO-PO Mapping:

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[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	II B.Tech. II Sem (4 th semester)			
Course Code 19198211	COMMUNITY SERVICE ORIENTED PROJECT				
Teaching	Total contact hours -15	L	T	P	C
Prerequisite(s): None		0	0	1	0.5

Course Objective:

1. To identify the problems encountered by different communities in their professional life or personal life.
2. Analyze the problem and finding out the causes of problem.
3. Finding out suitable solution to rectify the problem identified at cheaper rate and least effort.
4. Design and simulate any device to solve the problems identified.
5. Fabricate any device to solve the problems identified.
6. Analyze the working of the device fabricated.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Fix the problems of various communities
CO2:	Reconstruct the drawings and invent new designs of components
CO3:	Modify the available devices already in use by modern engineering software tools
CO4:	Fabricate small devices at cheaper rate to solve a particular community problem
CO5:	Analyze the devices constructed

A group of people with a common profession can be called as community. For example teacher community, student community and farmers community etc. The student has to identify any problem related to any community and has to do a project to rectify such problems. The project may be a case study or fabrication project.

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO1	3	2	-	2	1	1	-	-	3	3	2	1
CO2	1	1	-	1	1	1	-	-	1	1	1	1
CO3	1	1	-	1	1	1	-	-	1	1	1	1
CO4	1	-	-	-	1	-	-	-	-	-	-	1
CO5	1	-	-	-	-	1	-	-	-	1	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. II Sem (4 semester)			
Course Code	Dynamics of Machinery				
Teaching	Total contact hours-55	L	T	P	C
Prerequisite(s): Kinematics of Machinery		3	0	0	3

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

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 Proell governors, Spring loaded governors-Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

UNIT- IV

BALANCING: Balancing of rotating masses single and multiple-single and different planes, use of analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. Analytical and graphical methods, unbalanced forces and couples – examination of “V” multi cylinder inline and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

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's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Introduction to damped and forced vibrations.

Text Books:

1. Theory of Machines, "S.S Ratan, Mc. GrawHill Publ.
2. Theory of Machines, "Thomas Bevan,. CBS Publishers

References:

- 1 Theory of Machines,-Khurmi, S. Chand publications

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170505	MANUFACTURING PROCESSES				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s):		3	0	0	3

COURSE OBJECTIVES:

To make the student able to

1. Differentiate and choose the manufacturing process
2. Analyze the manufacturing process.
3. Apply principles of production techniques and be able to fabricate basic parts.
4. Organize the manufacturing process

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Differentiate and choose the manufacturing process
CO2:	Analyse the manufacturing process .
CO3:	Apply principles of production techniques and be able to fabricate basic parts.
CO4:	Organise the manufacturing process
CO5:	Analyse the sheet metal forming

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. Risers – Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

UNIT – III

Welding : Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting.

Basic principles of Arc welding, Manual metal 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.

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Heat affected zones in welding; pre & post heating, Weld ability of metals, welding defects – causes and remedies – destructive and non destructive testing of welds, Design of welded joints

UNIT – IV

Plastic deformation in 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 and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire 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 in these operations, Deep drawing, Stretch forming, Bending, Spring back and its remedies, 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 , 5thEdn.
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

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

CO-PO Mapping:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	3	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-
CO3	-	-	-	-	-	-	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)	III B.Tech. II Sem (6 th semester)			
Course Code	Heat Transfer				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Thermo dynamics		3	0	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.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

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 edition.
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.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170565a	Product Design & Assembly Automation (Professional Elective-I)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s):		3	0	0	3

COURSE OBJECTIVE:

1. To make the student to design various automatic feeding devices
2. To make the student to analyze the automation and automatic assembly transfer systems
3. To make the student to design the high speed assembly and robot assembly systems.
4. To make the student to develop sophisticated technologies using Robots in assembly lines

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Compare various automatic feeding devices
CO2:	Evaluate the automation and automatic assembly transfer systems
CO3:	Test the high speed assembly and robot assembly systems.
CO4:	Create sophisticated technologies using Robots in assembly lines.
CO5:	Evaluate the assembly problems in automation

Syllabus:

UNIT –I

AUTOMATIC FEEDING AND ORIENTING DEVICES: Vibrator feeders: Mechanics of vibratory conveying, estimating the mean conveying velocity, load sensitivity, solutions to load sensitivity, spiral elevators, balanced feeders. Orientation of typical oriental system, effect of active orienting devices on feed rate, analysis of orienting systems, performance of an orienting device, natural resting aspects, of parts for automatic handing, analysis of a typical orienting system, out-of-bowl tooling. Mechanical feeders. Reciprocating -tube hopper feeder; magazines.

UNIT-II

Assemble Automation: Development of the assemble process, choice of assemble method assemble advantages social effects of automation.

Automatic assembly transfer systems: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.

UNIT-III

Product design for high speed automatic assembly and robot assembly :Introduction, design of parts for: high speed, feeding and orienting, example, additional feeding difficulties, high speed automatic insertion, example, analysis of an assembly, general rules for product design for

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automation, design of parts for feeding and orienting, summary of design rules for high speed automatic assembly, product for robot assembly.

UNIT-IV

Design of manual assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

UNIT-V

Performance And Feasibility of Automation: Avoiding jams during assembly, reducing risk assembly problems, effects of holding down, manual assembly data base and design data sheets, application of the DFA methodology and general design guidelines.

Performance and economics of assembly systems: Indexing machines, free transfer machines, basis for economic comparisons of automation equipment, comparison of indexing and free – transfer machines' economics of robot assembly.

Feasibility study for assembly automation: Machine design factors to reduce machine downtime due to defective parts. Visibility study.

TEXT BOOKS

1. Geoffrey Boothroyd, "Assembly Automation and Product Design", Marcel Dekker Inc., NY, 1992.

REFERENCES

1. Geoffrey Boothroyd, "Hand Book of Product Design" Marcel and Dekken, N.Y. 1990.
2. A Delbainbre "Computer Aided Assembly London, 1992.

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170565b	Automotive Chassis & Suspension (Professional Elective-1)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering, Automotive Engines		3	0	0	3

COURSE OBJECTIVES:

1. Design the chassis to accommodate all the systems of an automobile
2. Construct the chassis
3. Develop the control systems
4. Modify the chassis

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Demonstrate the frame, front axle and steering system
CO2:	Examine the drive line and differential
CO3:	Identify the rear axles, wheels and tyres
CO4:	Operate suspension system in Automobiles
CO5:	Differentiate braking systems in Automobiles

Syllabus:

UNIT- I

LAYOUT, FRAME, FRONT AXLE AND STEERING SYSTEM

Basic construction of chassis, Types of Chassis layout, with reference to Power Plant location and drive, various, types of frames, Loads acting on vehicle frame, Types of Front Axles and Stub Axles, Front Wheel Geometry. Condition for True Rolling Motion. Ackerman's and Davis's Steering Mechanisms, Steering Linkages, Different Types of Steering Gear boxes, Slip Angle, Over-Steer and Under-Steer, Reversible and Irreversible Steering, Power Steering.

UNIT II

DRIVE LINE, FINAL DRIVE AND DIFFERENTIAL

Driving Thrust and its effects, torque reactions and side thrust, Hotchkiss drive, torque tube drive, radius rods and stabilizers, Propeller Shaft, Universal Joints, Constant Velocity Universal Joints, Final drive, different types of final drive, Worm and Worm wheel, straight bevel gear, spiral bevel gear and hypoid gear final drive. Differential principle, Constructional details of differential unit, Differential housings, Non-Slip differential, differential locks.

UNIT III

REAR AXLES, WHEELS, RIMS AND TYRES

Construction of rear axles, Types of Loads acting on rear axles, Full -Floating, Three-Quarter Floating and Semi-Floating Axles, Twist beam rear axle, Types, Multi axles vehicles, Wheels and

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Rims, Types of Tyres and their constructional details. Tubeless, cross ply radial type, tyre sizes and designation

UNIT IV

SUSPENSION SYSTEM

Requirement of Suspension System, Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi-Leaf spring, Coil and Torsion bar Springs, Rubber, Pneumatic and Hydro – elastic Suspension Spring Systems, Independent Suspension System, Shock Absorbers, Types and Constructional details of Leaf and Coil Springs, Sprung and un sprung mass, torsion bar springs.

UNIT V

BRAKE SYSTEMS

Need for Brake systems, Stopping Distance, Time and Braking Efficiency, Effect of Weight Transfer during Braking, Classification of brakes, Braking Torque, drum brake and disc Brake Theory, Types and Construction of Hydraulic Braking System, Mechanical Braking System, Pneumatic Braking System, Power-Assisted Braking System, Servo Brakes, Retarders – antilock braking systems(ABS).

TEXT BOOKS

1. Newton Steeds and Garret, "Motor Vehicles" 13th Edition, Butterworth, London, 2005.
2. Heinz Hazler, "Modern Vehicle Technology", Butterworth, London, 2005.
3. Devaradjane. Dr. G., Dr. M. Kumaresan, "Automobile Engineering", AMK Publishers, 2013.

REFERENCES

1. Heldt P.M., "Automotive Chassis" Chilton Co., New York, 1990.
2. Giri. N.K., "Automotive Mechanics" Khanna Publishers, New Delhi, 2005.
3. "Motor Vehicles", Newton, Steed and Garrot, 13th Edition, Butterworth London.
4. "Vehicle and Engine Technology", Heisler, Second Edition SAE International 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	2	1	1	-	2	-	-	-	1	1	-	-
CO2	1	1	1	-	3	-	-	-	-	-	-	-
CO3	1	1	3	-	1	-	-	-	-	-	-	-
CO4	1	3	2	-	2	-	-	-	-	-	-	-
CO5	1	2	2	1	1	-	-	-	-		1	-

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170565c	MODERN VEHICLE DESIGN (Professional Elective-1)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s):		3	0	0	3

COURSE OBJECTIVE:

1. To make the student to select the suitable material for vehicle design
2. To make the student to design the knowledge in modeling of the various components
3. To make the student to analyze the aerodynamic forces
4. To make the student to design the knowledge in design and analysis of the chassis
5. To make the student to analyze the accidents and injuries

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Select the suitable material for vehicle design
CO2:	Decide the modeling of the various components
CO3:	Analyze the aerodynamic forces
CO4:	Analyzing the accidents and injuries
CO5:	Describe endurance and durability studies in design

Syllabus:

UNIT I INTRODUCTION TO AUTOMOTIVE ENGINEERING DESIGN

The development of the world motor industry, Streamlining, Structure and manufacturing technology of automotive materials, Mechanical and physical properties of automotive materials, Materials selection for automotive components. The manufacturing challenge for automotive designers.

UNIT-II

BODY DESIGN: THE STYLING PROCESS

Introduction, The studios, working environment and structure, Product planning, Brainstorming, The package, Review of competition, Concept sketching and package related sketching, Full sized tape drawing, Clay modelling, 2D systems, 3D systems.

UNIT-III

BODY DESIGN: AERODYNAMICS

Introduction, Aerodynamic forces, Drag, Drag reduction, Stability and cross-winds, Noise, under hood ventilation, Cabin ventilation, Wind tunnel testing, Computational fluid dynamics.

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UNIT-IV

CHASSIS DESIGN AND ANALYSIS

Load case, introduction, Chassis types, introduction, and Structural analysis by simple structural surfaces method, Computational methods.

UNIT-V

CRASHWORTHINESS AND ITS INFLUENCE ON VEHICLE DESIGN

Introduction, Accident and injury analysis, Vehicle impacts: general dynamics, Vehicle impacts: crush characteristics, Structural collapse and its influence upon safety.

FAILURE PREVENTION – THE ROLE OF ENDURANCE AND DURABILITY STUDIES IN THE DESIGN AND MANUFACTURE OF RELIABLE VEHICLES:

Introduction, Important aspects of failures in the real engineering world, Testing and failure prediction, Automotive technology and the importance of avoiding failures, Case studies – typical examples of automotive failures.

TEXT BOOKS

1. Julian Happian- Smith, "Modern Vehicle Design", NY, 2002.

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	-	2	-	-	-	1	1	-	-
CO2	1	1	1	-	3	-	-	-	-	-	-	-
CO3	1	1	3	-	1	-	-	-	-	-	-	-
CO4	1	3	2	-	2	-	-	-	-	-	-	-
CO5	1	2	2	1	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)	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 concept plant location and layouts.
- To understand the methods for improving productivity in manufacturing industries.
- To familiarize various techniques of HRM, Quality Control.
- To understand the CPM and PERT networks .

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, Maintainability, and Availability concepts – Employee health and safety.

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.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

UNIT – IV

QUALITY MANAGEMENT: Introduction to quality - Statistical quality control (SQC): Control Charts, Numerical Examples on X Bar charts, R Charts, C Charts and P Charts – Acceptance Sampling techniques.
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 Techniques - CPM and PERT - Critical Path Analysis - Activity times and floats, Project completion times. PERT - 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 Gavriel Salvendy, A Wiley-Interscience Publication, 2001, Third edition.

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170565e	TWO & THREE WHEELERS (Professional Elective-1)				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering, Automotive Engines		3	0	0	3

COURSE OBJECTIVES:

1. Choose the engine
2. Construct two and three wheeler vehicles.
3. Demonstrate the wheels, tyres, suspensions and braking systems.
4. Identify the latest models of two wheelers

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Compare SI & CI Engines
CO2:	Analyze ignition system
CO3:	Demonstrate the frame ,drive systems
CO4:	Differentiate braking systems and wheels
CO5:	Identify case study of two & three wheelers

Syllabus:

UNIT-I

POWER UNIT

Two stroke and four stroke SI & CI engine Construction and Working, merits and demerits, Symmetrical and unsymmetrical valve & port timing diagrams. Types of scavenging processes, merits and demerits – scavenging efficiency. Scavenging pumps – Rotary valve engine.

UNIT-II

FUEL AND IGNITION SYSTEM

Fuel system – Different circuits in two wheeler fuel systems, fuel injection system. Lubrication system, Ignition systems - Magneto coil and battery coil spark ignition system, Electronic ignition System, and starting system - Kick starter system – Self starter system, Recent technologies.

