COURSE STRUCTURE
AND
DETAILED SYLLABUS

COLLEGE CODE: C4

MECHANICAL ENGINEERING

For

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2015-2016)

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(Autonomous)

Narsampet, Warangal – 506 332

Telangana State, India

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
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MECHANICAL ENGINEERING

COURSE STRUCTURE
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I YEAR– I SEMESTER **I-SEMESTER**

S.No	Code	Subject	L	T	P	Credits
1	AJ1001	Mathematics-I	3	1	0	4
2	AJ1013	English	3	0	0	3
3	AJ1010	Engineering Chemistry	3	0	0	3
4	AJ1301	Engineering Mechanics-I	3	1	0	3
5	AJ1304	Engineering Graphics-I	3	0	4	4
6	AJ1504	Computer Programming	3	0	0	3
7	AJ1014	English Language Communication Skills Lab	0	0	3	2
8	AJ1505	Computer Programming Lab	0	0	3	2
Total			**18**	**2**	**10**	**24**

I YEAR– II SEMESTER **II-SEMISTER**

S.No	Code	Subject	L	T	P	Credits
1	AJ2002	Mathematics-II	3	1	0	4
2	AJ2008	Engineering Physics	3	1	0	3
3	AJ2302	Engineering Mechanics-II	4	1	0	4
4	AJ2305	Engineering Graphics-II	3	0	4	4
5	AJ2508	OOP and Data Structures	3	0	0	3
6	AJ2307	Engineering Workshop & IT Work Shop	0	0	3	2
7	AJ2011	Physical Sciences Lab	0	0	3	2
8	AJ2509	OOP and Data Structures Lab	0	0	3	2
Total			**16**	**3**	**13**	**24**

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II YEAR – I SEMESTER **III-SEMESTER**

SI. No.	Code	Subject	L	T	P	Credits
1	AJ3005	Probability and Statistics	3	1	0	3
2	AJ3308	Thermodynamics	3	1	0	3
3	AJ3309	Mechanics of solids	4	1	0	4
4	AJ3311	Metallurgy and Materials Science	4	0	0	4
5	AJ3313	Production Technology	4	0	0	4
6	AJ3312	Metallurgy and Materials Science Lab	0	0	3	2
7	AJ3310	Mechanics of Solids Lab	0	0	3	2
8	AJ3314	Production Technology Lab	0	0	3	2
Total Credits			18	3	9	**24**
9	AJMC02	Value Education and human rights	2	0	0	0

II YEAR – II SEMESTER **IV-SEMISTER**

SI. No.	Code	Subject	L	T	P	Credits
1	AJ4012	Environmental Studies	2	0	0	2
2	AJ4203	Basic Electrical and Electronics Engineering	4	0	0	4
3	AJ4E01	Managerial Economics and Financial Analysis	4	0	0	4
4	AJ4315	Thermal Engineering-1	4	1	0	4
5	AJ4316	Mechanics of Fluids & Hydraulic Machines	4	1	0	4
6	AJ4317	Mechanics of Fluids & Hydraulic Machines Lab	0	0	3	2
7	AJ4204	Basic Electrical and Electronics lab	0	0	3	2
8	AJ4318	Machine Drawing Practice Lab	0	0	3	2
Total Credits			18	2	9	**24**
9	AJMC01	Gender sensitization	0	0	3	0

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III YEAR – I SEMESTER **V-SEMESTER (3-1)**

SI. No.	Code	Subject	L	T	P	Credits
1	AJ5319	Thermal Engineering-II	4	1	0	4
2	AJ5321	Kinematics of Machinery	4	1	0	4
3	AJ5322	Machine Tools	4	0	0	4
4		**Open Elective-I**	**3**	**0**	**0**	**3**
5	AJ5339 AJ5340 AJ5341	**Professional Elective-I** Refrigeration and Air Conditioning Renewable Energy Sources Mechatronics	**3**	**1**	**0**	**3**
6	AJ5320	Thermal Engineering Lab	0	0	3	2
7	AJ5323	Machine Tools Lab	0	0	3	2
8	AJ5015	Advanced Communication Skills Lab	0	0	3	2
		Total Credits	18	3	9	**24**
9	AJMC04	Energy studies	2	0	0	0

III YEAR – II SEMESTER **VI-SEMESTER(3-2)**

SI. No.	Code	Subject	L	T	P	Credits
1	AJ6324	Heat transfer	4	1	0	4
2	AJ6326	Dynamics Of Machinery	4	1	0	4
3	AJ6327	Design of Machine Elements	4	1	0	4
4		**Open Elective-II**	**3**	**0**	**0**	**3**
5	AJ6342 AJ6343 AJ6344	**Professional Elective-II** Finite Element Method Plant Layout & Material Handling Automation in Manufacturing	**3**	**1**	**0**	**3**
6	AJ6325	Heat Transfer Lab	0	0	3	2
7	AJ6328	Production Drawing Practice	0	0	3	2
8	AJ6329	Product Design Lab	0	0	3	2
		Total Credits	18	4	9	**24**

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IV YEAR - I SEMESTER **VII-SEMESTER (4-1)**

SI. No.	Code	Subject	L	T	P	Credits
1	AJ7330	Metrology and Instrumentation	4	1	0	4
2	AJ7332	CAD/CAM	4	1	0	4
3		**Open Elective-III**	**3**	**0**	**0**	**3**
4		**Professional Elective-III**	3	1	0	3
	AJ7345	Operation Research				
	AJ7346	Reliability Engineering				
	AJ7347	Modeling and Simulation of manufacturing systems				
5		**Professional Elective-IV**	3	1	0	3
	AJ7348	Power Plant Engineering				
	AJ7349	Advanced Strength of Materials				
	AJ7350	Mechanics of Composite Materials				
6	AJ7331	Metrology and Instrumentation Lab	0	0	3	2
7	AJ7333	CAD/CAM Lab	0	0	3	2
8	AJ7381	Mini Project / Industrial Training	0	0	3	3
		Total Credits	17	4	9	**24**

IV YEAR – II SEMESTER **VIII-SEMESTER (4-2)**

SI. No.	Code	Subject	L	T	P	Credits
1		**Professional Elective-V**	3	1	0	3
	AJ7351	Automobile Engineering				
	AJ7352	Robotics				
	AJ7353	Gas Dynamics				
2		**Professional Elective-VI**	3	1	0	3
	AJ7354	Unconventional Machining Processes				
	AJ7355	Computational Fluid Dynamics				
	AJ7356	Production Planning and Control				
3	AJ8382	Seminar	0	0	0	3
4	AJ8383	Comprehensive Viva	0	0	0	3
5	AJ8384	Project Work	0	0	15	12
		Total Credits	6	2	15	**24**

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LIST OF OPEN ELECTIVES

Sr.No.	Subject code	Name of the Open Elective Subject	Preferable Semester
		Department of ECE	
1.	AJ5416	Electronic Measuring Instruments	V
2.	AJ5443	Computer Organization	V
3.	AJ5444	Linear Digital IC Applications	V
4.	AJ5445	Micro Electronic Circuits	V
5.	AJ6446	Instrumentation	VI
6.	AJ6447	Electromagnetic Theory	VI
7.	AJ6448	Image and Video Processing	VI
8.	AJ7449	Bio-medical Instrumentation	VII
9.	AJ7450	Digital Signal Processing	VII
10.	AJ7451	Wireless Sensor Networks	VII
		Department of EEE	
11.	AJ5243	Electrical Technology	V
12.	AJ6244	Control Systems	V
13.	AJ7245	Renewable Energy Sources	V/VI
14.	AJ8246	Energy Storage Systems	V/VI
15.	AJ5243	Materials in Electrical Engineering	V/VI
16.	AJ8236	Neural Networks & Fuzzy Logic	VI/VII
		Department of CSE	
17.	AJ3511	Data Management Systems	III/IV
18.	AJ5522	Computer Networks	IV/V/VI
19.	AJ6529	Network Security	VI/VII
20.	AJ6530	Cloud Computing	VI/VII/VIII
21.	AJ6531	Artificial Intelligence and Robotics	VII/VIII
		Department of ME	
22.	AJ5360	Material Science	V
23.	AJ6365	Mechanics of Solids	VI
24.	AJ6361	Thermal Sciences	VI
25.	AJ5362	Engineering Mechanics	V
26.	AJ7366	Finite Element Analysis	VII
27.	AJ7363	Optimization Techniques and Its Applications	VII
28	AJ6364	Project Planning and Management	VI
		Department of CE	
29.	AJ5125	Disaster Management	V
30.	AJ5126	Environmental Impact Assessment	V
31.	AJ5127	Basics of Civil Engineering	V
32.	AJ6128	Legal Issues in Construction Management	VI
33.	AJ6129	Quantity Surveying and Costing	VI
34.	AJ7130	Construction Project Management	VII
		Department of MBA	
35.	AJ_E01	Management Science	III/IV/V
36.	AJ_E02	Managerial Economics and Financial Analysis	III/IV/V/VI
37.	AJ_E03	Total Quality Management	V/VI
38.	AJ_E04	Global Marketing	VI/VII
39.	AJ_E05	Green Marketing	VI/VII
40.	AJ_E06	Intellectual Property Rights	V/VI
41.	AJ_E07	Supply Chain Management	V/VI
42.	AJ_E08	Statistical Quality Control	VI/VII
43.	AJ_E09	Financial Analysis and Reporting	V/VI
44.	AJ_E10	Micro and Small Enterprises Management	V/VI