UNIT III

CHASSIS AND SUB – SYSTEMS

Main frame for two and three wheelers, its types, Chassis and different drive systems for two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear controls in two wheelers. Front and rear suspension systems. Shock absorbers, Panel meters and controls on handle bar, Freewheeling devices

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UNIT IV

BRAKES AND WHEELS

Drum brakes & Disc brakes Construction and Working and its Types, Front and Rear brake links lay-outs. Brake actuation mechanism. Spoked wheel, cast wheel, alloy wheel & its merits and demerits. Tyres and tubes Construction & its Types- vulcanizing methods. Steering column construction, steering geometry for two & three wheelers.

UNIT V

TWO & THREE WHEELER CASE STUDY

Case study of Sports bike, Motor cycles, Scooters and Mopeds - Auto rickshaws, Pick up van, Delivery van and Trailer. Importance of maintenance – general maintenance schedule –Servicing of two and three wheeler – periodic checkups, Recent developments.

SAFETY: Impact protection basics, physics of impact between deformable bodies, design for crash worthiness, occupant and cargo restraint, passive restraint systems, side impact analysis, bumper system energy absorbent foams, laws of mechanisms applied to safety.

TEXT BOOK:

1. Irving,P.E., Motor cycle Engineering, Temple Press Book, London, 1992.
2. Marshal Cavandedish, 'Encyclopedia of Motor cycling', New York, 1989
3. Srinivasan.S., 'Motor cycle, Scooter, Mopeds', New century book house, 1988.

REFERENCES:

1. The Cycle Motor Manual, Temple Press Ltd., London, 1990.
2. K. K. Ramalingam, Two Wheelers, Scitech publications, Chennai,
3. Encyclopedia of Motorcycling, 20 volumes, Marshall Cavensih, New York and London, 1989.
4. Bryaut,R.V., Vespa Maintenance and Repair series.
5. Raymond Broad, Lambretta – A practical guide to maintenance and repair, 1987.

CO-PO Mapping:

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

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

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

Course Objectives:

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

Course Outcomes:

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

Syllabus

UNIT – I

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

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

UNIT – II

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

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

Text Books:

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

References:

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

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

Course Objective(s):

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

Course Outcome(s):

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

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

CO-2: Demonstrate basic principles of Web application security

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

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

UNIT-1

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

UNIT-2

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

UNIT-3

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

UNIT-4

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

UNIT-5

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

Text Books

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

Reference Books

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

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 semester)			
Course Code	Energy Management (Open Elective-II)				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic electrical engineering		3	0	0	3

Course Objective:

1. To understand energy efficiency, scope, conservation and technologies.
2. To design energy efficient lighting systems.
3. To estimate/calculate power factor of systems and propose suitable compensation techniques.
4. To understand energy conservation in HVAC systems.
5. To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain energy efficiency, conservation and various technologies.
CO2:	Design energy efficient lighting systems.
CO3:	Calculate power factor of systems and propose suitable compensation techniques.
CO4:	Explain energy conservation in HVAC systems.
CO5:	Calculate life cycle costing analysis and return on investment on energy efficient technologies.

Syllabus:

UNIT-I: BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT

Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

UNIT-II : POWER FACTOR AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt-hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT-III : SPACE HEATING AND VENTILATION

Ventilation – Air-Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT-IV : ECONOMIC ASPECTS AND FINANCIAL ANALYSIS

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

UNIT-V : COMPUTATION OF ECONOMIC ASPECTS

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

Text Books:

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

Reference Books:

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

Web-Resources:

1. www.electrical4u.com
2. www.nptcl.com

CO-PO Mapping:

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

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

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

Course Objectives:

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

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

UNIT-1 Digital Image Fundamentals

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

UNIT-2 Image Enhancement in the Spatial Domain

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

UNIT-3 Image Enhancement in the Frequency Domain

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

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

UNIT-4 Image Restoration

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

UNIT-5 Color Image Processing

Color Fundamentals, Color Models, Pseudo color Image Processing.

Text Books:

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

Reference Books:

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

Web Links:

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) '0': No Correlation

[illegible]

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

Course Objective:

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

Course Outcomes:

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

Syllabus:

Unit – I

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

Unit – II

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

Unit – III

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

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

Unit – IV

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

Unit – V

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

Text Books:

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

References:

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

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19177561	HYBRID AND ELECTRIC VEHICLES (Open Elective-II) Not for AME Students				
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 Management Strategies in hybrid and electric vehicles, Case Studies: Design of a Hybrid

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Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV), Plug-in Hybrid Electric vehicle.

UNIT IV

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

UNIT V

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

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

TEXT BOOKS

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

REFERENCES

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

CO-PO Mapping:

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

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

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

Course Objectives

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

Course Outcomes

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

Syllabus

UNIT I

Concept of Hazards and Disasters

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

UNIT II

Classification of Hazards

Volcanoes- volcanic hazards/disasters, causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions; Earthquake Hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception & mitigation of earthquakes; Landslides- causes and impacts; Avalanches-causes and impacts; Infrequent events: Cyclones – Lightning – Hailstorms, cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms-causes, distribution human adjustment, perception & mitigation; Floods, droughts and their impacts.

UNIT III

Approaches and Measures in Disaster Management

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

UNIT IV

Disaster Management

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

UNIT V

Disaster Management in India

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

Text books

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

Reference Books

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

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

Course Objective: This course aims

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

Course Outcomes

On Completion of the course, the students will be able to-	
CO1:	Understand the necessity to improve four language skills
CO2:	Acquire knowledge about public speaking ability
CO3:	Strengthen their grammatical skills in the language
CO4:	Improve necessary vocabulary and academic writing skills
CO5:	Improve academic writing skills

Syllabus:

Unit-1

Technical Communication: Report writing: Importance, structure, drafting of reports, Types of reports-formal-informal reports-Business Writing: Sales letters, notices, agenda and minutes of the meeting-Information Transfer

Unit-2

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

Unit-3

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

Unit-4

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

Unit-5

(a)Occupational competency- Interview skills- self introduction-performance management planning-strategic planning-Negotiation techniques-visual communication- - delegation-filling personal information-C.V.preparation-Mock Interviews

(b) LSRW Skills-Selected lessons from UNLOCK-2 published by Cambridge University Press, mobile etiquette, table manners, dressing style

Prescribed Text Books: UNLOCK SERIES from Cambridge University Press

Unlock Book-2: Reading and Writing

Listening and Speaking

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

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

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

CO-PO Mapping:

(1: Slight [Low];

2: Moderate [Medium];

3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	3	2	-	-	-	-
CO2	-	-	-	-	-	3	3	3	-	-	-	-
CO3	-	-	-	-	-	2	3	3	-	-	-	1
CO4	-	-	-	-	-	3	3	3	-	-	-	-
CO5	-	-	-	-	-	2	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)	III B.Tech. II Sem (6 th semester)			
Course Code	Heat Transfer Lab				
Teaching	Total Contact hours-55	L	T	P	C
Prerequisite(s): Thermodynamics, Fluid Mechanics and Heat Transfer.		0	0	3	1.5

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 heat transfer rate of boiling and condensation.
- 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.

List of Experiments:

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.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

16. Determination of Heat transfer coefficient of horizontal tube in natural convection.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170513	BASIC AUTOMOBILE COMPONENTS MANUFACTURING LAB				
Teaching	Total contact hours- 42	L	T	P	C
Prerequisite(s):		3	0	0	3

Course outcomes:

After successful completion of this course, successful student able to

1. Apply some of the manufactures process directly in the industry for preparation of complicated jobs.
2. Choose the joining process
3. Process plastics
4. Select the manufacturing process

I. METAL CASTING:

To Perform Pattern and Mould Preparation for Engine Components-Connecting rod, Crank Shaft

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

II. WELDING:

To Perform Welding operation of Automobile Body Components

1. Gas welding
2. Gas cutting
3. Manual metal arc welding - Lap & Butt Joints
4. TIG/MIG Welding
5. Resistance Spot Welding

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6. Brazing and soldering

III METAL FORMING AND POWDER METALLURGY:

To Perform Basic Chasis Components by Forming Operation

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:

To Perform Plastic Moulds of Mirror, housing head lamp & tail lamp mountings.

1. Injection Moulding
2. Blow Moulding

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. I Sem (5 th Semester)			
Course Code 19170521	MINI PROJECT -1 / STUDY PROJECT / INTERNSHIP				
Teaching	Total contact hours- 42	L	T	P	C
Prerequisite(s):		3	0	0	3

The student has to do fabrication at any workshop in the semester break after II B.Tech., II Semester. The student has to submit a detailed report in the next semester i.e. in III B.Tech., I Sem.

The evaluation will be done by the committee consisting of HOD, senior staff from the same branch and another senior faculty member from any other branch from the same college.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170604	MACHINE TOOLS & METROLOGY				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Manufacturing Process		3	0	0	3

Course Objectives:

1. Analyze the metal cutting process.
2. Produce finished products by using machine tools
3. Determine and provide the tolerance
4. Measures the angles, tapers and surface roughness

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyse the metal cutting process.
CO2:	Produce finished products by using machine tools
CO3:	Determine and provide the tolerance
CO4:	Measures the angles, tapers and surface roughness
CO5:	Determining the optical measuring systems

Syllabus:

UNIT – I

Elementary treatment of metal cutting theory – element of cutting process – geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers, mechanics of orthogonal cutting –Merchant's force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials.

UNIT – II

Engine Lathe : principle of working, specification of lathe – types of lathe – work holders tool holders – operations performed- box tools taper turning, thread turning – for lathes and attachments, turret and capstan lathes – collect chucks – other work holding – tool holding devices. Principal features of automatic lathes – classification – single spindle and multi-spindle automatic lathes.

Shaping, slotting and planning machines: Principles of working – principal parts – specifications, operations performed, machining time calculations

UNIT – III: Drilling & Boring machines: Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring Machines – jig boring machine, deep hole Drilling Machine.

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Milling machine: Principles of working – specifications – classification of Milling Machines – machining operations, types of cutters and geometry.

Grinding: Theory of grinding – classification of grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations, comparison to grinding.

UNIT-IV

Systems of Limits and Fits: Introduction, nominal size, tolerance, limits, deviations, fits and their types-unilateral and bilateral tolerance system, hole and shaft basis systems. Interchangeability.

Linear measurement: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometers.

Measurement of angles and tapers: Different methods – bevel protractor, angle slip gauges inclinometer Limit gauges: Taylor's principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-V

Optical measurement instruments: Tools maker's microscope and uses - collimators, optical projector, optical flats and their uses.

Surface roughness measurement: Differences between surface roughness and surface waviness.

Comparators: Types - mechanical, optical, electrical and electronic, pneumatic comparators and their uses.

TEXT BOOKS

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II
3. Engineering Metrology by Mahajain / Dhanpat Rai Publishers

REFERENCES

1. Production Engineering, K.C Jain & A.K Chitale, PHI Publishers
2. Engineering Metrology by R.K.Jain / Khanna Publishers

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170605	AUTOMOTIVE POLLUTION & CONTROL				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering, Automotive Engines		3	0	0	3

Course Objectives:

1. To make the student to analyze and identify the emissions released from the IC engines
2. To make the student to use the pollution norms while designing and manufacturing the vehicle
3. To make the student to estimate the cost of a vehicle
4. To make the student to measure the pollutants

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyse and identify the emissions released from the IC engines
CO2:	Use the pollution norms while designing and manufacturing the vehicle
CO3:	Estimate the cost of a vehicle
CO4:	Measure the pollutants
CO5:	Analysis of pollution measuring system

Syllabus:

UNIT I

Pollutants from SI engines, Mechanism & formation of HC, CO, NO_x, Particulates in SI engines. Engines and operating variables affecting pollution in SI engines.

Pollution for CI engines, Mechanism & formation of HC, CO, NO_x, Particulates, and root in CI engines. Factor affecting emissions in CI engines.

UNIT-II

Laws and regulations: Historical background, regulatory test procedures (European cycles), BS I, BS II, BS III, BS IV, BS V and BS VI. Exhaust gas pollutants (European rail road limits), particulate pollutants, European statutory values, inspection of vehicles in circulation (influence of actual traffic conditions and influence of vehicle maintenance) Analysis of pollutants: Carbon and Nitrogen compounds-(CO.CO₂ No_x), Ammonia and Amines, Hydrocarbons. Volatile compounds, evaporative losses, analysis of particulates.

UNIT-III

Lean burns & stratified charge engines. Multipoint fuel injection and gasoline direct injection methods. Common rail fuel injection in diesel engines. Post combustion treatments:

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Introduction, exhaust gas recirculation, exhaust gas composition before treatment, catalytic convertors, oxidation and three way types thermal reactors, installation of catalysts in exhaust lines treatment in diesel engines, particulate traps for diesel engines, particulates trap regeneration, SCR (Selective Catalytic reduction), CCS (Carbon Capture & Storage), Char coal caniser.

UNIT-IV

Economic challenges: Introduction, cost of improvement to SI engines, cost of injection systems, cost of improvement in Diesel engines, economic consequences of introducing the catalyst, additional costs incurred by diesel traps, cost of periodic inspection of pollution control system and evaporative control system.

UNIT-V

Instrumentation for pollution measurements: NDIR- analysers, thermal conductivity and flame ionization detectors, analysers for NO_x, gas chromatograph. Orsat apparatus, smoke meters-spot sampling and continuous indication types like Bosch, Hartridge. Particulate measuring systems, dilution tunnels- full and partial flow.

SI and CI engines fuel requirements. Knock in SI and CI engines. Knock rating of SI and CI Engines fuels. Alternative fuel like Hydrogen, Natural gas, LPG, vegetable oil and biodiesel, their production, properties, storage and performance as engines fuels.

TEXT BOOKS

1. Bosch – Gawline fuel injection – Bosch Publications
2. Bosch – Diesel fuel injection – Bosch Publications
3. IC Engine Combustion & Emissions - B P Pundhir, 1st Vol.

REFERENCES

1. Automobiles and Pollution – Paul Degobert(SAE)
2. Diesel engine operation manual – V.L. Maleev, CBS Pub
3. I.C. Engines – E.F. Obert, Harper & Row
4. Engine emission – Springer and Patterson, Plenum Press

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170606	DESIGN OF AUTOMOTIVE ELEMENTS				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Engineering Mechanics, Mechanics of Solids		3	0	0	3

Course Objectives:

1. Apply theories of failures and estimate strength of a machine member
2. Design a riveted, welded and bolted joints and choose the joining process
3. Design, analyze and choose shafts and couplings
4. Design, analyze the various engine parts

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Apply theories of failures and estimate strength of a machine member
CO2:	Design a riveted, welded and bolted joints and choose the joining process
CO3:	Design, analyse and choose shafts and couplings
CO4:	Design and analysis of bearings and shafts
CO5:	Design, analyse the various engine parts

Syllabus:

UNIT – I

Introduction: General considerations in the design of Engineering Materials and their properties – Manufacturing consideration in design. Tolerances and fits – BIS codes of steels.