Note: '_' ***represents the subject code with semester of the respective B.Tech branch***

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LIST OF OPEN ELECTIVES WITH CODE

Sr.No.	Subject code	Name of the Open Elective Subject	Preferable Semester	L	T	P	C
1.	AJ5360	Material Science	V	3	0	0	3
2.	AJ6365	Mechanics of Solids	VI	3	0	0	3
3.	AJ6361	Thermal Sciences	VI	3	0	0	3
4.	AJ5362	Engineering Mechanics	V	3	0	0	3
5.	AJ7366	Finite Element Analysis	VII	3	0	0	3
6.	AJ7363	Optimization Techniques and Its Applications	VII	3	0	0	3
7.	AJ6364	Project Planning and Management	VI	3	0	0	3

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LIST OF PROFESSINAL ELECTIVES WITH CODE

Sl.No.	Code	Subject	L	T	P	C
1	AJ5339	Refrigeration and air conditioning	3	1	0	3
2	AJ5340	Renewable energy sources	3	1	0	3
3	AJ5341	Mechartonics	3	1	0	3
4	AJ6342	Finite element method	3	1	0	3
5	AJ6343	Plant layout & material handling	3	1	0	3
6	AJ6344	Automation in manufacturing	3	1	0	3
7	AJ6345	Operation Research	3	1	0	3
8	AJ6346	Reliability Engineering	3	1	0	3
9	AJ6347	Modeling and simulation of manufacturing systems	3	1	0	3
10	AJ7348	Power plant engineering	3	1	0	3
11	AJ7349	Advanced strength of materials	3	1	0	3
12	AJ7350	Mechanics of composite materials	3	1	0	3
13	AJ8351	Automobile engineering	3	1	0	3
14	AJ8352	Robotics	3	1	0	3
15	AJ8353	Gas dynamics	3	1	0	3
16	AJ8354	Unconventional machining processes	3	1	0	3
17	AJ8355	Computational fluid dynamics	3	1	0	3
18	AJ8356	Production planning and control	3	1	0	3

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LIST OF SUBJECTS WITH CODE

Sl.No.	Code	Subject	L	T	P	C
1	AJ1301	Engineering mechanics-I	4	1	0	3
2	AJ2302	Engineering mechanics-II	3	1	0	4
3	AJ2303	Engineering graphics	2	0	4	4
4	AJ1304	Engineering graphics-I	2	0	4	4
5	AJ2305	Engineering graphics-II	3	0	4	4
6	AJ2306	Engineering workshop	0	0	3	2
7	AJ2307	Engineering workshop & IT workshop	0	0	3	2
8	AJ3308	Thermodynamics	3	1	0	3
9	AJ3309	Mechanics of solids	4	1	0	4
10	AJ3310	Mechanics of solids lab	0	0	3	2
11	AJ3311	Metallurgy and material science	4	0	0	4
12	AJ3312	Metallurgy and material science lab	0	0	3	2
13	AJ3313	Production technology	4	0	0	4
14	AJ3314	Production technology alb	0	0	3	2
15	AJ4315	Thermal engineering-I	4	1	0	4
16	AJ4316	Mechanics of fluids & hydraulic machines	4	1	0	4
17	AJ4317	Mechanics of fluids & hydraulic machines lab	0	0	3	2
18	AJ4318	Machine drawing practice	0	0	3	2
19	AJ5319	Thermal engineering-II	4	1	0	4
20	AJ5320	Thermal engineering lab	0	0	3	2
21	AJ5321	Kinematics of machinery	4	1	0	4
22	AJ5322	Machine tools	4	0	0	4
23	AJ5323	Machine tools lab	0	0	3	2
24	AJ6324	Heat transfer	4	1	0	4
25	AJ6325	Heat transfer lab	0	0	3	2
26	AJ6326	Dynamics of machinery	4	1	0	4
27	AJ6327	Design of machine elements	4	1	0	4
28	AJ6328	Production drawing practice	0	0	3	2
29	AJ6329	Product design lab	0	0	3	2
30	AJ7330	Metrology and Instrumentation	4	1	0	4
31	AJ7331	Metrology and Instrumentation	0	0	3	2
32	AJ7332	CAD/CAM	4	1	0	4
33	AJ7333	CAD/CAM Lab	0	0	3	2

B.TECH
I YEAR
I & II SEMESTER
SYLLABUS

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
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(AJ1001) MATHEMATICS-I

I Yr. I Sem: Common to all branches **L T P C**
3 1 0 4

Course Objective:

The main aim of teaching Engineering Mathematics-I is to emphasize the relevance of fundamentals and applications of Mathematics in Engineering field. Mathematics is the basic of all branches of modern business and science and technology. It deals with using the constructive results of mathematics to solve a problem in applied science or Engineering field.

It helps the students in choosing a technique that improve the quality and efficiency of actual computation.

UNIT–I:

Ordinary differential equations of first order:
Formation of differential equations**,** solution of differential equations of First order and First degree. Exact differential equations, Non exact differential equations, Bernouli's Differential equations, Orthogonal Trajectories.

UNIT-II:

Ordinary linear differential equations of higher order:
Homogenous, Non Homogenous linear differential equations of higher order of the form e^{ax}, Sinax, Cosax, Polynomials in x, e^{ax} v(x), x^k v(x), Method of variation of parameters.

UNIT – III:

Differential calculus:
Rolle's Mean Value theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Theorem (without proof). Jacobian, Maxima and Minima of functions of two variables.

UNIT – IV:

Improper integration and multiple integrals:
Multiple integrals - Double & Triple integrals. Change of variables and Change of order of integration.

UNIT – V:

Laplace Transformation:
Laplace transform - Inverse Laplace transform - properties of Laplace transforms - Laplace transforms of unit step function, impulse function & periodic function, convolution theorem (without proof), applications of ordinary differential equations.

Learning Outcomes:

1. By learning the first order differential equations student can able to find the solutions of many applications in engineering field.
2. By studying the higher order differential equation many of the transcendental equations are solvable very easily.
3. By studying the mean value theorems student can find roots of the algebraic and transcendental equations.
4. By studying the applications of integration the student able to study find area, surface and volume of a revolution.
5. The students understand how to find the solution of initial and boundary value problem without finding general solution by Laplace technique.

Recommended Text Books:

1. R. K. Jain and S. R. K. Iyengar: Advanced Engineering Mathematics, Narosa Publishing House, 2008
2. B. S. Grewal: Higher Engineering Mathematics, Khanna Publications, 2009.

Reference Book:

1. Erwyn Kreyszig : Advanced Engineering Mathematics, John Wiley and Sons, 8th Edition.
2. T. K. V. Iyengar: Engineering Mathematics-I, S. Chand and Company.
3. A textbook of Engineering Mathematics Vol-I by P.B.Bhaskara Rao, S.K.V.S. Rama chary.
4. A textbook of Engineering Mathematics Vol-I by C. Shankaraiah, VGS Book Link.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
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(AJ1013) ENGLISH

I year B. Tech. I Sem common to all branches **L T P C**
3 0 0 3

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

Course Objectives:

To improve the language proficiency of the students in English with emphasis on LSRW skills.

To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.

To develop the study skills and communication skills in formal and informal situations.

SYLLABUS:

Listening Skills:

Objectives

To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation

To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

Listening for general content

Listening to fill up information

Intensive listening

Listening for specific information

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from all the **six** units of the prescribed text: ***Skills Annexe: Functional English for Success*.)**
- Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

To develop an awareness in the students about the significance of silent reading and comprehension.

To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

Skimming the text

Understanding the gist of an argument

Identifying the topic sentence

Inferring lexical and contextual meaning

Understanding discourse features

Scanning

Recognizing coherence/sequencing of sentences

NOTE : *The students will be trained in reading skills using the prescribed text for detailed study.*

They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives:

To develop an awareness in the students about writing as an exact and formal skill

To equip them with the components of different forms of writing, beginning with the lower order ones. Writing sentences

Use of appropriate vocabulary Paragraph writing

Coherence and cohesiveness

Narration / description

Note Making

Formal and informal letter writing

Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

For Detailed study

First Textbook entitled **"*Skills Annexe -Functional English for Success*",** Published by Orient Black Swan, Hyderabad

The Second Textbook entitled **"*Epitome of Wisdom*",** published by Maruthi Publications, Hyderabad.

The course content and study material is divided into **Five Units.**

Unit – I:

Importance of communication in English-Globalisation-changing trends-barriers to communication

Unit –II:

Chapter entitled '***Wit and Humour****'* from 'Skills Annexe' -Functional English to Success Published by Orient Black Swan, Hyderabad

Chapter entitled **'*Mokshagundam Visvesvaraya'*** from *"Epitome of Wisdom",* Published by Maruthi Publications, Hyderabad.

and

G-Types of Nouns and Pronouns

V- Homonyms, homophones synonyms, antonyms

Unit –III

Chapter entitled "***Advances in Science and Technology"*** from "***Skills Annexe - Functional English for Success***" Published by Orient Black Swan, Hyderabad.