Stresses in Machine Members: Simple stresses – Combined stresses – Torsional and bending stresses - Various theories of failure – factors of safety – Design for strength and rigidity – preferred numbers. Static strength design based on fracture toughness.

Strength of Machine Elements : Stress concentration –Fatigue stress concentration factor- notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman's line – Soderberg's line – Modified Goodman's line.

UNIT – II

Riveted, Welded and Bolted Joints – Design of joints with initial stresses, Bolted joints – Design of bolts with pre-stresses – both of uniform strength.

UNIT – III

Shafts, keys and Couplings:

Shafts: Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes. Design of Keys - stresses in keys.

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Couplings: Design of Rigid couplings: Muff, Split muff and Flange couplings-Flexible couplings.

UNIT – IV

Bearings:

Journal Bearings: 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 life.

UNIT – V

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 center cranks – Crank pins, Crank shafts. Pistons, Forces acting on piston – Construction Design and proportions of piston, Cylinder liners.

TEXT BOOKS:

1. Dr P. Kanniah Scitech Publishers
2. Design of Machine Elements/ T.J. Prabhu
3. Machine Design / Soundararaja Murthy and Shanmugam
4. Machine design – Pandya& shah.

REFERENCES:

1. Design of Machine Elements / V.M. Faies
2. Machine design / Schaum Series.
3. Mech. Engg. Design / JE Shigley
4. Machine Design / Sarma and Agarwal
5. Machine Design / V.V. Bhandari
6. Machine Design Hand Book / V.V. Bandari

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170607	AUTOMOTIVE ELECTRICAL & AUTOTRONICS				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): BASIC AUTOMOBILE ENGINEERING, BEEE		3	0	0	3

Course Objectives:

1. Analyze, choose and diagnose the battery.
2. Select, analyze and diagnose the ignition, charging system and alternator
3. Incorporate electrical systems in a vehicle
4. Analyze, Establish and diagnose the electronic control systems

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Analyse, choose and diagnose the battery.
CO2:	Select, analyse and diagnose the ignition, charging system and alternator
CO3:	Incorporate electrical systems in a vehicle
CO4:	Analyse, Establish and diagnose the electronic control systems
CO5:	Determine the electronic control systems and ignition system.

Syllabus:

UNIT-I

Storage Battery: Types of batteries, Principles of lead acid cells and their characteristics. Construction and working of lead acid battery. Testing of batteries, effect of temperature on capacity and voltage, battery capacity, voltage, efficiency, charging of batteries, sulphation and desulphation, maintenance and servicing. Fault diagnosis, New developments in electrical storage.

UNIT-II

a) Ignition System: Conventional ignition system and study of its components. Types of ignition systems spark advance and retarding mechanisms. Types of spark plugs.

b) Starter motor: Construction and working of series and shunt automotive starter motor, starter motor troubles and repairs.

c) Charging system: Principle of generation of direct current. Construction and working of alternator generating systems. Maintenance, servicing and trouble shooting. compact alternator.

UNIT-III

Wiring for auto electrical Systems: Earth return and insulated return systems, six volt and twelve volt systems, fusing of circuits, low and high voltage automotive cables, wiring diagram for typical automotive wiring systems, maintenance and servicing.

Dash board units and electrical accessories: Principle of automobile illumination, head lamp construction and wiring, horn, wind screen wiper signalling devices, fog lamps,

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auxiliary lighting , temperature gauge, oil pressure gauge, fuel gauge, speedometer, odometer, Central locking, Power windows.

UNIT-IV

Sensors: Sensors - Air flow, Pressure, Temperature, Speed, Exhaust gas Oxygen, Knock and Position, Principle of operation, construction and characteristics.

Electronic Gasoline Injection Systems: Open loop and closed loop systems, Mono-point, Multi-point, Direct injection systems and Air assisted systems – Principles and Features, Types of injection systems, Idle speed, lambda, knock and spark timing control.

UNIT – V

Electronic Diesel Injection Systems: Heat release, control of fuel injection, Inline injection pump, Rotary Pump and Injector– Construction and principle of operation, Electronic control, Common rail and unit injector systems – Construction and principle of operation.

Electronic Control Systems: Electronic ignition systems, Antilock brake system circuit, Traction control, Electronic control of automobile transmission, Active suspension, Engine management system, ESP, EEA, AMT, ECAS, GPS (Telematics), SLD.

TEXTBOOKS

1. Automotive Electrical auxiliary systems -By N. R. Khatawale
2. Automotive Electrical & Electronic Systems - Tom Denton, SAE International
3. Automobile Electrical & Electronic Equipments- Young, Griffiths, The English Language book co., London
4. Understanding Automotive Electronics- William B.Ribbens-ELSEVIER
5. Gasoline Engine management, 3rd Edition, Robert Bosch, Bently pub., 2004
6. Diesel Engine Management, 4th Edition, Robert Bosch, Newness Publications, 2005

REFERENCES

1. Automotive Electrical systems -By Young and Griffith, Butterworth
2. Basic automotive electrical systems -By C.P.Nakra, DhanpatRai.
3. Automotive mechanics -By William H. Grouse, TMH
4. Automotive Electrical Equipment -By P.I. Kohli, TMH

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170666a	UNCONVENTIONAL MACHINING PROCESSES (Professional Elective-II)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Manufacturing Processes, Machine tools		3	0	0	3

Course Objectives:

1. Illustrate the importance of non-traditional machining methods and its application in industries.
2. Evaluate the electro chemical machining process and its applications.
3. Elaborate the principles of electric Discharge machining process.
4. Compare the various unconventional machining processes.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Develop an understanding to the need, working principles and the mechanism of material removal in the modern machining processes
CO2:	Solve the practical problems related to selection of suitable unconventional machining method for the given machining process and for the given material
CO3:	To know the influence of various process parameters on the performance and the applications
CO4:	Inspect the various machining process based on materials
CO5:	Compare various unconventional machining processes based on Material Removal Rate

Syllabus:

UNIT-I

INTRODUCTION: Need for non-traditional machining methods - classification of modern machining processes—considerations in process selection, applications.

ULTRASONIC MACHINING –Elements of the process, mechanics of material removal, material removal rate (MRR) process parameters, economic considerations, applications and limitations.

UNIT-II

ELECTRO CHEMICAL MACHINING (ECM): Fundamentals of ECM, electro chemical grinding, electro chemical honing and deburring process, MRR in ECM, tool design, surface finish and accuracy, economic aspects of ECM—Simple problems for estimation of metal removal rate, fundamentals of chemical, machining, advantages and applications.

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UNIT- III

THERMAL METAL REMOVAL PROCESSES: General principle and applications of Electric Discharge Machining (EDM), Electric Discharge Grinding and wire EDM–Power circuits for EDM, mechanics of metal removal in EDM, process parameters, selection of tool electrode and dielectric fluids, surface finish and machining accuracy, characteristics of spark eroded surface.

UNIT- IV

ELECTRON BEAM MACHINING, LASER BEAM MACHINING AND PLASMA MACHINING: Basic principle and theory, mechanics of material removal, process parameters, efficiency & accuracy, applications

UNIT-V

ABRASIVE JET MACHINING, WATER JET MACHINING AND ABRASIVE WATER JET MACHINING: Basic principles, equipment, process variables, and mechanics of material removal, MRR, applications and limitations. Magnetic abrasive finishing, abrasive flow finishing. Comparison of various unconventional machining processes based on Material Removal Rate, surface finish, efficiency and cost.

TEXTBOOK:

1. “Advanced Machining Processes”, V. K. Jain, Allied Publishers Pvt. Ltd., New Delhi, 2007
2. “Fundamentals of Modern Manufacturing”, Mikell P Groover, Wiley Publications- 3 ed.

REFERENCES:

1. “Modern Machining Process”, Pandey P.C. and Shah H.S., TMH.
2. “New Technology”, Bhattacharya A, The Institution of Engineers, India 1984

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170666b	TROUBLE SHOOTING, SERVICING & MAINTENANCE OF AUTOMOBILES (Professional Elective-II)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		3	0	0	3

Course Objectives:

1. To make the students able to Trouble shoot, Service and maintain the Automobile
2. To make the students able to maintain the workshop its schedules and records
3. To make the students able to choose the proper repairing and overhauling method
4. To make the students able to maintain the fleet

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Inspect the engine components and Trouble shoot the Automobile
CO2:	Analyze the maintenance of workshops and its scheduled records
CO3:	Repair and Overhauling the engine components
CO4:	Testing and servicing of batteries.
CO5:	Fleet maintenance requirements and stocking of tools.

Syllabus:

UNIT- I

INTRODUCTION AND TROUBLE SHOOTING

Check list on trouble shooting - Engine, clutch, gear box, rear axle, front axle, steering, Brakes, Suspension, Tyre wear, electrical systems - Trouble shooting on engine management system - On board diagnosis using multi-scanner - Testing of SI engine using computerized engine analyzer.

UNIT- II

MAINTENANCE OF WORKSHOP, ITS SCHEDULE AND RECORDS

Importance of maintenance - Types of maintenance, Periodic maintenance, Preventive maintenance, Annual maintenance, Statutory maintenance, seasonal maintenance, schedule and unscheduled maintenance - scope of maintenance - vehicle down time - vehicle inspection, reports, log books, trip sheet.

UNIT- III

ENGINE REPAIR AND OVERHAULING

Dismantling of SI & CI engines and its components - Cleaning methods - inspection and checking - repair and reconditioning methods for all engine components - Maintenance of ignition system - fuel injection system - cooling system, lubrication system, Air intake & Exhaust system - Study of trouble shooting chart for MPFI & CRDI Engines.

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UNIT- IV

MAINTENANCE, REPAIR AND OVERHAULING OF THE CHASSIS

Maintenance - servicing and repair of clutch, fluid coupling, gear box, torque converter, propeller shaft - Maintenance of front axle, rear axle, brakes, steering systems, tyre.

MAINTENANCE AND REPAIR OF VEHICLE BODY & ELECTRICAL SYSTEMS

Body panel tools for repairing - Tinkering and painting - Use of soldering, metalloid paste, Wheel alignment, wheel balancing. Service, maintenance, testing and trouble shooting of battery, starter motor, alternator rectifier and transistorized regulator.

UNIT- V

FLEET MAINTENANCE MANAGEMENT

Need for automobile dealer ships, 3s(Sales, Service & Spares), 2s(Service & Spares), 1s(Service), Types of dealer ships, Fleet maintenance requirement - investment and costs, types of work shop layout, tools and equipment - spare parts and lubricants stocking, manpower, training, workshop management, warranty, replacement policy.

TEXT BOOK

1. Martin W. Stockel, Martin T. Stockel, Chris Johanson, "Auto Service & Repair: Servicing, Troubleshooting, and Repairing Modern Automobiles: Applicable to All Makes and Models", Good heart-Willcox Publisher, 1996.

REFERENCES

1. James D. Halderman, "Chase D. Mitchell, "Automotive steering, suspension, and alignment", Prentice Hall, 2000.
2. Martin T. Stockel, Chris Johanson, "Auto Diagnosis, Service, And Repair", Good heart-Willcox Publisher, 2003.
3. Vaughn D. Martin, "Automotive Electrical Systems: Troubleshooting and Repair Basics", Prompt Publications, 1999
4. Crouse W., "Everyday Automobile Repair", Intl. student edition, TMH, New Delhi, 1986.
5. BOSCH, "Automotive Handbook", 8th Edition, BENTLEY ROBERT Incorporated, 2011.

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170666c	AUTOMOTIVE AERODYNAMICS (Professional Elective-II)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering, Vehicle Body Design		3	0	0	3

Course Objectives:

1. Build the basics of fluid mechanics on vehicle motion and expose to the optimization techniques followed in automotive industry in reducing aerodynamics drag, fuel consumption and improving vehicle stability.
2. Summarize the testing techniques practiced in industry.
3. Discuss the stability, vehicle dynamics and dirt accumulation on the vehicle.
4. Design and analyze the aerodynamic drag forces with optimization techniques.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Determine the forces & moments influencing drag
CO2:	Solve simple numerical related to fuel economy & drag
CO3:	Discuss the techniques of optimization practiced in industry
CO4:	Compare the relation between drag, stability & fuel economy
CO5:	Analyze the aerodynamic drag forces with optimized methods

Syllabus:

UNIT I

BASICS OF FLUID DYNAMICS ON VEHICLE MOTION

Importance of study - timeline developments -basics of fluid mechanics -flow phenomenon related to vehicles - external flow problem -various resistances to vehicle motion - performance, fuel consumption and traction force diagram of a passenger car.

UNIT II

DRAW FRACTIONS AND LOCAL ORIGINS IN A PASSENGER CAR

Car as a bluff body - generation & transportation of vortices around car -types of aerodynamic drag forces& its contribution to total drag - analysis of aerodynamic drag at local origins - shape and detail optimization techniques with case studies.

UNIT III

VEHICLE HANDLING

The origin of forces and moments on a vehicle - lateral stability problems - methods to calculate forces and moments – vehicle dynamics under side winds - the effects of forces and

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moments, dirt accumulation on the vehicle, wind noise. Add-ons to improve stability of road vehicles.

UNIT IV

COMMERCIAL VEHICLE AERODYNAMICS

Tractive resistance & fuel consumption – Drag coefficients of various commercial Vehicles – Scope for reducing drag on commercial vehicles (Trucks with trailers and buses), Advantages of commercial vehicles aerodynamics & its effects – Vehicle soiling & its effects on driving.

UNIT V

WIND TUNNELS FOR ROAD VEHICLES AERODYNAMICS

Need of a wind tunnel, principle of wind tunnel technology, problems with reduced scale models, full scale wind tunnels examples and case studies, instrumentation & measurement techniques, Introduction to numerical analysis (CFD).

TEXT BOOKS:

1. R.H. Barnard - "Road vehicle aerodynamic design, An Introduction", Mech aero publications, Third edition
2. Hucho .W.H. – "Aerodynamic of Road Vehicles – From Fluid Mechanics to Vehicle Engineering", Society of Automotive Engineers, U.S, Fourth edition
3. Alan Pope, Jewel B. Barlow, William H. Rae "Low speed wind tunnel testing", John Wiley & Sons Third edition

REFERENCES:

1. Automotive Aerodynamic, Update SP-706 – SAE – 1987
2. Vehicle Aerodynamics – SP-1145-SAE-1996.

CO-PO Mapping:

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

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

GODAVARI INSTITUTE OF ENGG & TECHNOLOGY
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NH-5, CHAITANYA KNOWLEDGE CITY, RAJAHMUNDRY, A.P., INDIA
TEL: +91-883-2484828, 29, 30, 31 FAX: +91-883-2484739, HTTP://WWW.GIET.AC.IN

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170666d	VEHICLE TRANSPORT MANAGEMENT (Professional Elective-II)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Not required		3	0	0	3

Course Objectives:

1. Adapt the infrastructure required for transport management.
2. Organize the transport system in effective way
3. Prevent the accidents
4. Estimate the fare

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Determine the traffic conditions required for the transport management
CO2:	Analyze the transport management in effective manner
CO3:	Handling the problems to prevent accidents
CO4:	Estimate the running cost
CO5:	Design and planning the capacity of sitting arrangement of vehicle.

Syllabus:

UNIT – I

Historical Back ground: Introduction, the growth of a network, trams, trolley buses, private car's subsidies.

The Infrastructure: Road- Approach Road. Highways National, State, District, traffic condition, relief of congestion, pedestrians, zebra lines, margins, shopping centres. Bus-stops. Shelters, Bus stations, Garages layout of premises, equipment, use of machinery, conveyance of staff, facilities for passengers. Maintenance -preventive, breakdown, overhauling -major, minor.

UNIT – II Organization and Management: Forms of ownership, principle of transport management - STU (State Transport Undertaking) staff administration: industrial relation, administration, recruitment and training, welfare, health and safety.

Public relations divisions: Dissemination of information, handling complaints, traffic advisory. Committees- local contractors -inter departmental liaison advertisements, signs, notice and directions- general appearance of premises, specialized publicity.

UNIT - III Prevention of accidents: Emphasis of safe driving-annual, awards, bonus encouragement vehicle design platform, layout, location of steps, scheduled route hazards records elimination of accident prone devices.

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Route planning: Source of traffic, town planning, turning points, stopping places, shelters survey of route preliminary schedule test runs elimination of hazards factors affecting. Frequency direction of traffic flow estimated traffic possibility single verses double deck.

UNIT - IV

Timing, bus working and schedules : Time table layout uses of flat graph method of presentation preparation of vehicle and crew schedule preparation of the duty roster, co-operation with employers use of the vehicle running numbering- determination of vehicle efficiency, checking efficiency of crew, duty arrangements.

The fare structure: Basis of fares historical background effects of competition and control calculating average zone system straight and tapered scale.

UNIT - V

Operating cost and types of vehicles: Classification costs, average speed running costs supplementary costs depreciation obsolescence, life of vehicles- sinking fund factor- wages and overheads 100 seats miles basis, average seating capacity vehicles size and spread overs, types of vehicle economic considerations authorization of trolley, bus services, statutory procedure taxes and hire cars.

TEXT BOOKS:

1. Bus Operation -L.D.Kitchen, Liffé & Sons
2. Bus & Coach Operation -Rex W. Fautks, Butterworth Version Of 1987

REFERENCES:

1. Compendium of Transport Terms Cirt, Pune
2. M.V. Act 1988 Central Law Agency, Allahabad
3. The Elements of Transportation -R.J. Eaton
4. Goods Vehicle Operation -By C.S. Dubbar
5. Road Transport Law- L. D kitchen
5. Road Transport Law – L.D. Kitchen

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170666e	SPECIAL PURPOSE VEHICLES (Professional Elective-II)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		3	0	0	3

Course Objectives:

1. To make students able to design and construct special vehicles such as Bulldozers, Ditchers, Bucket excavators, farm equipments, military vehicles etc
2. To make student to incorporate safety systems in a
3. To make student to design and develop farm machinery.
4. To make student to design and develop control systems

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Design and construct special vehicles such as Bulldozers, Ditchers, Bucket excavators, farm equipments, military vehicles etc
CO2:	Incorporate safety systems in a vehicles
CO3:	Design and develop farm machinery.
CO4:	Design and develop control systems
CO5:	Analysis of military and combat vehicles

Syllabus:

UNIT I

EARTH MOVERS AND CONSTRUCTIONAL EQUIPMENT

Construction details, capacity and applications of earthmovers for dumpers, front-end loaders, bulldozers, excavators, backhoe loaders, scrappers, and motor graders. criteria for selection of prime mover for dumpers and front end loaders based on vehicle performance characteristics.

UNIT II

POWER TRAIN CONCEPTS

Engine – converter match curves. Epicyclic type transmissions. Selection criteria for universal joints. Constructional details of steerable and drive axles of dumper.

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UNIT III

VEHICLE SYSTEMS AND FEATURES

Brake system and actuation – OCDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Kinematics for loader and bulldozer operational linkages. Safety features, safe warning system for dumper. Design aspects of 28 dumper body, loader bucket and water tank of sprinkler. Articulated vehicles, double Decker. Fire fighting equipment.

UNIT IV

VEHICLES FOR INDUSTRIAL APPLICATIONS

Constructional features, capacity and stability of jib cranes, Vibratory compactors. Stackers bore well machines, concrete mixtures.

UNIT V

FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES

Ride and stability characteristics, power take off, special implementations. Special features and constructional details of tankers, gun carriers and transport vehicles. harvesting vehicles.

TEXT BOOKS

1. K. Abrosimov, A. Bromberg and F. Katayer, 'Road making machineries', MIR Publisher, Moscow, 1975.
2. SAE Handbook – Vol III, 1995.

REFERENCES

1. Pipenger, 'Industrial Hydraulics', Mcgraw Hill, Tokoyo, 1979.
2. A. Astakhov, 'Truck cranes', MIR Publishers, Moscow, 1971.
3. Bart H Vanderveen, 'Tanks and Transport Vehicles', Frederic Warne and co. Ltd., London, 1974.

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th Semester)			
Course Code	Nano Technology (Open Elective-III)				
Teaching	Total contact hours-53	L	T	P	C
Prerequisite(s): Metallurgy and Material Science		3	0	0	3

Course Objectives:

- To study the applications of nano materials.
- To understand the mechanical, electrical, thermal and physical properties of nano materials.
- To learn the synthesis and fabrication techniques of nano particles.
- 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 films, 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 crystalline diamond films, graphene, 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. I Sem (7 semester)			
Course Code 19150701	HUMAN COMPUTER INTERACTION (OPEN ELECTIVE)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Fundamentals of Programming		3	0	0	3

Course Objective(s):

- How to design and evaluate interactive technologies.

Course Outcome(s):

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

- CO-1:** Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- CO-2:** Describe typical human-computer interaction (HCI) models, styles, and various historic HCI paradigms.
- CO-3:** Apply an interactive design process and universal design principles to designing HCI systems.

UNIT-1

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing **Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

UNIT-2

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT-3

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in **Computing Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

UNIT-4

Balancing Function and Fashion: Introduction, Error Messages, Non-anthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

UNIT-5

Information Search: Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces

Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Text books

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design, 2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books

1. Human Computer, Interaction Dan R.Olsan, Cengage, 2010
2. Designing the user interface. 4/e, Ben Shneidermann, PEA.
3. User Interface Design, SorenLauesen, PEA
4. 4.Interaction Design PRECE, ROGERS, SHARPS, Wiley.

Web Links:

<https://nptel.ac.in/courses/106/103/106103115/>

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 semester)			
Course Code	Renewable Energy Sources And Systems (Open Elective-III)				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): Basic electrical engineering		3	0	0	3

Course Objective:

1. To Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
2. To Design solar thermal collections.
3. To Develop maximum power point techniques in solar PV and wind systems.
4. To Explain hydro and tidal power systems
5. To Understand fuel classification and geothermal classification.

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 systems
CO4:	Explain hydro and tidal power systems
CO5:	Understand fuel classification and geothermal classification.

Syllabus:

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 radiation 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.

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 aquifer – 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.

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
C01	-	2	-	-	-	-	-	-	-	-	-	-
C02	-	1	-	-	-	-	-	-	-	-	-	-
C03	-	-	3	-	-	-	-	-	-	-	-	-
C04	-	-	2	-	-	-	-	3	-	-	-	-
C05	-	-	-	-	-	-	-	3	-	-	1	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th Semester)			
Course Code	DATA COMMUNICATION (Open Elective)				
Teaching	Total Contact Hours - 50	L	T	P	C
Prerequisites Electronic Devices & Circuits, Switching Theory and Logic, Electronic Circuit Analysis.		3	-	-	3

Course Objectives:

1. To comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
2. To explain the basics of data communication and various types of computer networks.
3. To illustrate TCP/IP protocol suite and switching criteria.
4. To demonstrate Medium Access Control protocols for reliable and noisy channels.
5. To expose wireless and wired LANs along with IP version.

On Completion of the course, students will be able to	
CO1:	Understand and explain Data Communications System and its components.
CO2:	Enumerate the layers of the OSI model and TCP/IP and explain function(s) of each layer.
CO3:	Apply error detection and correction techniques to determine the error rate.
CO4:	Identify the different types of network topologies and protocols.
CO5:	Familiarity with the basic wireless networks, and how they can be used to assist in network design and implementation.

Unit-I

Introduction: Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

Signals, Noise, Modulation, And Demodulation: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and *M*-ary Encoding, Digital Modulation.

Unit-II

Metallic Cable Transmission Media: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves

Optical Fiber Transmission Media: Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber

Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

Unit-III

Digital Transmission: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to- Quantization Noise Voltage Ratio, PCM Line Speed, PCM and Differential PCM.

Data Communications Codes, Error Control and Data Formats: Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization

Unit-IV

Wireless Communications Systems: Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Unit-V

Telephone Instruments and Signals: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

Cellular Telephone Systems: First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, 5th Edition, Tata McGraw-Hill, 2013.
2. Data and Computer Communication - William Stallings, 8th Edition, Pearson Education, 2007.

Reference Books:

1. Communication Networks - Fundamental Concepts and Key architectures, Alberto Leon-Garcia and Indra Widjaja, 2nd Edition, Tata McGraw-Hill, 2004.
2. Computer Networks – A Systems Approach, Larry L. Peterson and Bruce S. Davie, 4th Edition, Elsevier, 2007.
3. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007.

CO-PO Mapping:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

'-': No Correlation

[illegible]

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7th semester)			
CourseCode 19116761	GLOBAL ENVIRONMENT PROBLEMS & POLICIES (OPEN ELECTIVE III)				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s): Basics of Environmental science		3	0	0	3

Course Objectives:

- To study the explain the scientific basis of the global environmental issues.*
- To discuss social, psychological, economic and political issues surrounding each of the global environmental issues.*
- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.*
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.*
- Appreciate the concern of environmental agreement.*

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	To Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
CO2	To Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO3	To Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	To know environmental laws and grasp the concept of environmental legislation and its application in international environmental agreement.
CO5	To appreciate the concern of environmental agreement.

Syllabus:

Unit – I

Unit-I: Environmental problems and protection:

Environmental pollution and its consequences – Air pollution, water pollution, land pollution, nuclear pollution, Ozone depletions – Urbanization and its impacts on environment – Deforestation and its impacts on environment – Ways of protecting, Management of Environment, Preserving and Restoring of environment.

Unit – II

India and Environmental Issues and Policies:

Environmental Awareness – Environmental problems of India - Environmental ethics - Nature conservation education movement – Social forestry scheme. Conservation of biodiversity :Meanings and need conservation of natural resources – soil, forest, water and wildlife In-situ conservation -National parks and sanctuaries – Biosphere Reserves –Man and Biosphere programme (MAP) –Ex –situ conservation, in –situ conservation, IUCN Red list categories, hot spots

Unit – III

Human population and environment:

Population growth, Indian population situations population explosion – family welfare programme – Environment and Human health.-Factors affecting environment-Acid rain, green house effect-Extinction

of species-soil erosion and energy crisis.

Unit – IV

International Efforts for Environmental Protection:

The Stockholm conference 1972 – Brundtland commission 1983 – Nairobi conference 1982 – The Rio Summit 1992 – the Rio Declaration at the earth charter – Major achievement of the Rio Summit – Main features of the Rio Declaration – Kyoto conference and part on Global Warming 1997 – present developments.

Unit – V

Environmental laws in India:

Environmental Legislation, Acts, Rules, Notifications and Amendments. International Environmental Agreements. Role of mass media and technology in developing awareness about environmental problems and its prevention; Role of NGO's and Government organization in developing Environmental education. Environmental Movements and Developments: Environmental movements in India: Silent Valley movement, Chipko movement, Narmada Bachao, Andolan, National Test Range at Balipal, Orissa. - Conditions for achieving the goals of sustainable development Strategies for sustainable development in India.

Text books:

1. Agarwal s.k. (1997). Environmental Issues themes New Delhi: APH Publishing Corporation.
2. C.E.E (1994) Essential Learning in Environmental Education. Ahmadabad. C.E.E. Publication
3. Garg, B. & Tiwana. (1995) Environmental Pollution and Protection, Deep & Deep publication, New Delhi.

References:

1. Karpagam M. (1991) Environmental Economics – A text book. New Delhi. Sterling Publishers.
2. Kelu.P (2000) Environmental Education – A conceptual Analysis Calicut: Calicut University
3. Nanda V.K. Environmental Education, New Delhi: Anmol Publications PVT LTD.

Web references:

1. <http://www.bdu.ac.in/cde/docs/ebooks/B-d/II/ENVIRONMENTAL%20EDUCATION.pdf>
2. https://www.terisas.ac.in/uploads/1551863268_980872_NRE%20155.pdf
3. <http://moef.gov.in/>.

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170565c	MODERN VEHICLE TECHNOLOGY Open Elective – III Not for AME Students				
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.

UNIT-III

Emission and Noise Pollution Control: Introduction, Engine emissions, types of catalytic conversion, open loop and closed loop operation to the oxidizing catalytic converter,

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Evaporative emissions, Internal and External Noise, Identification of Noise sources, Noise Control Techniques. SCR, DPF and DOC.