Chapter entitled **'*Three days To See'*** from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad.

and

G- Verb forms

V- Noun, verb, adjective and adverb

Unit –IV

Chapter entitled **'*Risk Management'*** from **"*Skills Annexe -Functional English for Success*"** Published by Orient Black Swan, Hyderabad.

Chapter entitled **'*Leela's Friend'*** by R.K. Narayan from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad.

and

G – Present tense

V – Synonyms and Antonyms

Unit –V

Chapter entitled '***Human Values and Professional Ethics'*** from "***Skills Annexe - Functional English for Success"*** Published by Orient Black Swan, Hyderabad.

Chapter entitled ***'The Last Leaf'*** from ***"Epitome of Wisdom",*** Published by Maruthi Publications, Hyderabad.

and

G- Past and future tenses

V- Vocabulary - idioms and Phrasal verbs

* Exercises from the texts not prescribed shall also be used for classroom tasks.

Course Outcomes

Usage of correct English Language, written and spoken Enrichment of comprehension and fluency

Gaining confidence in using language in varied situations

Suggested Reading:

1. ***Contemporary English Grammar Structures and Composition*** by David Green, MacMillan Publishers, New Delhi. 2010.
2. **Innovate with English: A Course in English for Engineering Students,** edited by T Samson, Foundation Books.
3. English for Employability-**K. Purushotham, Orient Blackswan** (with CD).
4. Listening & Speaking Skills **Book I and Book II, Cambridge Publishers** (with CD's).
5. English Grammar Practice**, Raj N Bakshi, Orient Longman.**
6. **Technical Communication** by Daniel Riordan. 2011. **Cengage Publications. New Delhi.**
7. **Effective English, edited** by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by **Pearson**
8. Handbook of English Grammar and Usage**, Mark Lester and Larry Beason, Tata Mc Graw –Hill.**
9. Spoken English**, R.K. Bansal & JB Harrison, Orient Longman.**
10. Technical Communication, **Meenakshi Raman, Oxford University Press**
11. Objective English **Edgar Thorpe & Showick Thorpe**, **Pearson Education**
12. Grammar Games**, Renuvolcuri Mario, Cambridge University Press.**
13. Everyday Dialogues in English**, Robert J. Dixson, Prentice Hall India Pvt Ltd.,**
14. ABC of Common Errors **Nigel D Turton, Mac Millan Publishers.**
15. Basic Vocabulary **Edgar Thorpe & Showick Thorpe**, **Pearson Education**
16. Effective Technical Communication**, M Ashraf Rizvi, Tata Mc Graw –Hill.**
17. An Interactive Grammar of Modern English, **Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO**
18. A Communicative Grammar of English, **Geoffrey Leech, Jan Svartvik, Pearson Education**
19. Enrich your English, **Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,**
20. A Grammar Book for You And I, **C. Edward Good, MacMillan Publishers.**
21. Practical English Usage **(ELBS) Michael Swan.**
22. Examine Your English – **Margaret Maison.**
23. The Parts of Speech: **Prof. P. Satyanarayana, P.C. Ray Publications,** Warangal, 2003.
24. The Tense: **Prof. P. Satyanarayana, P.C. Ray Publications,** Warangal 2003

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
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(AJ1010) ENGINEERING CHEMISTRY

	L	T	P	C
I Year B. Tech. I-SEM CIVIL, MECH. & EEE				
II-SEM ECE & CSE	**3**	**0**	**0**	**3**

Course Objectives:

The purpose of these courses is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering. Thus, the courses have been conceived in such a way that they take into account appropriate combinations of old and new emerging concepts in the chemical sciences area and their current and potential uses in engineering. The Courses attempt to address the principles of general chemistry and specific topics relevant to various engineering disciplines, wherein the students can apply this learning in their respective areas of expertise.

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of their profession and that therefore they must have a good understanding of chemistry before they can use it in their profession.

UNIT- 1:
Electro Chemistry
Ohm's law, conductance, specific, equivalent and molar conductance, units and their relation. Numerical Problems. EMF: Electrochemical and Electrolytic cells, Galvanic cell, Electro chemical series, measurement of emf and single electrode potential, Nernst's equation and its applications,

UNIT- 2:
Electrodes and Battery Chemistry
Introduction, Types of electrodes: Reference electrodes (SHE, SCE and QH). Determination of PH. Numerical Problems. Batteries: Primary cells-Dry cell, Secondary cells - Pb-Acid storage cell, Fuel cells- Hydrogen-Oxygen fuel cell.

UNIT–3:
Corrosion and Its control
Introduction, Causes of corrosion, Types of corrosion- Dry and Wet corrosion (Galvanic & concentration). Factors affecting on corrosion, Corrosion controlling methods- Cathodic protection and Surface coatings (anodic and Cathodic), Methods of applications of metal coatings- Hot dipping and electroplating.

UNIT-4:
Polymer Chemistry

Introduction, Functionality of Monomers, classification of polymers, Types of polymerization, Mechanism of polymerization: Chain and step. Plastics: Chemistry of Thermoplastic resins (PE, PVC & PS) and thermosetting resins (Nylon & Bakelite).

UNIT – 5:

Water Chemistry

Introduction, Types of hardness, units and Numerical problems, Estimation of hardness of water-EDTA method. Boiler Troubles, caustic embrittlement & Boiler corrosion. Treatment of Boiler feed water- Zeolite and Ion-exchange process.

Course Outcomes:

- Applications of electrochemistry understanding different types of cells, their representation, knowledge of electrode potentials, utilization of electrical energy and its conversation into different energies.
- Applicability of electrodes in different fields of analysis.
- Understanding the utility of batteries as a source of energy in many electronic gadgets & their types.
- Enhancement of power generation by making of fuel cells. Knowledge of need for alternate source of energy.
- Deterioration of metal under the influence of environment, Mechanism of corrosion, Factors affecting corrosion, Prevention of corrosion using various methods & A basic knowledge of surface coatings.
- Improving the properties of plastics by various additives, Integral role of various polymers in our life style & Applicability of plastic in automobile and textile industry.
- Knowledge of hardness of water and its effects, Industrial utility of water especially for steam generation, Removal Methodologies of hardness.

Text Books:

1. Text Book of Engineering Chemistry by C. Parameshwara Murthy. B.S. Publications
2. Text Book of Engineering Chemistry by Y. Bharathi kumari and Jyotsna Cherikuri, VGS Publications.
3. Text Book of Engineering Chemistry by Shashi Chawla
4. Text Book of Engineering Chemistry by B. Ramadevi & Ch. Venkata Ramana Reddy, CENGAGE Learning 2012.

Reference Books:

1. Elementary principles of Physical Chemistry by P.W. Atkins, Oxford University Press.
2. Physical Chemistry by Puri & Sharma
3. Engineering Chemistry by Jain & Jain
4. Engineering Chemistry by Shashi Chawla.
5. Polymer Chemistry by Gourikar.
6. Physical Chemistry Glastone.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ1301) **ENGINEERING MECHANICS-I**

I-Year I-Sem: Mech & Civil	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

COURSE OBJECTIVES:

1. Understand the basic principles of static's applicable to rigid bodies in equilibrium
2. Apply static principles to the solution of a variety of practical problems.
3. Determine the centre of gravity of Simple figures, composite figures and its applications
4. Determine the Moment of inertia of Simple figures, composite figures and its applications
5. Determine mass moment of inertia of simple objects, composite bodies.
6. Determine the Frictional Forces when the bodies are under motion.

UNIT – I

Introduction to Engineering Mechanics – Basic Concepts.

Resultants of Force System: Parallelogram law –Forces and components- Resultant of coplanar Concurrent Forces – Moment of Force -principle of moments – Coplanar Applications – Couples -Resultant of any Force System.

UNIT – II

Equilibrium of Force Systems : Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems .

UNIT – III

FRICTION: Introduction – Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions –Motion of Bodies: Screw, Screw-jack and Differential Screw-jack. **Transmission of Power**: Flat Belt Drives - Types of Flat Belt Drives – Length of Belt, tensions, Tight side, Slack Side, Initial and Centrifugal – Power Transmitted and Condition for Max. Power.

UNIT – IV

CENTROIDS AND CENTERS OF GRAVITY: Introduction – Centroid and Centre of gravity of simple figures (from basic principles) – Centroid of Composite Figures – Center of gravity of bodies and centroid of volumes.

UNIT – V

Moments of Inertia : Definition – Polar Moment of Inertia –Radius of gyration - Transfer formula for moment of inertia - Moments of Inertia for Composite areas - 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.

TEXT BOOKS:

1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International Publishers
2. Engineering Mechanics - Statics and Dynamics by Ferdinand.L. Singer / Harper International Edition.
3. Engineering Mechanics/ S. Timoshenko and D.H. Young / Mc Graw Hill Book Company.