UNIT-IV

Vehicle Operation and Control: Fundamentals of Automotive Electronics - sensors, actuators, Processors, Computer Control for pollution, noise and for fuel economy - Electronic Fuel Injection and Ignition system.

UNIT-V

Fuel Injection Systems: SPFI, MPFI, DI, Pilot Injection, Unit Injection. CRDI; Two Wheeler Technology: DTS- i, DTS - Fi, DTS - Si; Four Wheeler Technology: WT, Cam less Engine, GDI.

TEXT BOOKS:

1. Crouse/Anglin "Automotive Mechanics"
2. K.Newton, W.Steeds "The Motor Vehicle"

REFERENCES

1. K.K. Ramalingam, "Automobile Engineering", Scitech Publications Pvt. Ltd., 2005
2. Dr. N.K. Giri, "Automobile Mechanic", Khanna Publishers, 2006
3. Heinz Heisler "Advanced Vehicle Technology" ELSEVIER

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem. (6 th Semester)			
CourseCode XXXXX	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. KandTsung 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.

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, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions .

UNIT III

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

UNIT 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

CO-PO Mapping:

(1: Slight [Low];
No Correlation)

2: Moderate[Medium];

3: Substantial[High],

4: Very High

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170611	MACHINE TOOLS & METROLOGY LAB				
Teaching	Total contact hours-42	L	T	P	C
Prerequisite(s): Not required		0	0	3	1.5

Course Objectives:

1. To make the student able to measure the length, height, diameters, gear geometry, angle, taper, flatness, thread geometry, surface roughness by using specialized tools
2. To make the student able to test tool alignment in machine tools
3. To make the student able to identify the design
4. To make the student able to manufacture finished products

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Measure the length, height, diameters, gear geometry, angle, taper, flatness, thread geometry, surface roughness by using specialized tools
CO2:	Test tool alignment in machine tools
CO3:	Identify the design
CO4:	Manufacture finished products
CO5:	Performing the various machining process

Syllabus:

SECTION-I

METROLOGY LAB

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth vernier calipers and checking the chordal thickness of spur gear.
4. Machine tool alignment test on the lathe.
5. Machine tool alignment test on milling machine.
6. Angle and taper measurements by bevel protractor, Sine bars, etc.

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7. Use of spirit level in finding the straightness of a bed and flatness of a surface.
8. Thread measurement by two wires/ three wire method & tool makers' microscope.
9. Surface roughness measurement by Talysurf.

SECTION-II

MACHINE TOOLS LAB

1. Introduction of general purpose machines -lathe, drilling machine, milling machine, shaper, planning machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on -lathe machine.
4. Drilling and tapping
5. Shaping and planning
6. Slotting
7. Milling
8. Cylindrical surface grinding
9. Grinding of tool angles.

CO-PO Mapping:

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

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



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	III B.Tech. II Sem (6 th semester)			
Course Code 19170622	ACCIDENT ANALYSIS				
Teaching	Total contact hours-28	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		0	0	2	1

Course Objectives:

1. To study different road accidents
2. To analyse the causes of accidents
2. To examine the damage of vehicle caused by accidents
3. To develop the systems to safeguard the vehicle and passengers from accidents
4. To demonstrate the importance and working of modern safety systems

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Interpret the causes of road accidents
CO2:	Test the safety systems of the vehicles
CO3:	Demonstrate the working of modern safety systems
CO4:	Estimate the repair charges of the accidents
CO5:	Suggest remedies to avoid specific road accidents

The student need to visit the road accident sites / the vehicles at garage which are met with accidents and need to investigate the causes of accident, estimate the damage caused by the accident, and try to get solution/s for the accident. The students have to exchange their experiences in the laboratory/class room and form groups with similar accidents and find the solutions to avoid such accidents. Finally, each student needs to submit a report on any type of accident/s with causes of accidents and solutions to avoid such accidents.

CO-PO Mapping:

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170704	VEHICLE DYNAMICS				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Dynamics of Machinery		3	0	0	3

Course Objectives:

1. To make the student to analyze various kinds of vibrations
2. To make the student to distinguish various kinds of vibrations caused due to different aspects like uneven road, engine unbalance
3. To make the student to measure the intensity of vibration
4. To make the student to reduce the vibration effect on a vehicle

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Determination Of Undamped free vibration, Damped free vibration
CO2:	Examine Single degree of freedom systems
CO3:	Determine Systems with two degree of freedom
CO4:	Examine Vehicle vibration with single degree of freedom
CO5:	Determination Of all the natural frequencies using sweeping matrix and orthogonality principle, Holzer's method for systems with free, fixed free and fixed ends.

Syllabus

Unit-I

Concept of vibration

Definitions Vehicle dynamics, Degrees of freedom, Types of degrees of freedom, Vibration, Types of vibrations, Free Vibrations, Forced Vibrations, Undamped and Damped Vibrations.

Undamped free vibrations: Single degree of freedom Systems, introduction, undamped free vibrations- Natural frequency' of free vibration, Rayleigh's method, stiffness of spring elements, effects of spring mass, Energy method, Newton's method and D' Alembert's principle- problems.

Unit-II

Damped free vibrations: Single degree of freedom systems, different types of damping, concept of critical damping and its importance, response study of viscous damped systems for cases of under damping and over damping, logarithmic decrement. Semi active suspension and active suspension.

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Unit-III

Forced Vibrations and Harmonically Excited Vibrations

Forced damped Harmonic vibrations of single degree of freedom systems, Rotating balance, Reciprocating unbalance, Vibration isolation, viscous damping and types, Sharpness of the resonance.

Unit-IV

Vehicle vibrations: Vehicle vibration with single degree of freedom free vibration, forced vibration, vibration due to road roughness, vibration due to engine unbalance, transmissibility of engine mounting vibration with two degree of freedom, free vibration, compensated suspension systems forced vibrations, vibration due to road roughness.

Unit-V

Vibration measuring instruments -Accelerometers and vibrometers. Whirling of shafts with and without air damping, discussion of speeds above and below critical speeds.

TEXT BOOKS

1. Mechanical Vibration -By G.K.Grover, Nernchand & Brothers
2. Vehicle dynamics, Theory and applications-reza N. Jazar-Springer International
3. Vibration Theory & Applications -By William I Thomson, Prentice Hall
4. Theory and Applications of Mechanical Vibrations - By Dilip Kumar Adhwarjee

REFERENCES:

1. Theory & Problems of Mechanical Vibration -By William W. Seto, McGrawHill
2. Problems in Automobile Mechanics-By N.K.Giri, Khanna Pub.
3. Mechanics of Pneumatic Tyre -By S.K.C. Fark, Prentice Hall
4. Mechanical Vibration Analysis -By P Srinivasan, TMH
5. Mechanical Vibration -By Church. Wife) international

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170705	HYBRID, ELECTRIC & FUEL CELL VEHICLES				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Alternative fuels, Automotive Electrical & Electronics		3	0	0	3

Course Objectives:

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

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	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, Plug-in Hybrid Electric Vehicles.

UNIT III

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

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

UNIT IV

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

UNIT V

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

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

TEXT BOOKS

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

REFERENCES

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

CO-PO Mapping:

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

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



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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)	IV B.Tech. II Sem (8 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,



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DEPARTMENT OF MECHANICAL ENGINEERING

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

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.



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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)	IV B.Tech. I Sem (7 th Semester)			
Course Code	CAD/CAM				
Teaching	Total contact hours-60	L	T	P	C
Prerequisite(s): Production Technology, Metal Cutting and Machine Tools.		3	0	0	3

Course Objectives:

- To study the computer hardware components.
- To understand geometric modeling and manipulation methods.
- To familiarize with the part programming of NC and CNC machines.
- To understand the concepts of Group Technology, CAQC.
- To understand the concepts of 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:	Solve 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 –IV

GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, types and advantages. Computer aided processes planning – importance, types



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DEPARTMENT OF MECHANICAL ENGINEERING

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

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 interactions with 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.
3. CAD/CAM: Principles and Applications, P N Rao, Tata McGraw Hill Private Limited, 3rd Addition, 2017.

References:

1. CAD / CAM Theory and Practice, Ibrahim Zeid & R. Sivasubramin, McGraw 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.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170766a	AUTOMATION IN AUTOMOTIVE MANUFACTURING (Professional Elective – III)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Manufacturing Process ,Machine Tools & Metrology		3	0	0	3

Course Objectives:

1. To impart the knowledge of latest trends in manufacturing
2. Automated flow lines
3. Material handling systems
4. Flexible assemble lines.

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Manufacture automotive components
CO2:	Design and analyze the automated flow lines
CO3:	General terminology and Assembly process
CO4:	Material handling systems and Storage systems
CO5:	Control the machining parameter

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.

UNIT – II

AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, AGV, buffer storage, control function, design and fabrication considerations.

UNIT – III

ANALYSIS OF AUTOMATED FLOW LINES: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

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UNIT – IV

AUTOMATED MATERIAL HANDLING: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems.

AUTOMATED STORAGE SYSTEMS: Automated storage and retrieval systems; Kanban system, JIT, work in process storage, interfacing handling and storage with manufacturing.

UNIT – V

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, adaptive control with constraints, application of AC in machining operations. Use of various parameters such as cutting force, temperatures, vibration and acoustic emission.

Automated inspection: Fundamentals, types of inspection methods and equipment, CMM, machine vision.

Text Books:

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./ PE/PHI
2. Manufacturing process and systems : Ostwals Munoz

References:

1. Computer Control of Manufacturing Systems by YoramCoren.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.
4. Mechanical assemblies –Daniek E. Whitney

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170766b	VEHICLE MAINTENANCE (Professional Elective – III)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		3	0	0	3

Course Objectives:

1. To maintain vehicle and workshop properly
2. To maintain engine sub systems and drive line components.
3. To maintain vehicle systems
4. Diagnosis the electrical systems

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Importance of Vehicle maintenance
CO2:	Service procedure of engine and subsystems
CO3:	Service procedure of drive line
CO4:	Service procedure of chassis components
CO5:	Maintenance of electrical and air conditioning system

Syllabus

UNIT - I

MAINTENANCE, WORKSHOP PRACTICES, SAFETY AND TOOLS

Maintenance – Need, importance, classification of maintenance, basic problem diagnosis. Automotive service procedures – workshop operations – Safety – Personnel, machines and equipment, vehicles, fire safety - First aid. Basic tools – special service tools – measuring instruments.

UNIT - II

ENGINE AND ENGINE SUBSYSTEM MAINTENANCE

General Engine service- Dismantling of Engine components- Engine repair- Service of basic engine sub systems- cooling and lubricating system, fuel system, Intake and Exhaust system, electrical system - Electronic fuel injection and engine management service - fault diagnosis- servicing emission controls

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UNIT – III

TRANSMISSION AND DRIVELINE MAINTENANCE

Clutch- general checks, adjustment and service- Dismantling, identifying, checking and reassembling transmission, transaxle- road testing- Removing and replacing propeller shaft, servicing of cross and yoke joint and constant velocity joints- Rear axle service points- removing axle shaft and bearings- servicing differential assemblies- fault diagnosis.

UNIT – IV

STEERING, BRAKE, SUSPENSION, WHEEL MAINTENANCE

Maintenance and Service of steering system-Inspection, Maintenance and Service of break system- Drum brake, Disc brake, Parking brake. Bleeding of brakes. Inspection, Maintenance and Service of Mc person strut, coil spring, leaf spring, shock absorbers-Dismantling and assembly procedures. Wheel alignment and balance, removing and fitting of tyres, tyre wear and tyre rotation. Inspection,

UNIT V AUTO ELECTRICAL AND AIR CONDITIONING MAINTENANCE

Maintenance of batteries, starting system, charging system and body electrical -Fault diagnosis using Scan tools. Maintenance of air conditioning parts like compressor, condenser, expansion valve, evaporator - Replacement of hoses- Leak detection- AC Charging- Fault diagnosis Vehicle body repair like panel beating, tinkering, soldering, polishing, painting.

TEXT BOOKS

1. William H Crouse and Donald L Anglin “Automotive Mechanics” Tenth Edition, McGraw Hill Publications, 2007
2. Ed May, Automotive Mechanics Volume One , McGraw Hill Publications, 2003
3. Ed May, Automotive Mechanics Volume Two , McGraw Hill Publications, 2003

REFERENCES

1. Bosch Automotive Handbook, Sixth Edition, 2004
2. Vehicle Service Manuals of manufacturers

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170766c	DESIGN FOR MANUFACTURING (Professional Elective – III)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering		3	0	0	3

Course Objectives:

1. To understand the complex interrelationships between design and manufacturing.
2. To explore and understand basic manufacturing processes.
3. To identify the various process parameters of manufacturing processes.
4. Determine the design factors of the components

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the design rules for manufacturability with economic 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 Weld elements 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.

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UNIT –IV

Metal joining: Appraisal of various welding processes, factors in design of weld elements – 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.

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	1	-	-	3	-	-	-	-	-	-	-
CO3	1	-	2	-	-	-	-	-	-	-	1	-
CO4	1	3	-	-	-	-	-	-	-	-	-	-
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)	IV B.Tech. I Sem (7 th semester)			
Course Code	Operations Research				
Teaching	Total contact hours-64	L	T	P	C
Prerequisite(s): Industrial Engineering and Management, Mathematics-III		2	1	0	3

Course Objectives:

- To impart knowledge on various concepts of Operations Research and LP problems.
- To learn the solution methods of transportation, assignment and sequencing.
- To learn the solution methods of replacement and game theory problems.
- To understand inventory and waiting lines problems.
- To understand simulation methods.

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

INTRODUCTION: Development, Definition, Characteristics and phases, Types of operation research models, Applications.

LINEAR PROGRAMMING PROBLEM: Linear programming problem formulation - Graphical solution - Simplex method -Artificial variables techniques -Two-phase method - Big-M method - Special cases: degeneracy, multiple optimal solution, infeasibility and unbounded solution, duality principle.

UNIT – II

TRANSPORTATION PROBLEMS: Formulation - Initial and optimal solutions for balanced and unbalanced transportation problems – Degeneracy in transportation problems.

ASSIGNMENT PROBLEMS: Formulation - Optimal solution - Variants of assignment problem- 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.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

UNIT-IV

WAITING LINES: Introduction – Single channel, Poisson arrivals, exponential service times, with infinite population and finite population models, multichannel, Poisson arrivals, Exponential service times with infinite population single channel Poisson arrivals.

INVENTORY MODELS: Introduction, Deterministic inventory models – Static economic order quantity models, 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, ArthurYaspan& Lawrence Friedman, 1st edition, 1959.
4. Operations Research, R.Pannervselvam, PHI Publications, 2nd edition, 2009.
5. Operations Research, S Kalavathy, Vikas Publishers, 4th edition, 2013.



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170766e	OFF ROAD VEHICLES (Professional Elective – III)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Probability theory		3	0	0	3

Course Objectives:

1. To make students able to design and construct off – road vehicle
2. To make student to analyse the performance of an off – road vehicles
3. To make student to design and develop farm machinery
4. To make student to design and develop vehicle systems

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Design and construct off – road vehicle
CO2:	Analyze the performance of Earth moving Machines
CO3:	Study of self powered scrappers and graders
CO4:	Study of Special features and constructional details of tankers, gun carriers and transport vehicles.
CO5:	Design aspects on dumper body, loader bucket and water tank of sprinkler

Syllabus

UNIT - I

CLASSIFICATION AND REQUIREMENTS OF OFF ROAD VEHICLES

Construction layout, capacity and applications. Power Plants, Chassis and Transmission, Multi axle vehicles.

UNIT - II

EARTH MOVING MACHINES

Earthmovers like dumpers, loaders – single bucket, Multi bucket and rotary types – bulldozers, excavators, backhoe loaders, scrappers, drag and self powered types, Bush cutters, stumpers, tree dozer, rippers etc. – Power and capacity of earth moving machines.

UNITY - III

SCRAPPERS, GRADERS, SHOVELS AND DITCHERS

Scrappers, elevating graders, motor graders, self powered scrappers and graders, Power shovel, revolving and stripper shovels – drag lines – ditchers – capacity of shovels.

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UNIT - IV

FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES

Power take off, special implements. Special features and constructional details of tankers, gun carriers and transport vehicles.

UNIT - V

VEHICLE SYSTEMS, FEATURES

Brake system and actuation – OCDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Kinematics for loader and bulldozer operational linkages. Safety features, safe warning system for dumper. Design aspects on dumper body, loader bucket and water tank of sprinkler.

TEXT BOOKS:

1. Robert L. Peurifoy, "Construction, planning, equipment and methods" Tata McGraw Hill Publishing company Ltd.
2. Nakra C.P., "Farm machines and equipments" Dhanparai Publishing company Pvt. Ltd.
3. Abrosimov.K. Bran berg.A and Katayer.K., "Road making machinery", MIR Publishers, Moscow, 1971.
4. SAE Handbook Vol. III., Society of Automotive Engineers, 1997
5. Wong.J.T., "Theory of Ground Vehicles", John Wiley & Sons, New York, 1987.

REFERENCES:

1. Ia. S. Ageikin, "Off the Road Wheeled and Combined Traction Devices: Theory and Calculation", Ashgate Publishing Co. Ltd. 1988.
2. Schulz Erich.J., "Diesel equipment I & II", McGraw Hill company, London, 1982.
3. Bart H Vanderveen, "Tanks and Transport Vehicles", Frederic Warne and Co Ltd., London.
3. Satyanarayana. B., "Construction planning and equipment", standard publishers and distributors, New Delhi, 1985.

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS Common to all Branches (Open Elective)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Basic knowledge of Economics and accounts		3	-	-	3

Course Objective:

The objective of this course is

- 1.To acquaint the students regarding various accounting concepts and its application in managerial decision making.
- 2.To enable the students to analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.
- 3.To introduce prospective managers of new ventures to prepare and analyse financial statements.
- 4.To enable the students understand how organizations make important investment and financing decisions

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Analyze the scope of managerial economics
CO2	Analyze various aspects of managerial economics, production & cost analysis, markets & pricing strategies
CO3	Develop an ability to identify, formulate, and solve engineering problems by applying the subject knowledge of Managerial economics.
CO4	Apply capital budgeting, financial analysis techniques in evaluating various investment opportunities
CO5	Enhance their capabilities in the interpretation of balance sheets are followed in industries, organizations & institutes.

Syllabus:

UNIT –I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT –II

Production and Cost Analyses:

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.

UNIT –III

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

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features, Introduction to e-commerce – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT –IV

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle – Capital Budgeting Techniques.(simple problems)

UNIT –V

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Subsidiary books- Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

Text books:

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis',
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial

Reference Books:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand. 2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.

4. 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	
C01:	Can know the importance of entrepreneurship in economic developments, ethics and its social responsibility
C02:	Can understand the business plan its scope, implementation in marketing and Launching.
C03:	Can able to know the finance resources, motivating, marketing and internet advertising.
C04:	Can understand the problems related to selection of layout.
C05:	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, 5th Edition
3. Dollinger: Entrepreneurship, 4/e, Pearson, 2004.

References:

1. Vasant Desai: Dynamics of Entrepreneurial Development and management, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Robert J. Calvin: Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola: The Entrepreneurial Connection, TMH, 2001.
5. Bolton & Thompson: Entrepreneurs- Talent, Temperament, Technique, Butterworth Heinemann, 2001.
6. Agarwal: Indian Economy, Wishwa Prakashan 2005.
7. Dutt & Sundaram: Indian Economy. S. Chand, 2005.
8. Srivastava: Industrial Relations & Labour Laws, Vikas, 2005.
9. Aruna Kaulgud: Entrepreneurship Management by. Vikas publishing house, 2003.

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
Course Code	Principles Of Management (Open Elective)				
Teaching	Total contact hours - 48	L	T	P	C
Prerequisite(s): Knowledge of General Management		4	0	0	4

Course Objectives:

The course is to give a basic perspective of Management. This will form foundation to study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Management.

Course outcomes:

On Completion of the course, the students will be able to-	
CO1	Gain the knowledge of basic concepts, tested principles emerging ideas, evolving theories and latest techniques.
CO2	Understand the importance of critical decisions that ensure growth and sustainability of the organization.
CO3	Understand theoretical aspects and its application to modern management practice
CO4	Demonstrate critical thinking when presented with managerial issues and problems
CO5	Understand the importance of Professional Management for effective utilization of resources in organizations.

UNIT I

Introduction to Management: Nature and scope of Management, Functions of Management Management as a Science, Art and Profession - Management & Administration - Principles of Management- Managerial roles: Mintzberg Model - Contributions of F.W.Taylor and Henry Fayol

UNIT II

Planning: Planning premises, types of plans and Planning process, Decision making meaning and importance- types of decision- steps in decision making, Forecasting techniques.

UNIT III

Organization: Structure, types of organizations, principles of organizing, Authority and span of control, delegation and decentralization, Line and staff relationship.

UNIT VI

Directing& Controlling: Nature and scope, Leadership- styles of Leadership; Co-ordination- types of interdependence. Controlling: Process of controlling- making controlling effective,-techniques of controlling.

UNIT – V

Contemporary issues – (Brief Study) Quality circle-Total Quality Management - Business Process Reengineering (BPR)- Six sigma.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Harold Koontz, Heinz Weihrich,A.R.Aryasri, Principles of Management, TMH, 2010.
2. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
3. Kumar, Rao, Chhaalil "Introduction to Management Science" Cengage Publications,New Delhi
4. V.S.P.Rao, Management Text and Cases, Excel, Second Edition, 2012.
5. K.Anbuvelan, Principles of Management, University Science Press, 2013.
6. K.Aswathappa " Organisational Behaviour-Text, Cases and Games", Himalaya Publishing House, New Delhi,2008.
7. Steven L Mc Shane, Mary Ann Von Glinow, Radha RSharma: "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	-	-	-	-	-	-
CO5	-	-	2	-	2	-	-	3	1	-	-	-

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech. (1 st Semester)			
Cours. Code	Financial Management for Engineers (Open Elective)				
Teaching	Total contact hours - 8	L	T	P	C
		4	0	0	4

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	The students would be able to understand and define basic terminology used in finance and accounts
CO2:	The students would be able to prepare & appraise Financial Statements and evaluate a company in the light of different measurement systems.
CO3:	The students would be able to analyse the risk and return of alternative sources of financing.
CO4:	Estimate cash flows from a project, including operating, net working capital, and capital spending.
CO5:	To estimate the required return on projects of differing risk. to estimate the cash flows from an investment project. calculate the appropriate discount rate, and determine the value added from the project, and make a recommendation to accept or reject the project.

Unit I

Introduction to Financial Accounting, Book keeping & Recording - Meaning, Scope and importance of Financial Accounting. Financial Accounting - concepts and conventions, classification of accounts, Rules and principles governing Double Entry Book-keeping system, Meaning, Preparation of Journal, Ledger, Cash book & Trial balance. (Practical application on tally)

UNIT II

Financial Statement Preparation, analysis & Interpretation- Preparation of financial statement and Profit & Loss Account, Balance Sheet, Ratio Analysis - classification of various ratios. (Calculation on Excel)

UNIT III

Introduction To Financial Management- Concept of business finance, Goals & objectives of financial management, Sources of financing - LONG TERM: shares, debentures, term loans, lease & hire purchase, retained earnings, public deposits, bonds (Types, features & utility), SHORT TERM: bank finance, commercial paper, trade credit & bills discounting, INTERNAL: Retained earnings,

Unit-IV

Working Capital Management- Concept of working Capital, significance, types. Adequacy of working capital, Factors affecting working capital needs, Financing approaches for working capital, Methods of forecasting working capital requirements, meaning & importance of accounts receivable. (Excel based)

Unit-V

Time Value of Money & Capital Budgeting- Concept of time value of money, Compounding & discounting; Future value of single amount & annuity, present value of single amount & annuity; Practical application of time value technique. Capital budgeting - Nature and significance, techniques of capital budgeting -Pay Back Method, Accounting rate of return, Internal Rate of Return, DCF, Net Present Value and profitability index. (Application on Excel)

Relevant cases have to be discussed in each unit and in examination case is compulsory

from any unit.

References

1. Financial , Cost & Management Accounting by Dr.P.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

CO-PO Mapping:

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

[illegible]

GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	OPERATIONS MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
Prerequisite(s):		3	-	-	3

Course Objective:

Objective: This Course is designed to make student understand the strategic significance of Operation management, to acquaint them with application of discipline to deal with real life business problem.

Course Outcomes:

On Completion of the course, the students	
CO1:	Are able to understand the basic concepts in operations and production activities.
CO2:	Can identify factors influencing plant location and plant layout.
CO3:	Can identify the production process and execute the customer order timely.
CO4:	Can manage the materials, manpower effectively by using appropriate inventory and time study techniques.
CO5:	Can improve the productivity by using effective quality control standards and techniques.

Introduction to Operation Management: Nature & Scope of Operation/ Production Management, Relationship with other functional areas, Recent trend in Operation Management, Manufacturing & Theory of Constraint, Types of Production System, Just in Time (JIT) & lean system.

UNIT -II:Product Design & Process Selection: Stages in Product Design process, Value Analysis, Facility location & Layout: Types, Characteristics, Advantages and Disadvantages, Work measurement, Job design.

UNIT- III:Forecasting & Capacity Planning: Methods of Forecasting, Overview of Operation Planning, Aggregate Production Planning, Production strategies, Capacity Requirement Planning, MRP, Scheduling, Supply Chain Management, Purchase Management, Inventory Management. Unit- IV: Productivity: Factors, Affecting Productivity – Job Design – Process Flow Charts – Methods Study – Work Measurement – Engineering and Behavioral Approaches.

UNIT -V:Quality Management: Quality- Definition, Dimension, Cost of Quality, Quality Circles-Continuous improvement (Kaizen), ISO (9000&14000 Series), Statistical Quality Control: Variable & Attribute, Process Control, Control Charts - Acceptance Sampling Operating Characteristic Curve (AQL, LTPD, Alpha & Beta risk), Total Quality Management (TQM).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References: 1. Krajewski&Ritzman (2004). Operation Management -Strategy and Analysis. Prentice Hall of India.
2. PannerSelvem, Production and Operation Management, Prentice Hall of India.
3. Chunnawals, Production & Operation Management Himalaya, Mumbai
4. Charry, S.N (2005). Production and Operation Management- Concepts, Methods Strategy. John Willy& Sons Asia Pvt Limited.
5. K Aswathappa& Sridhar Bhatt, Production & Operations Management, Himalaya, Mumbai.

CO-PO Mapping:

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

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

Regulation 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 marketing and its applications.

Course Outcomes:

On Completion of the course, the students	
CO1:	Would be able to learn about model approach of Marketing.
CO2:	Would be able to learn various methods and channels of digital marketing
CO3:	Would be introduced to Digital Marketing planning execution
CO4:	Get concept of SEO's is introduced for the benefit of students aspiring startups
CO5:	Can learn advertising strategies of Digital Marketing have been introduced

Syllabus:

UNIT - I:

Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

UNIT - II:

Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels.

UNIT - II:

Marketing in the Digital Era: Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

UNIT - III:

Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

UNIT - IV:

Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

UNIT - V:

Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention.

Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Suggested Readings:

1. Michael Miller, B2B Digital Marketing, 1e, Pearson, 2014.
2. Vandana Ahuja, Digital marketing, Oxford University Press 2015
3. Michael R Solomon, Tracy Tuten, Social Media Marketing, Pearson, 1e, 2015.
4. Judy Strauss & Raymond Frost, E-Marketing, Pearson, 2016
5. Richard Gay, Alan Charles worth and Rita Esen, Online marketing – A customer led approach
6. Oxford University Press 2007.
7. Arup Varma, Pawan S. Budhwar, Angelo S. De Nisi, Digital Marketing, Wiley, 2016.

CO-PO Mapping:

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

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

Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	TOTAL QUALITY MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-64	L	T	P	C
Pre-requisites/Exposure :Exposure of Supply Chain and Operations		4	0	0	4

Course outcomes:

On Completion of the course, the students will be able to-	
CO1:	To realize the importance of significance of quality.
CO2:	Manage quality improvement teams
CO3:	Identify requirements of quality improvement programs
CO4:	Develop a thinking towards Quality systems and Thinking.
CO5:	Acknowledge the strategic value of leading practices and therefore their implementation • Efficiently designing the effective performance measurement system.

OBJECTIVES: To facilitate the understanding of Quality Management principles and process.