REFERENCES:

1. Engineering Mechanics / Irving Shames / Prentice Hall
2. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

COURSE OUTCOMES:

The students will be able to

1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ1304)ENGINEERING GRAPHICS –I

I Year I –Sem: Mechanical, Civil **L T P C**
3 0 4 4

COURSE OBJECSTIVES:

1. Use various engineering drawing instruments.
2. Learn the basic conventions of drawings, dimensioning, scales and conic sections like ellipse, parabola and hyperbola.
3. Learn projections of points, lines viewed in different positions
4. Learn projections of plane surfaces and solids viewed in different positions.
5. Gain knowledge of sections of solids and their usage in real time applications.

UNIT-I

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and– Various Drawing instruments – Conventions in Drawing – Lettering Practice – BIS Conventions.
Curves: Constructions of Curves used in Engineering Practice:
a) Conic Sections – General method only.
b) Cycloid. Epicycloid and Hypocycloid
c) Involute
d) Scales: Constructions of different types of Scales, Plain, Diagonal, Vernier scale.

UNIT- II

ORTHOGRAPHIC PROJECTIONS IN FIRST ANGLE PROJECTION:
IN FIRST ANGLE PROJECTION: Principles of Orthographic Projections – Conventions – First and Third Angle . Projections of points
PROJECTIONS OF LINES: Parallel, Perpendicular inclined to one plane and inclined to both planes. True lengths. traces.

UNIT - III

PROJECTIONS OF PLANES: Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference planes.

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of regular solids. Cube, prisms, pyramids, tetrahedron, cylinder, Cylinder and cone, axis inclined to both planes.

UNIT – V
SECTIONS AND SECTIONAL VIEWS: Right Regular Solids – Prism, Cylinder, Pyramid, cone – Auxiliary views.

TEXT BOOKS

1. Engineering Drawing – Besant, Agrawal, TMH
2. Engineering Drawing. N.D.Bhatt

REFRENCES:

1. Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd.
2. Engineering drawing – P.J.Shan S.Chand Publihers.
3. Engineering Drawing – Johle/Tata Macgraw Hill Book Publishers.
4. Engineering Drawing – M.B.Shah and B.C.Rana, pearson.
5. Engineering Drawing by K.Venu Gopal & V.Prabu Raja New Age publications.
6. Engineering Drawing by John. PHL Learning Publisher.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ1504) COMPUTER PROGRAMMING

I Year I-Sem: Mech & Civil	L/T/P	C
	3/0/0	3

Objectives:

To provide the necessary knowledge and training for step by step computer program development and to present the basic concepts in C programming language and to prepare the students to write modular and readable C Programs

Syllabus Content

UNIT-1

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

Introduction to C Language: Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

Selection Statements: if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

UNIT-2

Designing Structured Programs: Functions, basics, user defined functions, inter function communication,

Standard functions: Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

Arrays: Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT-3

Pointers: Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

UNIT-4

Strings: Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

Derived types: Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

UNIT-5

Sorting: Selection sort, Bubble sort, Insertion sort, merge sort, quick sort. **Searching: L**inear and Binary search methods.

Input and Output: Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

Text Books:

1. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
2. *C Programming & Data Structures*, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

References:

1. *C Programming & Data Structures*,E.Balagurusamy,TMH.
2. *C Programming with problem solving*, J.A. Jones & K. Harrow, dreamtech Press
3. *Programming in C* – Stephen G. Kochan, III Edition, Pearson Eductaion.
4. *C for Engineers and Scientists*, H.Cheng, Mc.Graw-Hill International Edition
5. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:

1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.
4. Designing of linear data structures stacks, queues and linked lists. Learning of different searching and sorting techniques and ability to compare differences in performances.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ1014) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

	L	T	P	C
I year B. Tech. I Sem EEE, ECE, CIVIL & MECH				
II Sem CSE	**0**	**0**	**3**	**2**

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Course Objectives:

To facilitate computer-aided multi-media instruction enabling individualized and independent language learning

To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm

To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking

To improve the fluency in spoken English and neutralize mother tongue influence

To train students to use language appropriately for interviews, group discussion and public speaking

Syllabus:

English Language Communication Skills Lab shall have two parts:

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

The following course content is prescribed for the **English Language Communication Skills Lab**

Exercise-I

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants **ICS Lab**: Ice-Breaking Activity and JAM Sessions
Intensive Practice in Articles, Prepositions, Word Formation- Prefixes & Suffixes, Synonyms & Antonyms with Software/Handouts

Exercise-II

CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.
Concord (Subject in agreement with verb) and Words Often Misspelt- Confused/Misused

Exercise-III

CALL Lab: Minimal Pairs- Word Accent and Stress Shifts- Listening Comprehension.
ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines.
Sequence of Tenses, Question Tags and One Word Substitutes.

Exercise-IV
CALL Lab: Intonation and Common Errors in
Pronunciation. **ICS Lab**: Extempore- Public Speaking
Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise-V
CALL Lab: Neutralization of Mother Tongue Influence and Conversation
Practice **ICS Lab**: Information Transfer- Oral Presentation Skills
Reading Comprehension and Job Application with Resume Preparation.

Course Outcomes:

Better Understanding of nuances of language through audio- visual experience and group activities

Neutralization of accent for intelligibility

Speaking with clarity and confidence thereby enhancing employability skills of the students

Minimum Requirement of Infrastructural Facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:
The Computer Aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.
System Requirement (Hardware Component):
Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
ii) Headphones of High Quality

2. Interactive Communication Skills (ICS) Lab :
The Interactive Communication Skills Lab: A spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system, camcorder etc.
Prescribed Lab Manual: A Manual entitled "***English Language Communication Skills (ELCS) Lab Manual- cum- Work Book****"*, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

In addition to the prescribed lab manual, all the listening and speaking activities mentioned in Text-1 and Text-2 can be conducted in the English Language Communication Skills Lab.

Suggested Software:

Macmilan Dictionary Modern English (with CD)**.**

Oxford Advanced Learners' Dictionary (with CD).

Cambridge Advanced Learners' English Dictionary with CD. Grammar Made Easy by Darling Kindersley

Punctuation Made Easy by Darling Kindersley

Clarity Pronunciation Power – Part I

Clarity Pronunciation Power – part II

Oxford Advanced Learner's Compass, 8th Edition

DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

Lingua TOEFL CBT Insider, by Dreamtech

TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press

Raman, M & Sharma, S. 2011. Technical Communication, OUP

Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

Suggested Reading:

1. Situational Enlgish, Prof. Damodar 33 situations BIE Publications (with CD)
2. Radio lessons, Prof. G. Damodar.
3. Rama Krishna Rao, A. *et al. English Language Communication Skills – A Reader cum Lab Manual Course Content and Practice.* Chennai: Anuradha Publishers
4. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories.* New Delhi: Foundation
5. *Speaking English Effectively* 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
6. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews.* Tata McGraw Hill
7. Hancock, M. 2009. *English Pronunciation in Use. Intermediate.* Cambridge: CUP
8. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
9. Hewings, M. 2009. *English Pronunciation in Use. Advanced.* Cambridge: CUP
10. Marks, J. 2009. *English Pronunciation in Use. Elementary.* Cambridge: CUP
11. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication.* New Delhi : Foundation
12. Soundararaj, Francis. 2012. *Basics of Communication in English. New Delhi: Macmillan*
13. *Spoken English* (CIEFL) in 3 volumes with 6 cassettes, OUP.
14. *English Pronouncing Dictionary* Daniel Jones Current Edition with CD.
15. *A Textbook of English Phonetics for Indian Students* by T.Balasubramanian (Macmillan)
16. *Topical Thoughts – (A Textbook of Reading and Writing Skills) Dr.P. Satyanarayana, JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES, Warangal Publications, 2013.*

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department .of the same institution.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(**UGC-AUTONOMOUS, AFFILIATED TO JNTUH**)

(AJ1505) COMPUTER PROGRAMMING LAB

I Year I-Sem: Civil & Mech.	**L/T/P**	**C**
	0/0/3	**2**

Objectives:

To provide the necessary knowledge and practical training for step by step computer program development and to apply the basic concepts in C programming language and to train the students to write modular and readable C Programs.

Syllabus Content

1.a Write a C program to find the sum of individual digits of a positive integer.

1.b 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.

1.c Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

2.a Write a C program to find the roots of a quadratic equation.

2.b Write a C program to find the factorial of a given integer.

2.c Write a C program to find the GCD (greatest common divisor) of two given

integers. 3.a Write a C program to solve Towers of Hanoi problem.

3.b Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

3.c Write a C program to find both the largest and smallest number in a list of integers.

4. Write a C program that uses functions to perform all of the following:
   - i. Reading of a matrix.
   - ii. Printing a matrix in a formatted form.
   - iii. Adding two compatible matrices to produce a result matrix
   - iv. Multiplying two compatible matrices to produce a result matrix.

5. Write a C program that uses functions to perform the following operations:
   - i. To insert a sub-string in to a given main string from a given position.
   - ii. To delete n Characters from a given position in a given string.
   - iii. Write a C program to determine if the given string is a palindrome or not.

6.a Write a C program using pointer to create a two dimensional matrix, to input values in to the matrix and to display the matrix and its transpose. Free the memory properly.

6.b Write a C program to demonstrate calling of a function (like add,subtract,multiply) using a function pointer.

7.a Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

7.b Write a C program to count the lines, words and characters in a given

text. 8.a Write a C program to generate Pascal's triangle.

8.b Write a C program to construct a pyramid of numbers.

9. Write a menu driven C program that uses functions to perform the following operations on complex numbers stored in a structure:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition of two complex numbers
   iv. Multiplication of two complex numbers

10. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Bubble sort ii) Selection sort

11. Write a C program that implements the merge sort method to sort a given list of integers in ascending order.

12. Write a C program that implements the quick sort method to sort a given list of integers in ascending order.

13. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

14.a Write a C program which copies one text file to another text file and verify the correctness.

14.b Write a C program which copies one binary file to another binary file and verify the correctness.

15.a Write a command-line C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

15.b Write a C program to display the contents of a file.

16.a Write a C program to produce reverse of the content of a text fie into another text file and verify the result.

16.b Write a C program to merge two text files into a third text file (i.e., the contents of the first file followed by those of the second are put in the third file) and verify the correctness.

Text Books:

1. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press.

2. *C Programming & Data Structures*, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

References:

1. *C& Data structures* – P. Padmanabham, Third Edition, B.S. Publications.
2. *C& Data structures* – E V Prasad and N B Venkateswarlu, S.Chand&Co.
3. *C Programming & Data Structures*,E.Balagurusamy,TMH.
4. *C Programming with problem solving*, J.A. Jones & K. Harrow, dreamtech Press
5. *Programming in C* – Stephen G. Kochan, III Edition, Pearson Eductaion.
6. *C for Engineers and Scientists*, H.Cheng, Mc.Graw-Hill International Edition
7. *Data Structures using C* – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
8. *The C Programming Language*, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:

1. Understanding the fundamentals of C programming.
2. Learning of sequencing, branching, looping and decision making statements to solve scientific and engineering problems.
3. Implementing different operations on arrays and creating and using of functions to solve problems.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2002) MATHEMATICS-II

I Yr. II Sem: Common to all branches **L T P C**
3 1 0 4

Course Objective:

The main aim of this subject is to improve the mathematical knowledge of the student. When the student study the mathematics-II he should get the impression that mathematics is a systematic science of practical importance, resting on a relatively small number of basic concepts and involving powerful unifying methods. He should soon convince himself of the necessity for applying mathematical procedures to engineering problem.

By studying the mathematics the students translating the given physical information into mathematical model. This model may be a differential equation, a system of equation or some other mathematical expression.

Unit-I :

Solution of Linear System:

Matrix and types of Matrices Elementary row and column operations on a matrix, Rank of matrix –Echelon and Normal form, Linear dependence and independence of vectors, solutions of systems of linear equations using elementary operations.

Unit-II:

Eigen values and Eigen vectors:

Eigen values and Eigen vectors of a matrix and their properties, Cayley-Hamillton theorem and its applications, Complex matrices-Hermitian, Skew-Hermitian and Unitary matrices.

Unit – III:

Fourier series:

Determination of Fourier Coefficients, Even and Odd functions, Half Range Fourier Sine and Cosine expansions Fourier series in an arbitrary interval.

Unit - IV:

Vector Calculus:

Scalar and Vector fields; directional derivatives - Gradient of scalar field, Divergence and Curl of a vector field -Vector integration: Green’s theorem, Gauss Divergence theorem, Stoke’s theorem (without proof).

Unit – V:

Partial differential equation:

Formation of partial differential Equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear and
non-linear Equations. Method of separation of variables.

Learning Outcomes:

1. The student learns about the rank of the matrix and solving of system of simultaneous linear equations.
2. The student learns about how to find the eigen values and eigen vectors of different engineering fields and they use concept of matrices in the development of programming languages.
3. By studying the Fourier series & Fourier transforms students are able to solve the problem related to theory of circuits and many applications in electronics engineering and communication engineering.
4. The concept of vector integrations (Green's, Gauss & Stoke's theorems), students are able to convert double integration into line integrations and triple integrations.
5. By studying the partial differential equation students are able to solve the many applications of mechanical and civil Engineering.

Recommended Text Books:

1. R.K.Jain and S.R.K.Iyengar : Advanced Engineering Mathematics, Narosa Publishing House, 2008
2. B. S. Grewal : Higher Engineering Mathematics, Khanna Publications, 2009.

Reference Book:

1. T.K.V.Iyengar:Mathematical Methods, S.Chand and Company.
2. Erwyn Kreyszig : Advanced Engineering Mathematics, John Wiley and Sons, 8th Edition.
3. A textbook of Engineering Mathematics Vol-I by P.B.Bhaskara Rao, S.K.V.S. Rama chary
4. A textbook of Engineering Mathematics Vol-I by C. Shankaraiah, VGS Book Link

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2008) ENGINEERING PHYSICS

I Year B. Tech. II Sem: ECE, CSE, EEE, MECH & CIVIL **L T P C**
3 1 0 3

Objectives:

Physics is the mother of engineering and technology. Without the applications of concepts of physics there can be no technological developments. Hence physics is the foundation on which stands the elaborate structure of technology. The main purpose of teaching physics to engineering under graduates is to acquaint the budding engineers with a thread of development. The aim of Physics is to provide an adequate exposure and develop insight about the basic principles of physics along with the engineering applications. The acquaintance of basic physics principles would help the engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.

UNIT-I:

Crystallography, Crystal Structures & Band Theory of Solids:

Crystallography & Crystal Structures: Crystal planes & crystal directions, Miller indices, Inter-planar spacing of orthogonal crystal systems. Atomic radius, Co-ordination number and packing fraction of S.C.C., B.C.C & F.C.C., Crystal structure of diamond.

Band theory of solids: Schrodinger time independent wave equation and significance of wave function. Electrons in a periodic potential, Bloch theorem, Kronig-Penny model (Qualitative treatment), E-k curve, Origin of band formation in solids, Classification of materials into conductors, semi conductors and insulators.

UNIT-II:

Semi-conductor Physics & Semi-conductor Devices.

Semi-conductor Physics: Calculation of carrier concentration in intrinsic semiconductors and extrinsic semi conductors (N-type), Direct and Indirect band gap semi conductors, Hall effect & its applications.

Semi-conductor devices: Energy diagram of P-N diode, I-V characteristics of P-N junction diode, LED, photo diode & solar cell.

UNIT-III:

Dielectrics & Magnetic Materials

Dielectrics: Electric dipoles, Dipole moment, Polarizability, Electric susceptibility, Displacement vector, Electronic, ionic and orientational polarizations and calculations of electronic and ionic polarizabilities, Internal fields in solids, Piezo-electricity, Ferro electricity & Pyro electricity (elements only).

Magnetic materials: Origin of magnetic moment, Bohr magneton, Classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve, Soft and hard magnetic materials , Properties of anti-ferro and ferri magnetic materials and their applications in engineering.

UNIT-IV:

Lasers & Fibre Optics

Lasers: Characteristics of lasers, Spontaneous and stimulated emission of radiation, Einstein's coefficients (qualitative treatment), Population inversion, Lasing action. Semi conductor diode laser (homo-junction), Applications of lasers in engineering and medicine.

Fibre Optics: Acceptance angle and acceptance cone, Numerical aperture, Step index and graded index fibres, Applications of optical fibres in communication systems.

UNIT-V:

Super-conductivity & Nano Science

Super-conductivity: Zero resistance, Critical temperature, Perfect dia-magnetism, Meissner effect, Critical field (H_C), Type-I & Type -II super conductors, Applications of super conducting magnets.

Nano Science: Nano scale, Surface to volume ratio, Quantum confinement, Top-down method: Bottom-up fabrication, sol-gel method, chemical vapour deposition method, Characterization by SEM (Principles) - Applications.

Learning Outcomes:

1. The student learns about crystalline materials and their structures.
2. The student learns about classification of solids by band theory.
3. The student learns how to calculate number of charge carriers in a semi conductor.
4. The student learns about fabrication of semi conductors into devices.
5. The student learns about dielectrics and magnetic materials along with their engineering applications.
6. The student learns about lasers, their construction and applications in engineering field.
7. The student learns about super conductors, classifications and their applications.
8. The student learns about nano materials and their fabrication methods along with their characterisation by XRD & SEM.

Recommended Text Bbooks:

1. Engineering Physics, P.K Palanisamy, Scitech Publications
2. Engineering Physics, V. Rajandran, Tat Mc. Graw Hill Book Publishers.
3. A Text Book of Engg Physics – M. N. Avadhanulu & P. G. Khsirsagar, S. Chand & Co. (for acoustics).
4. Applied Physics for Engineers – P. Madhusudana Rao, Academic Publishing Company, 2013.