UNIT-I

INTRODUCTION: Introduction – Need for quality – Evolution of quality – Definitions of quality – Dimensions of product and service quality – Basic concepts of TQM – TQM Framework – Contributions of Deming, Juran and Crosby – Barriers to TQM – Quality statements – Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention – Costs of quality.

UNIT-II

TQM PRINCIPLES: Leadership – Strategic quality planning, Quality Councils – Employee involvement – Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDCA cycle, 5S, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT-III

TQM TOOLS AND TECHNIQUES: The seven traditional tools of quality – New management tools – Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT-IV

TQM TOOLS AND TECHNIQUES II: Control Charts – Process Capability – Concepts of Six Sigma – Quality Function Development (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures.

UNIT-V

QUALITY SYSTEMS: Need for ISO 9000 – ISO 9001-2008 Quality System – Elements, Documentation, Quality Auditing – QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors.. **TOTAL: 45 PERIODS OUTCOMES :** x The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXTBOOK:

1. Dale H. Besterfield, et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint 2006.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.

2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

3. Janakiraman. B and Gopal .R.K., "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

CO- PO Mapping

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

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

UNIT-IV

Leadership and Power: Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

UNIT-V

Dynamics of Organizational Behavior: Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives – Organizational effectiveness.

TEXT BOOKS

1. Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCES

1. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organizational Behavior, 2nd Edition, Oxford Higher Education, 2004.
3. Mc Shane & Von Glinov, Organizational Behavior, 4th Edition, Tata Mc Graw Hill, 2007.
4. Hellrigal, Slocum and Woodman, Organizational Behavior, Cengage Learning, 11th Edition 2007.
5. Ivancevich, Konopaske & Maheson, Organizational Behavior & Management, 7th edition, Tata McGraw Hill, 2008.

CO-PO Mapping:

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

GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	B.Tech.			
CourseCode	HUMAN RESOURCE MANAGEMENT (Open Elective)				
Teaching	Totalcontacthours-48	L	T	P	C
		3	-	-	3

Course Objective:

To equip the students with basic concepts of Human Resource Management and the various functions of HRM including Industrial Relations in the liberalized, socialism environment.

Course Outcomes:

On Completion of the course, the students	
CO1:	Integrated perspective on role of HRM in modern business. Ability to plan human resources and implement techniques of job design
CO2:	Can conduct job analysis and scientific recruitment and selection process for the higher productivity
CO3:	Can get competency to recruit, train, and appraise the performance of employees
CO4:	Can learn rational design of compensation and salary administration
CO5:	Are able to handle employee issues and evaluate the new trends in HRM

UNIT -I

HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department –aligning HR strategy with organizational strategy - HRM –changing , global perspective challenges, environment – crosscultural problems – emerging trends in HRM.

UNIT -II

Investment perspectives of HRM: HR Planning – Demand and Supply forecasting - Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques - Training and Development – Methods and techniques– Job design , evaluation and Analysis - Management development - HRD concepts.

UNIT -III

Performance Appraisal: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation - Concepts and Principles Influencing Factors- Current Trends in Compensation- Methods of Payments in detail - Incentives rewards compensation mechanisms.

UNIT -IV

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame Work Determinants 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: A South-Asian Perspective", Cengage Learning, New Delhi, 2013.
4. Subba Rao P: "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
5. Madhurima Lall, Sakina Qasim Zaidi: "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	INTELLECTUAL 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 Trademarks.		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	-	-	-	-

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170711	SERVICING, MAINTENANCE & SCANNING OF AUTOMOBILES LAB				
Teaching	Total contact hours-42	L	T	P	C
Prerequisite(s): Not required		0	0	3	1.5

Course Objectives:

1. To make the student to assemble and dis-assemble the various components of an automobile
2. To make the student to troubleshoot the vehicle to identify the problem location
3. To make the student to test and overhaul the components of an vehicle
4. To make the student to calibrate measuring instruments

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Assemble and dis-assemble the various components of an automobile
CO2:	Troubleshoot the vehicle to identify the problem location
CO3:	Test and overhaul the components of an vehicle
CO4:	Calibrate measuring instruments

Section-I

1. Dismantling and assembly of LMV components as following:
 - a) Gear box
 - b) clutch assembly
 - c) Propeller shaft
 - d) differential gear box
 - e) Rear axle
 - t) suspension system
 - g) steering mechanism.
2. Dismantling and assembly of door frames, door locks and window locks
3. Study of driver's seat layout in anyone LMV and anyone HMV.
4. Testing, servicing and charging of batteries
5. Servicing of generator, alternator and starter motor with dismantling, testing, inspection and assembly.
6. Servicing of ignition systems
7. Drawing of general electrical wiring diagrams of various vehicles {two and four wheelers}



8. Calibration of micrometer, measurement of plain plug, measurement of plain ring gauge, taper gauge
9. Measurement of taper using sine bar and other instruments.
10. Measurement of base circle diameter and tooth thickness of spur and helical gears
11. Use of slip gauges, measurement of screw threads using screw thread micrometer, use of comparators, experiments involving profile projectors.
12. Overhauling & testing of fuel injection pumps on test bench.
13. Study of air brake components in the brake system on test bench.
14. Scanning of Automobile Sensors using Scanning device.

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

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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)	IV B.Tech. I Sem (7 Semester)			
Course Code	CAD/CAM Lab				
Teaching	Total contact hours-55	L	T	P	C
Prerequisite(s): CAD/CAM.		3	0	0	3

Course Objectives:

- To familiarize the fundamentals of CAD/CAM software.
- To provide necessary numerical skills for solving structural problems using analysis package.
- To provide necessary numerical skills for solving heat transfer and fluid flow problems using analysis package.
- To familiarize the thermal properties of bodies for both steady and transient state conditions
- 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.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

- 14. Generation of NC code for turning operation.
- 15. Generation of NC code for pocket milling operation.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. I Sem (7 th Semester)			
Course Code 19170721	MINIPROJECT – 2 / STUDY PROJECT / INTERNSHIP				
		L	T	P	C
Prerequisite(s):		0	0	0	1.5

The student has to do fabrication project at outside workshop or inside the college laboratories during semester break after III B.Tech. II Sem. Course and it will be evaluated during IV B.Tech. I Semester. The student has to submit the model and brief report.

The evaluation will be done by the expert committee consisting of HOD, A senior faculty member from the same branch and another senior faculty member from any other branches of the same college.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170861a	RAPID PROTOTYPING (Professional Elective – IV)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Computer Aided Design		3	0	0	3

Course Objectives:

1. To understand the importance of rapid prototyping in manufacturing.
2. To understand slicing methods for rapid prototyping.
3. To learn liquid, powder and solid based rapid prototyping processes.
4. To learn the materials for rapid prototyping systems
5. To learn the reverse engineering and new technologies.

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

History – Development of RP systems – Applications in Product Development, Reverse Engineering, Rapid Tooling, Rapid Manufacturing- Principle – Fundamental – File format – Other translators – medical applications of RP – On demand manufacturing – Direct material deposition – Shape Deposition Manufacturing.

UNIT - II

LIQUID BASED AND SOLID BASED RAPID PROTOTYPING SYSTEMS

Classification – Liquid based system – Stereo lithography Apparatus (SLA), details of SL process, products, Advantages, Limitations, Applications and Uses. Solid based system – Fused Deposition Modeling, principle, process, products, advantages, applications and uses – Laminated Object Manufacturing

UNIT - III

POWDER BASED RAPID PROTOTYPING SYSTEMS

Selective Laser Sintering – principles of SLS process, principle of sinter bonding process, Laser sintering materials, products, advantages, limitations, applications and uses. Three Dimensional Printing – process, major applications, research and development. Direct shell production casting – key strengths, process, applications and uses, case studies, research and

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development. Laser Sintering System, e-manufacturing using Laser sintering, customized plastic parts, customized metal parts, e-manufacturing – Laser Engineered Net Shaping (LENS).

UNIT - IV

MATERIALS FOR RAPID PROTOTYPING SYSTEMS

Nature of material – type of material – polymers, metals, ceramics and composites- liquid based materials, photo polymer development – solid based materials, powder based materials – case study.

UNIT - V

REVERSE ENGINEERING AND NEW TECHNOLOGIES

Introduction, measuring device- contact type and non-contact type, CAD model creation from point clouds-preprocessing, point clouds to surface model creation, medical data processing – types of medical imaging, software for making medical models, medical materials, other applications – Case study.

TEXT BOOKS

1. Rafiq I. Noorani, Rapid Prototyping, “Principles and Applications”, Wiley & Sons, 2006.
2. Chua C.K, Leong K.F and Lim C.S, “Rapid Prototyping: Principles and Applications”, Second Edition, World Scientific, 2003.

REFERENCES:

1. N.Hopkinson, R.J.M, Hauge, P M, Dickens, “Rapid Manufacturing – An Industrial revolution for the digital age”, Wiley, 2006
2. Ian Gibson, “Advanced Manufacturing Technology for Medical applications: Reverse Engineering, Software conversion and Rapid Prototyping”, Wiley, 2006
3. Paul F.Jacobs, “Rapid Prototyping and Manufacturing : Fundamentals of Stereolithography”, McGraw Hill 1993.
4. Pham. D.T., and Dimov. S.S., “Rapid Manufacturing”, Springer Verlag 2001.

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170861b	VEHICLE PERFORMANCE & TESTING (Professional Elective – IV)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Basic Automobile Engineering, Automotive Engines		3	0	0	3

Course Objectives:

1. Estimate the vehicle performance
2. Check the transmission performance
3. Test the vehicles in Laboratory
4. Test the vehicles on road
5. Know various control systems

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Investigate the vehicle performance
CO2:	Determine the vehicle testing
CO3:	Detect the transmission performance
CO4:	Operate the control systems
CO5:	Determine the testing of vehicles on road and track

Syllabus:

UNIT- I

VEHICLE PERFORMANCE ESTIMATION & PREDICTION

Aerodynamic drag, methods of estimation of resistance to motion, power requirement for propulsion, Power plant characteristics & transmission related requirements, arrangement of power train, vehicle controls.

Introduction to Public Transportation System & Coordinated Transportation System

UNIT- II

DYNAMIC VEHICLE TESTING

Vehicle acceleration, maximum speed, and gradiability drive systems comparison, hill climbing, handling and ride characteristics on different road surfaces. Effect of pressure, temperature and humidity on power output. Heat Balance, combustion, Emission, Load test.

Engine testing – noise, vibrations, emission, power & fuel consumption, Vehicle testing on chassis dynamometers.

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UNIT- III

VEHICLE TRANSMISSION PERFORMANCE

Characteristics & features of friction clutches, mechanical gear transmission & Epicyclic gear boxes.

OPERATIONAL PERFORMANCE

Engine performance & operating characteristics, Operation at full load and part load conditions, fuel economy, effect of vehicle condition, tyre and road condition, traffic condition and driving habits on fuel economy, vehicle safety.

UNIT-IV

CONTROL SYSTEMS

Braking arrangements & Characteristics, weight transfer, steering arrangements, rigid & independent suspension, roll centre, torsion bar, stabilizer, radius bar.

UNIT-V

VEHICLE PERFORMANCE TESTING ON ROAD & TRACK

Initial inspection, running in and durability, extensive driving, maximum speed & acceleration, Brake testing on the road, Hill climbing, handling & ride characteristics on different road surfaces, ride comfort.

TEXT BOOK

1. Martyr A. J, Plint M. A, "Engine Testing Theory and Practice", 3rd edition, Butterworth-Heinemann, 2007.

REFERENCES

1. Gousha H. M, "Engine Performance Diagnosis & Tune Up Shop Manual".
2. Giles J. G, "Vehicle Operation & Performance".
3. Crouse. W. H, Anglin. D. L, "Motor Vehicle Inspection", McGraw Hill, 1978.

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	-	2	-	1	-	-	-	-	-	-	-
CO3	3	-	-	-	-	1	-	-	-	-	-	2
CO4	3	-	-	-	-	1	-	-	-	-	-	2
CO5	3	-	-	-	-	1	-	-	-	-	-	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)	IV B.Tech. II Sem (8 th 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		3	0	0	3

Course Objectives:

- To familiarize the concepts of Computational Fluid Dynamics.
- To familiarize the governing equations involved in fluid flow problems.
- 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.



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DEPARTMENT OF MECHANICAL ENGINEERING

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

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. Computational Fluid Dynamics The Basics with Applications, Anderson, J.D.(Jr), McGraw-Hill, Inc ,2017.
2. Computational Fluid Dynamics, Hoffman, K.A., and Chiang, S.T., Vol. I, II and III, Engineering Education System, Kansas, USA, 2000.
3. Computational Fluid Dynamics, Chung, T.J., 2nd Edition ,Cambridge University Press, 2010.

References:

1. An Introduction to Computational Fluid Dynamics: The Finite Method, Versteeg, H.K. and Malalasekara, W., 2nd Edition, Pearson Education, 2008.
2. Computational Fluid Mechanics and Heat Transfer, Richard Pletcher, John Tannehill and Dale Anderson, 3rd Edition, CRC Press, 2013.

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170861d	PRINCIPLES OF ENTREPRENEURSHIP (Professional Elective – IV)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):	Engineering Mathematics, Fluid Mechanics & Heat Transfer	3	0	0	3

Course Objectives:

1. To make the student to become entrepreneur
2. To make the student to estimate the capital required to establish the new venture
3. To make the student to apply production and marketing techniques to manage organization
4. To make the student to manage human resources

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Demonstrate Entrepreneurship
CO2:	Classify the product planning and development process
CO3:	Identify the public issues and bonus issues
CO4:	Discover about production and Marketing Management Methods
CO5:	Distinguish about motivation and leading teams

Syllabus:

UNIT - I

Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Entrepreneur. 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.

UNIT - II

Creating and Starting the Venture Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process.

The Business Plan: Nature and scope of Business plan, Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities.



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170861e	ALTERNATIVE ENERGY SOURCES FOR AUTOMOBILES (Professional Elective – IV)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Automotive Engines		3	0	0	3

Course Objectives:

1. Produce and use vegetable oils, gaseous fuels, hydrogen fuels, alcohol fuels
2. Determine and predict the properties, performance, emission characteristics of vegetable oils, gaseous fuels, hydrogen fuels, alcohol fuels
3. Judge the effect of alternative fuels when use in combination with both fuels
4. Design, analyze and build the electric and hybrid automobiles

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Classify the types of alternate fuels
CO2:	Determine the performance of vegetable oils in IC Engines
CO3:	Operate hydrogen in IC Engines
CO4:	Differentiate about Biogas, Natural Gas and LPG
CO5:	Construct about different types of electric vehicles

Syllabus:

UNIT-I

Introduction: Need for non-conventional energy sources. Energy alternative: solar, photo-voltaic, Hydrogen, Bio mass. Electrical - their merits and demerits.