Reference Books:

1. Solid State Physics – M.Armugam, Anuradha Publications.
2. Modern Physics – R. Murugeshan & K. Siva Prasath, S. Chand & Co. (for Statistical Mechnaics).
3. Introduction to Solid State Physics, C. Kittel (Wiley Eastern).
4. Solid State Physics, A.J. Dekker (Macmillan).
5. Applied Physics, Mani Naidu Pearson Edition.
6. Engineering Physics, K. Vijay Kumar, T. Sreekanth, S. Chand Publications.
7. Engineering Physics, D.K. Bhattacharya, Poonam Tandon, Oxford University Press

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2302) ENGINEERING MECHANICS-II

I-Year II-Sem: Civil, Mech

L	T	P	C
4	1	0	4

COURSE OBJECTIVES:

1. Determine the internal forces in plane trusses.
2. Know the applications of trusses to cantilever and simply supported trusses.
3. Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of references.
4. Apply work, energy, relationships for a particle in motion.
5. Apply impulse and momentum relationships for a particle in motion.
6. Describe the motion of a rigid body in different frames of reference.

UNIT-I

ANALYSIS OF PERFECT FRAMES: Analytical Method-Types of frames-Assumption for forces in members of a perfect frame. Method of Joints, Method of sections, Force Table, Cantilever Trusses, Structure with one end hinged & other freely supported on rollers carrying Horizontal & inclined loads.

UNIT-II

KINEMATICS OF A PARTICLE: Motion of a particle – Rectilinear motion – motion curves – Rectangular components of curvilinear motion– Kinematics of Rigid Body - Types of rigid body motion -Angular motion - Fixed Axis Rotation.

UNIT-III

KINETICS OF A PARTICLES: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of plane motion - Angular motion - Fixed Axis Rotation – Rolling Bodies.

UNIT-IV

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

UNIT-V

Mechanical Vibrations : Definitions and Concepts – Simple Harmonic Motion – Free vibrations, simple and Compound Pendulums – Torsion Pendulum – Free vibrations without damping: General cases.

TEXT BOOKS:

1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International Publishers
2. Engineering Mechanics - Statics and Dynamics by Ferdinand.L. Singer / Harper International Edition.
3. Engineering Mechanics/ S. Timoshenko and D.H. Young / Mc Graw Hill Book Company.

REFERENCES:

1. Engineering Mechanics / Irving Shames / Prentice Hall
2. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

COURSE OUTCOMES:

The students will be able to

1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
3. Use references that provide tabulated physical data that are useful for mechanical engineers.
4. Deal the subjects like Mechanics of Solids, Mechanics of Fluids and Design of machines etc. in higher classes with an ease.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2305) ENGINEERING GRAPHICS –II

I Year II–Sem: Mechanical, Civil **L T P C**
3 0 4 4

COURSE OBJECSTIVES:
1. Development of Surfaces is Most useful of real time applications of in industry.
2. Gain knowledge of sections of solids and their usage in real time applications.
3. Attain the concepts of isometric, orthographic projections

UNIT – I

DEVELOPMENT OF SURFACES: Development of Surfaces of Right, Regular Solids – Prisms, Cylinder, Pyramids, cone and their parts. Frustum of solids. [16]

UNIT – II

INTERSECTION OF SOLIDS:- Intersection of Cylinder Vs Cylinder, Prism Vs Prism, Cylinder Vs Prism, Cylinder Vs Cone. [16]

UNIT – III

ISOMETRIC PROJECTIONS: Principles of isometric Projection – Isometric Scale – Isometric Views – conventions –Isometric views of lines, Plane Figure, Simple and Compound Solids – Isometric Projection of objects having non – isometric lines, isometric projection of Spherical Parts. [16]

UNIT – IV

TRANSFORMATION OF PROJECTIONS: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views to isometric views – simple objects. [14]

UNIT – V

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines and Plane Figure, Vanishing Point Methods (General Method only).
Introduction to AutoCAD: Draw lines, curves, plane geometries using AutoCAD commands. [16]

TEXT BOOKS

1. Engineering Drawing. N.D.Bhatt

REFRENCES:

1. Engineering Drawing – Besant, Agrawal, TMH
2. Engineering Drawing by K.Venu Gopal & V.Prabu Raja New Age publications.
3. Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2508) OBJECT ORIENTED PROGRMMING & DATA STRUCTURES

I Year II-Sem: Civil & Mech	**L/T/P**	**C**
	3/0/0	**3**

Objectives:

To provide a comprehensive working knowledge on the object oriented language C++ and to implement abstract data types, linear and nonlinear data structures for problem solving. To provide a foundation on generic programming based on over loading concepts, inheritance and virtuality. To inculcate ability to grasp the behaviour of data structures such as stacks, queues, trees, hash tables, search trees, graphs and their representation and to apply them in problem solving. To provide a working knowledge on searching and sorting techniques and to write programs to solve problems on arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Syllabus Content

UNIT-1

C++ Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling. Function Over Loading, Operator Overloading,

UNIT-2

Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

UNIT-3

Basic data structures- The list ADT, Stack ADT, Queue ADT, Implementation using template classes in C++. Linked list operations insertion, deletion and searching. Hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

UNIT-4

Search Trees: Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations _ Insertion, Deletion and Searching. Trees definitions, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching.

UNIT-5

Graphs: Basic terminology, representations of graphs, graph search methods DFS, BFS, Suffix tries.

Text Books:

1. *Object oriented programming with C++, E. Balagurusamy*, Cengage Learning ,Tata McGraw Hill Education ,3rd Edition.
2. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
3. Classic Data structures by Samantha, PHI Learning Pvt.Ltd,2nd Edition.

References:

1. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek,Cengage Learning.
4. Data Structures Using C++, D.s. Malik,Cengage Learning, India Edition.
5. Mastering Algorithms with C,K.Loudon,O'Reilly,SPD PVT.Ltd.
6. An introduction to Data structures and algorithms, J.A.Storer,Springer.
7. *Data Structures: A Pseudocode Approach with C++*, Richard F Gilberg, Behrouz A Forouzan, Cengage Learning
8. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.

CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.

CO-4: An ability to communicate effectively, both in writing and oral.

CO-5: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:

1. Understanding of fundamental concepts of abstract data types and general standard data structures.
2. Ability to design linear data structures stacks, queues and linked lists.
3. Ability to design nonlinear data structures, trees and graphs, and to implement their operations.
4. Ability to implement different searching and sorting techniques.
5. Ability to apply different searching and sorting techniques for real world problems..

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2307) ENGINEERING WORKSHOP/IT WORKSHOP

I Year I-Sem EEE
I Year II-Sem Civil, Mechanical, ECE **L T P C**
0 0 3 2

COURSE OBJECSTIVES:
1. Know the usage of various tools and their application in carpentry, tin smithy.
2. Know the usage of various tools and their application in black smithy, foundry, welding and house wiring.
3. Make lap joint and dove tail joint in carpentry.
4. Make scoop, funnel and tray like items in tin smithy.
5. Use one – way, two-way switches, parallel and series connections in house wiring.
6. Know the basics of welding.

UNIT – I

TRADES FOR EXERCISES: (Any ten exercises are required to perform from the following trades) [10]

1. Carpentry	2
2. Fitting	2
3. Tin – Smithy	2
4. Black Smithy	1
5. House – wiring	2
6. Plumbing	1

UNIT - II

TRADES FOR DEMONSTRATION & EXPOSURE **[1]**
1. Demonstration of Power tools
2. Welding.

UNIT – III **[5]**

IT WORKSHOP I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.

IT WORKSHOP II: Installation of operating system windows and Linux simple diagnostic exercises.

TEXTBOOKS:

1. Workshop Manual – P.Kannaiah / K.L.Narayana/Scitech Publishers.
2. Workshop Manual – Venkat Reddy/BS Publication / 6th Edition.

COURSE OUTCOMES:

The students will be able to

1. Know the fundamental knowledge of various trades and their usage in real time applications.
2. Gain knowledge of Welding, Black smithy, Fitting and house wiring.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2010) PHYSICAL SCIENCES LAB

I Year B. Tech. II-Sem : CIVIL, MECH & EEE

L	T	P	C
0	0	3	2

OBJECTIVES:

This Course *On Engineering* Physics /chemistryLab Designed With12 Experiments In An Academic Year The Objective Of Course Is That The Student Will Have Exposure To Various Experimental Skills Which Is Very Essential For An Engineering Student The Experiments Are Selected From Various Areas Of Physics and chemistry Like Physical Optics, Lasers, Fiber Optics, Electricity And Basic Electronics, conductometry, potentiometry, etc..Also The Students Is Exposed To Various Tools Like Screw Gauge, Vernier Callipers, Physical Balance, Spectrometer And Microscope, viscometer, stalagmometer, etc…

ENGINEERIG PHYSICS

1. Determination of energy gap of semiconductor material of p-n junction diode
2. Determination of frequency of electrical vibrator by using Melde's experiment
3. Determination of wavelength of LASER by using diffraction grating
4. Determination of rigidity modulus of given wire using Torsional pendulum
5. R-C circuit analysis
6. Determination of Numerical aperture of given optical fiber

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Laboratory Manual:

1 .Laboratory Manual Of Engineering Physics By Dr. Y.Aparna And Dr K. Venkateswara Rao (V.G.S Publishers)

ENGINEERING CHEMTSTRY

1) Estimation of ferrous iron by dichrometry.
2) Estimation of hardness of water by EDTA method.
3) Conduct metric titration of strong acid vs. strong base
4) Titration of strong acid vs. strong base by potentiometry.
5) Determination of viscosity of sample oil by Ostwald's viscometer.
6) Determination of Surface tension of lubricants.

TEXT BOOKS:

1) Practical Engineering Chemistry by K. Mukkanti, etal' B'S' Publications, HYderabad.
2) lnorganic quantitative analysis, Vogel'

REFERENCE BOOKS:

1) Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel, Ane Books Private Ltd.,
2) A text book on experiments and calculation Engg. S.S. Dara'
   lnstrumental methods of chemical analysis, chatwal, Anand, Himalaya Publications

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ2509) OBJECT ORIENTED PROGRMMING & DATA STRUCTURES LAB

I Year II-Sem: Civil & Mech	**L/T/P**	**C**
	0/0/3	**2**

Objectives:

To provide a comprehensive working knowledge on the object oriented language C++ and to provide implementation experience on abstract data types, linear and nonlinear data structures for problem solving. To provide a working knowledge on generic programming based on over loading concepts, inheritance and virtuality. To inculcate ability to grasp the behaviour of data structures such as stacks, queues, trees, hash tables, search trees, graphs and their representation and to apply them in problem solving. To provide an application oriented working knowledge on searching and sorting techniques and to write programs to solve problems on arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

Syllabus Content

1. Write a C++ program to demonstrate class.
2. Write a C++ program on constructor.
3. Write a C++ program on inline functions.
4. Write a C++ program on this pointer.
5. Write a C++ program on function overloading.
6. Write a C++ program on operator overloading.
7. Write a C++ program that illustrates how run time polymorphism is achieved.
8. Write a C++ program on Multiple inheritance.
9. Write a C++ program to implement all the functions of a dictionary ADT.
10. Write a C++ program for single linked list operations.
11. Write a C++ program for hashing with quadratic programming.
12. C++ programs using class templates to implement the following using an array.
    a) Stack ADT b) Queue ADT
13. Write C++ programs using class templates to implement the following using a singly linked list.
    a) Stack ADT b) Queue ADT
14. Write C++ programs, using class templates, that use non-recursive functions to traverse the given binary tree in
    a) preorder b) inorder c) postorder.
15. Write C++ programs, using class templates, that use recursive functions to traverse the given binary tree in
    a) preorder b) inorder c) postorder.
16. Write a C++ program using class templates to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.

17. Write C++ programs using class templates for the implementation of bfs and dfs for a given graph.

Text Books:

1. *Object oriented programming with C++, E. Balagurusamy,* Cengage Learning ,Tata McGraw Hill Education ,3rd Edition.
2. Data structures a pseudo code approach with c++, Indian edition, R.F.Gilberg and B.A.Forouzan Cengage Learning.
3. Programming Prinicples and Practice using C++, B.Stroustrup, Addition-Wiesly (Pearson Education)
4. Data Structures and STL,W.J.Collins,mc Graw Hill,Internationational Edition.
5. Data Structures and Algorithms with OODesign patterns in C++,B.R.Priess,John Wiley &sons.
6. The Art,Philosophy and Science of OOP with C++,Rick Miller,SPD.
7. C++ for Programmers ,P.J.Deitel and H.M.Deitel,PHI/Pearson.

Course Outcomes:

CO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.
CO-2: An ability to apply knowledge of mathematics, science, and engineering to real-world problems.
CO-3: Ability to model, understand, and develop complex software for System Software as well as Application Software.
CO-4: An ability to communicate effectively, both in writing and oral.
CO-5: A recognition of the need for, and an ability to engage in life-long learning.

Learning Outcomes:

1. Understanding of fundamental concepts of abstract data types and general standard data structures.
2. Ability to design linear data structures stacks, queues and linked lists.
3. Ability to design nonlinear data structures, trees and graphs, and to implement their operations.
4. Ability to implement different searching and sorting techniques.
5. Ability to apply different searching and sorting techniques for real world problems..

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B.TECH
II YEAR
I & II SEMESTER
SYLLABUS

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3005) PROBABILITY & STATISTICS

B.Tech II Year I Sem : MECH

L	T	P	C
3	1	0	3

Course Objective:

The main purpose of teaching Probability and Statistics is to develop the knowledge of the student. In the syllabus we concentrate on a few carefully selected basic ideas of general practical importance which are especially suitable for teaching the students probability and statistics to think and develop his own creative ability to solve engineering problem.

UNIT-I: Probability

Sample Space and events – Probabilty – The axioms of probability – Some Elementary theorems – Conditional probability – Baye's theorem.

UNIT-II: Single Random Variables and Probability Distributions.

Random variables – Discrete and continuous. Probability distributions, mass function/ density function of a probability distribution . Mathematical Expectation, Moment about origin, Central moments Moment generating function of probability distribution.

Binomial , Poisson, Normal distribution and Exponential distributions.

UNIT-III: Correlation & Regression

Covariance of two random variables, Correlation:- Coefficient of correlation, The rank correlation.

Regression: Regression Coefficient, The lines of regression and multiple correlation & regression.

UNIT-IV: Sampling Distributions and Testing of Hypothesis

Sampling: Definitions of population, sampling, statistic, parameter. types of sampling, Expected values of Sample mean and varience, sampling distribution, standard error, sampling distribution of means and sampling distribution of varience.

Parameter Estimations – Likelihood estimate, interval estimations.

Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test,

Large sample tests:

(i) Test of Equality of means of two samples equality of sample mean and population mean (cases of known varience & unknown varience, equal and unequal variances)

(ii) Tests of significance of difference between sample S.D and population S.D.

(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.

Small Sample Tests:

Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples

Snedecor's F- distribution and it's properties. Test of equality of two population variences Chi-square distribution , it's properties, Chi-square test of goodness of fit

UNIT- V: Queuing Theory :

Queuing Theory: Notation and assumption, Poisson Process, queuing models with Poisson Process input - exponential service, infinite queue-infinite source, single server model, infinite queue-infinite source, arrival theorem – pure birth process and death process M/M/1 Model, finite queue-infinite source, single server model.

TEXT BOOKS:

1) Fundamentals of Mathematical Statistics by S C Gupta and V.K.Kapoor (chapters IV&V)
2) Probability and Statistics for Engineers and Scientists by Sheldon M.Ross, academic press
3) Probability and Statistics for Engineering and the Sciences by Jay I. Devore.

REFERENCES BOOKS:

1) Mathematics for engineers series –Probability Statistics and Stochastic Process by K.B.datta and M.A. Srinivas , Cengage Publications
2) Probability, Statistics and Stochastic Process by Prof.A R K Prasad., Wiely India
3) Probability and Statistics by T.K.V.Iyengar & B.Krishna Gandhi
4) A Text Book of Probability and Statistics, Shahnaz bathul ,Cengage Learning

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3308)THERMODYNAMICS

II Year B.Tech. ME-I-Sem **L T P C**

3 1 0 3

UNIT-I

FUNDAMENTAL CONCEPTS: Units and dimensions- Introduction to SI units. System and continuum. Thermodynamic state, property, process and cycle. Intensive and extensive properties. Energy: Work and heat, Microscopic and macroscopic points of view of thermodynamics. Perfect and real gases, joule Thomson coefficient, inversion curve, Vander walls equation of state. Thermodynamic equilibrium, Zeroth law and its applications, Principles of thermometry, fixed points.

FIRST LAW OF THERMODYNAMICS: First law, applications to closed systems- internal energy – applications to open systems-Enthalpy, Steady flow energy equation and its applications. Specific heats. Processes of closed system constant volume, constant pressure, Isothermal, adiabatic and polytrophic.

UNIT-II

SECOND LAW OF THERMODYNAMICS: Limitations to first law, statements of Second law and their equivalence, Reversible and Irreversible processes. Carnot's cycle, Carnot's theorem, Thermodynamic efficiency and Temperature scales. Heat engine, Heat pump and Refrigerator.

UNIT-III

ENTROPY: Concept of entropy, Classius inequality, Entropy changes in various processes, Third law of thermodynamics.

AVAILABILITY AND IRREVERSIBILITY: Available energy, Available energy referred to a cycle, Helmholtz and Gibb's functions, Availability in steady flow, entropy equation for a flow process, irreversibility, effectiveness.

UNIT-IV

THERMODYNAMIC RELATIONS: Max-well relations, coefficient of volume expansion, isothermal compressibility factor, T-ds Equations, difference in heat capacities, ratio of heat capacities, change in internal energy, entropy and enthalpy equations.

UNIT-V

GAS POWER CYCLES: Brayton, Otto, Diesel and dual cycles- calculation of air standard efficiency and mean effective pressure, Representation of Stirling, Ericsson and Atkinson cycles on P-V and T-S diagrams.

TEXT BOOK:

1. Engineering Thermodynamics / PK Nag /TMH.
2. Engineering Thermodynamics/ E Rathakrishnan/PHI.

REFERENCE BOOKS:

1. Gupta C.P. & Prakash.R. *Engineering Thermodynamics*, Nem Chand & Brothers, Roorkee.
2. Mathur M.L and Mehta F.S, *Thermal Engineering*, Jain Brothers, New Delhi.
3. D S Kumar, *Thermal science and Engineering*, S K Kataria and sons, New Delhi

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3309)MECHANICS OF SOLIDS

II Year B.Tech. ME-I-Sem **L T P C**

4 1 0 4

UNIT-I

SIMPLE STRESS AND STRAIN: Types of Loads, Definition of Stress, Strain, Types of stresses, strains, Stress Tensor, Strain tensor, stress strain diagrams for ductile and brittle materials, Generalized Hooke's law, relation between elastic constants, Compound bars, Thermal stresses & strains.