Vegetable Oils: Various vegetable oils for diesel engines, structure and properties, problems in using vegetable oils in diesel engines, methods to improve the engine performance using vegetable oils-preheating, Esterification (biodiesel, blending with good secondary fuels, semi-adiabatic engine, surface ignition engine, ignition accelerators dual fuelling with gaseous and liquid fuels, performance, combustion and emission characteristics of vegetable oil fuelled diesel engines.

UNIT-II

Gaseous Fuels: Properties of hydrogen, production and storage methods, safety precautions, use in SI and CI engines, biogas production and its properties, use in SI and CI engines, properties of LPG and CNG, use in SI and CI engines. Performance, combustion and emission characteristics of hydrogen, biogas, LPG and CNG in SI and CI engines.

Energy from Bio mass: Photosynthesis, photosynthetic oxygen production, energy plantation. Biogas production from organic waste, description and types of Bio gas plants, Application and limitations - Merits and demerits performance characteristics and their comparison.

UNIT-III

Hydrogen Fuel: Hydrogen Energy: Properties of Hydrogen, sources of Hydrogen,



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Thermodynamics of water splitting Production of Hydrogen, Electrolysis of water. Thermal decomposition of water. Thermo-chemical production.
Hydrogen fuel, Storage and Transportation methods, Applications to engines modifications necessary, precautions and safety measures - Performance characteristics in Engine and their comparison.

Alcohol Fuels: Properties of alcohols, engine modifications required to use alcohols in SI engines, performance, combustion and emission characteristics in SI engines, alcohol – gasoline blends, fuel flexible vehicle, methanol reformed gas engine, use of alcohols in CI engines-emulsions, dual fuel system, spark assisted diesel engine, surface ignition engine, ignition accelerators, performance, combustion and emission characteristics in CI engines.

Electric & Hybrid Vehicles: cost of electric car, Availability of energy for recharging. Traction motors and types. Electric Automobiles: Design considerations, limitations. Opportunities for improvement Batteries, problems. future possibilities , capacities, types , material requirement

Solar & Fuel Cell Vehicles : Solar photo-voltaic conversion, Collection and storage of solar energy, collection devices, flat plate collectors, concentrating type collectors, principles and working of photo-voltaic Conversion, Applications to automobiles.

1. G.D. Rai 'Non-conventional sources of energy Khamma Lab.
2. William Hamilton 'Electric Automobiles', PHI
3. Alternative sources and control system. Yes Dee publishing pvt Ltd

1. S.P. Sukhatme 'Solar Energy', Tata McGraw Hill .
2. S. Rao & B.B. Larulekar 'Energy Technology', Khamma Lab
3. Frank Kreith & Jan F. Krieder' Principles of Solar Engineering' McGraw Hill.
4. J.A. Duffie&W.A. Beckman 'Solar Energy -thermal Process' McGrawHil1
5. E, D ;Totta, 'Solar Hydrogeff Energy-Systems'
6. T.N. Veziroglu. Alternative energy sources.
7. Mitsui E. Stal, Biological solar energy conversion

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170862a	COMPUTER INTEGRATED MANUFACTURING (Professional Elective -V)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

1. To make the student able to manufacture automotive components
2. To make the system able to design and analyze the automated flow lines
3. To make the student able to establish the automation in manufacturing system
4. To make the student able to control the machining parameters
5. To make the student able to control the robots

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe fundamentals of computer aided design, manufacturing and the mathematical basis in the technique of representation of geometric entities.
CO2:	Understand part programming codes for CNC machines and to list the various types of Group Technology and Computer aided Process planning.
CO3:	Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.
CO4:	Understand about vehicle guidance technology
CO5:	Identify the various Robots

Syllabus:

UNIT I

INTRODUCTION

Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM – Concurrent Engineering-CIM concepts – Computerised elements of CIM system – Types of production - Manufacturing models and Metrics – Mathematical models of Production Performance – Simple problems – Manufacturing Control – Simple Problems – Basic Elements of an Automated system – Levels of Automation – Lean Production and Just-In-Time Production.

UNIT II

PRODUCTION PLANNING AND CONTROL AND COMPUTER AIDED PROCESS PLANNING

Process planning – Computer Aided Process Planning (CAPP) – Logical steps in Computer Aided Process Planning – Aggregate Production Planning and the Master Production Schedule – Material Requirement planning – Capacity Planning- Control Systems-Shop Floor Control-Inventory Control – Brief on Manufacturing Resource Planning-II (MRP-II) & Enterprise Resource Planning (ERP) - Simple Problems.

UNIT III

CELLULAR MANUFACTURING

Group Technology(GT), Part Families – Parts Classification and coding – Simple Problems in Opitz Part Coding system – Production flow Analysis – Cellular Manufacturing –



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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170862b	VEHICLE BODY ENGINEERING AND SAFETY (Professional Elective – V)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Vehicle Design , Automotive Safety , Vehicle Maintenance		3	0	0	3

COURSE OBJECTIVES:

1. To make the student to design the construction of vehicle, aerodynamics, panelling of passenger car and commercial vehicle body design
2. To make the student to analyze the construction details of bus body
3. To make the student to select the various materials in construction of vehicle body
4. To make the student to select different mechanisms in vehicle construction
5. To make the student to select different materials used in vehicle construction

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify different types of car bodies.
CO2:	Examine the bus body details.
CO3:	Practice and differentiate about commercial vehicles.
CO4:	Evaluate various aerodynamic forces and moments in vehicle body design
CO5:	Select the material used in body building, tools used in body repairs

Syllabus:

UNIT I

CAR BODY DETAILS

Types of Car body - Saloon, hatch back, convertibles, Limousine, Estate Van, Racing and Sports car – Visibility- regulations, driver's visibility, improvement in visibility and tests for visibility. Driver seat design -Car body construction-Variou panels in car bodies. Safety: Safety design, safety equipment for cars.

UNIT II

BUS BODY DETAILS

Types of bus body: based on capacity, distance travelled and based on construction. Bus body lay out, floor height, engine location, entrance and exit location. Types of metal sections used – Regulations – Constructional details: Conventional and integral.

UNIT III

COMMERCIAL VEHICLE DETAILS

Types of commercial vehicle bodies - Light commercial vehicle body. Construction details of Flat platform body, Tipper body and Tanker body – Dimensions of driver's seat in relation to controls – Drivers cab design.

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UNIT IV

VEHICLE AERODYNAMICS

Objectives, Vehicle drag and types. Various types of forces and moments. Effects of forces and moments. Side wind effects on forces and moments. Various body optimization techniques for minimum drag. Wind tunnels – Principle of operation, Types. Wind tunnel testing such as: Flow visualization techniques, Airflow management test – measurement of various forces and moments by using wind tunnel.

UNIT V

BODY MATERIALS, TRIM, MECHANISMS AND BODY REPAIR

Types and properties of materials used in body construction-Such as steel sheet, timber, plastics and GRP. Body trim items-body mechanisms. Hand tools-power tools for body repair. Vehicle corrosion-Anticorrosion methods-Modern painting process procedure.

TEXT BOOKS:

1. Powloski, J., Vehicle Body Engineering, Business Books Ltd., 1998.
2. James E Duffy, Body Repair Technology for 4-Wheelers, Cengage Learning, 2009.

REFERENCES:

1. Giles, G.J., Body construction and design, Illiffe Books Butterworth & Co., 1991.
2. John Fenton, Vehicle Body layout and analysis, Mechanical Engg. Publication Ltd., London, 1992.
3. Braithwaite, J.B., Vehicle Body building and drawing, Heinemann Educational Books Ltd., London, 1997.
4. Dieler Anselm., The passenger car body, SAE International, 2000

CO-PO Mapping:

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

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170862c	SIMULATION OF SI & CI ENGINES (Professional Elective – V)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

1. To make the student to design SI and CI engines
2. To make the student to analyse the engine design
3. To make the student to validate the engine design
4. To make the student to develop the validated design
5. To make the student to develop the testing of engine performance

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Design SI and CI engines
CO2:	Analyze the engine design
CO3:	Validate the engine design
CO4:	Develop the validated design
CO5:	Identify the performance parameters

Syllabus:

UNIT - I

INTRODUCTION: Simulation principles – simulation exercises using computers, validation of models.

COMBUSTION PROCESS: Reactive process, heat of reaction, adiabatic flame temperature, isentropic changes of stage, temperature change due to fuel vaporization.

UNIT-II

SIMULATION OF SI ENGINE PROCESSES:

SI engine simulation with air as working medium: Ideal otto cycle, deviation with ideal and actual cycle.

SI engine simulation with adiabatic combustion: Temperature drop due to fuel vaporization, full throttle, part throttle and supercharged operations, problems.

UNIT-III

SI engines simulation with progressive combustion, gas exchange process, evaluation of performance parameters.

Simulation of two strokes SI engine processes

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UNIT-IV

SIMULATION OF CI ENGINE PROCESS:

CI engines simulation with air as working medium: deviation with ideal and actual cycle.

CI engines simulation with adiabatic combustion: Naturally aspirated and super charged operations, problems.

UNIT-V

CI engines simulation with progressive combustion, combustion modeling, zero dimensional combustion models, heat release and heat transfer models.

CI engines simulation with gas exchange process. Evaluation of performance parameters.

Introduction to CFD simulation of IC engine flow mixture formation and combustion

TEXT BOOKS

1. Computer simulation of SI engine process, V.Ganesan, Orient Longman Ltd.,
2. Computer simulation of CI engine process, V.Ganesan, Orient Longman Ltd.,

REFERENCES

1. Introduction to modelling and control of Internal Combustion Engine Systems, Lino Guzzella, Christopher H.Onder, Springer, 2010.
2. Computer Optimization of Internal Combustion Engines, Y.Shi, et, al; Springer, 2011.
3. 3D – CFD Simulation of IC Engine Flow, Mixture Formation and Combustion with AVL FIRE, Gunter P.Merker, Springer, 2010.

CO-PO Mapping:

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170862d	DISASTER MANAGEMENT (Professional Elective – V)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):		3	0	0	3

Course Objectives:

1. To make the student able to predict the disasters.
2. To make the student able to Measure the intensity of an disaster
3. To make the student able to identify the type of disaster
4. To make the student able to manage disasters

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Predict the disasters.
CO2:	Measure the intensity of an disaster
CO3:	Identify the type of disaster
CO4:	Manage disasters
CO5:	Identify the applications of disaster management

Syllabus:

UNIT- I

INTRODUCTION TO DISASTERS

Definition: Disaster, Hazard, Tsunami, Tornado, Hurricanes, Power grid Failures, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters. Responsibilities as a citizen/engineer

UNIT II

APPROACHES TO DISASTER RISK REDUCTION (DRR)

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- non structural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies

UNIT- III

INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use , Climate Change Adaptation-Severe Summer & Cold Climate,

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IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT- IV

DISASTER RISK MANAGEMENT IN INDIA

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, and Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment Responsibilities as a rescue team member.

UNIT- V

DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TEXT BOOKS:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13:978-9380386423
2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy, 2009.

CO-PO Mapping:

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170862e	MODERN VEHICLE TECHNOLOGY (Professional Elective – V)				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s):		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:	Identify the suspension systems in automobile vehicles
CO3:	Analyze braking operation in automobile vehicles
CO4:	Analyze and control the exhaust emissions and noise
CO5:	Distinguish and choose the fuel injection system

Syllabus:

UNIT-I

Trends in Automotive Power Plants: Hybrid Vehicles - Stratified charged / lean burn engines -Hydrogen Engines-Electric vehicles-Magnetic track vehicles solar powered vehicle Combined power source vehicle, types of hybrid drives, Toyota hybrid system.

UNIT-II

Suspension: Interconnected air and liquid suspensions, 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.

UNIT-III

Emission and Noise Pollution Control: Introduction, Engine emissions, types of catalytic conversion, open loop and closed loop operation to the oxidizing catalytic converter,

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Evaporative emissions, Internal and External Noise, Identification of Noise sources, Noise Control Techniques. SCR, DPF and DOC.

UNIT-IV

Vehicle Operation and Control: Fundamentals of Automotive Electronics - sensors, actuators, Processors, Computer Control for pollution, noise and for fuel economy - Electronic Fuel Injection and Ignition system.

UNIT-V

Fuel Injection Systems: SPFI, MPFI, DI, Pilot Injection, Unit Injection. CRDI; Two Wheeler Technology: DTS- i, DTS - Fi, DTS - Si; Four Wheeler Technology: WT, Cam less Engine, GDI.

TEXT BOOKS:

1. Crouse/Anglin "Automotive Mechanics"
2. K.Newton, W.Steeds "The Motor Vehicle"

REFERENCES

1. K.K. Ramalingam, "Automobile Engineering", Scitech Publications Pvt. Ltd., 2005
2. Dr. N.K. Giri, "Automobile Mechanic", Khanna Publishers, 2006
3. Crouse/Anglin "Automotive Mechanics"
4. K.Newton, W.Steeds "The Motor Vehicle"
5. Heinz Heisler "Advanced Vehicle Technology" ELSEVIER

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

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Regulation GRBT-19	Godavari Institute of Engineering & Technology (Autonomous)	IV B.Tech. II Sem (8 th Semester)			
Course Code 19170841	PROJECT WORK				
Teaching	Total contact hours-90	L	T	P	C
Prerequisite(s):		0	0	18	9

COURSE OBJECTIVES:

The aim of the course is to make the student perform a comprehensive project work that involves either or all of the following: optimum design of a mechanical component or an assembly, thermal analysis, computer aided design & analysis, cost effective manufacturing process, material selection, testing procedures or fabrication of components and prepare a detailed technical thesis report. The completed task should also take into account the significance of real time applications, energy management and the environmental affects.

COURSE OUTCOMES:

After completing the project work the student should learn the technical procedure of planning, scheduling and realizing an engineering product and further acquire the skills of technical report writing and data collection.

Course content:

The student should work in groups to achieve the aforementioned objectives and the outcomes.

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