SHEAR FORCE AND BENDING MOMENT: Types of supports, types of determinate beams simply supported, cantilever and overhang beams. Shear force and bending moment diagrams, principle of superposition.

UNIT-II

THEORY OF SIMPLE BENDING: Assumption, flexure formula, bending stresses in beams, discussion of efficiency of various cross -sections.

DEFLECTIONS OF BEAMS: Double integration method, Macaulay's method and moment area method, slope and deflection for statically determinate beams.

UNIT-III

SHEAR STRESSES IN BEAMS: Flexural shear stress distribution in various shapes of cross sections of beams

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion in solid and hollow circular shafts, Torsional shear stresses and angle of twist, transmission of power. Compound shafts, torsion of tapered shafts.

UNIT-IV

COLUMN AND STRUTS : Column and strut, Types of columns, end conditions, Euler's column Theory, different cases in Euler's Theory, Limitations of Euler's Theory, Rankine's formula

STRAIN THEORY : Strain Energy, Resistance , proof Resistance Modulus of Resistance strain energy due to gradually applied load, strain energy due to suddenly applied load , impact loading ,impact factor, strain energy due to freely falling weight , strain energy due to shear ,strain energy due to torsion ,strain energy due to bending.

UNIT-V

THIN AND THICK CYLINDERS: Cylindrical shells, distinguish between Thin cylinders and cylinders, circumferential stresses, Longitudinal stresses, Radial stresses, Thin cylinders subjected to internal pressure , Thin spherical shells. Thick cylinders, Lame's Theory for thick cylinder, stresses in compound thick cylinders.

TEXT BOOK:

1. Strength of Materials – R.S.Khurmi and Gupta.
2. E.P.Popov, *Engineering Mechanics of Solids*, Pearson Education, New Delhi

REFERENCE BOOKS:

1. F.P.Beer and E.R.Johnston,Jr., *Mechanics of Materials*, 2/e, McGraw-Hill,1992.
2. I.H.Shames and J.M.Pitarrew, *Introduction to Solid Mechanics*,3/e, , Prentice-Hall of India, New Delhi,
3. W.F.Riley and L.W. Zachary, *Introduction to Mechanics of Materials*, John Wiley

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3311) METALLURGY AND MATERIALS SCIENCE

II Year B.Tech. ME-I-Sem **L T P C**

4 0 0 4

UNIT-I

INTRODUCTION TO MATERIAL SCIENCE: Historical perspective, classification of materials, advanced materials, atomic structure and interatomic bonding, Influence on properties of materials, structures of crystalline solids, crystal structures, crystallography, planes and directions, polymorphism and allotropy. Determination of crystal structures by X-ray diffraction methods, non-crystalline solids. Introduction To Metallurgy

PROPERTIES OF MATERIALS AND TESTING: Tension test, Compression Test, hardness tests - Brinnells, Vickers, Rockwell, Superficial hardness test and micro hardness testing. Impact testing, creep test, fatigue test and fracture of materials and testing.

UNIT-II

SOLIDIFICATION PROCESS AND IMPERFECTIONS IN SOLIDS - point, line, surface and volume defects, grain size determination, role of dislocations in strengthening materials, various mechanisms of strengthening, deformation behaviors of materials, elastic deformation, plastic deformation, and time dependent deformation processes, failure of materials, Fracture, fatigue and creep concepts and their significance.

Constitution of alloys, construction and interpretation of binary equilibrium diagrams, eutectic, eutectoid, Fe-C equilibrium diagram. Isothermal transformation curves, continuous cooling curves, effect of alloying elements on microstructure. Fe-C diagram and T-T-T curves.

UNIT-III

HEAT TREATMENT OF STEEL: principles of annealing, normalizing, hardening, tempering, surface hardening and age hardening, austempering, martempering, ausforming, marforming, thermo-mechanical treatments.

STRUCTURE AND PROPERTIES OF STEELS: low, medium and high plain carbon steels, stainless steels, wear resistant steels, high speed tool steels, free cutting steels, die steels, forging quality steels, and special alloys, for high temperature and magnetic applications, Haste alloys, Nimonics, Inconel Mu-metal, permalloys, Alnicos and Kanthal.

UNIT-IV

CAST IRONS: types and production of cast irons, white cast iron, malleable cast iron, grey cast iron, nodular cast iron, their properties and uses, alloy cast-iron, Ni-hard, Ni-resist, chilled cast iron and Nitrocil Non-ferrous metals and alloys, properties and uses of Cu and Cu-alloys, Al and Al-alloys, Ni & Ni- alloys Mg & Mg-alloys and super alloys.

UNIT-V

POLYMER AND CERAMIC MATERIALS: Characteristics, applications and processing of polymers, mechanical and thermo-mechanical characteristics, polymer applications and processing, Ceramic materials and their structure, application and processing of ceramics, glasses, clay products, refractories and abrasives, composite materials, introduction to particle reinforced, fiber reinforced composites, structural composites.

TEXT BOOK:

1. Material Science and Metallurgy/kodgire.
2. V. Raghavan, *Materials Science and Engineering*, Prentice Hall of India, New Delhi

REFERENCE BOOKS:

1. Rudin, A, *The Elements of Polymer Science & Engineering,* Academic Press, New York 1982.
2. G.E. Dieter, *Mechanical Metallurgy, SI Metric Ed.*, McGraw-Hill, New York.
3. Davis, Troxell and Huck, *Testing and Inspection of Engineering Materials*, TMH, New Delhi.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3313) PRODUCTION TECHNOLOGY

II Year B.Tech. ME-I-Sem **L T P C**
4 0 0 4

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

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment.

Methods of Melting: Crucible melting and cupola operation, steel making processes, special.

UNIT-III

A) Welding: Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding.

B) Cutting of Metals: Oxy – Acetylene Gas cutting, water plasma. Cutting of ferrous, non-ferrous metals. Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT-IV

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements. Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming – Drawing and its types
– wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V

EXTRUSION OF METALS : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. **Forging processes:** Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects.

TEXT BOOKS:

1. P.N.Rao, *Manufacturing Technology*, 2/e, Tata McGraw-Hill, New Delhi, 1990.
2. Amitabha Ghosh and Ashok Kumar Mallik, *Manufacturing Science*, 4/e, Associated East West Press Pvt. Ltd., New Delhi, 1991.

REFERENCE BOOKS:

1. George E Dieter, *Mechanical Metallurgy*, McGraw-Hill, New York.
2. Roy, A. Lindberg, *Processes and Materials of Manufacture*, 5/e, Prentice Hall of India, New Delhi,
3. O P Khanna, *Welding Technology*, Dhanapat RaiPublications (P) Ltd., New Delhi
4. R S Parmar, *Welding Technology*, Khanna Publishers, New Delhi

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3310) MECHANICS OF SOLIDS LAB

II Year B.Tech. ME-I-Sem **L T P C**

0 0 3 2

List of experiments to be performed

1. Direct tension test
2. Torsion test
3. Hardness test
    a). Brinells hardness test
    b). Rockwell hardness test
4. Test on springs
5. Compression test on cube
6. Impact test
7. Punch shear test

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3312) METALLURGY AND MATERIALS SCIENCE

II Year B.Tech. ME-I-Sem **L T P C**
0 0 3 2

List of experiments

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ3313) PRODUCTION TECHNOLOGY LAB

II Year B.Tech. ME-I-Sem **L T P C**
0 0 3 2

Minimum of 12 Exercises need to be performed

I. METAL CASTING LAB:

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise -for strengths, and permeability – 1
3. Moulding Melting and Casting - 1 Exercise

II WELDING LAB:

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing – 2 Exercises (Water Plasma Device)

III MECHANICAL PRESS WORKING :

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press : Deep drawing and extrusion operation.
3. Bending and other operations

IV PROCESSING OF PLASTICS

1. Injection Moulding
2. Blow Moulding

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJMC02) Value Education, Human Rights and Legislative Procedures

II Year B.Tech. ME-I-Sem **L T P C**
2 0 0 0

Module 1: Values and Self Development-Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

Module 2: Personality and Behavior Development- Soul and scientific attitude, God and scientific attitude, Positive thinking, Integrity and discipline, Punctuality, Love and kindness, Avoiding fault finding, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering love for truth, Aware of self destructive habits, Association and cooperation, Doing best, Saving nature.

Module 3:Character and Competence- Science vs. God, Holy books vs. blind faith, Self management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of women, All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.

Module 4:Human Rights- Jurisprudence of human rights nature and definition, Universal protection of human rights, Regional protection of human rights, National level protection of human rights, Human rights and vulnerable groups.

Module 5: Legislative Procedures- Indian constitution, Philosophy, fundamental rights and duties, Legislature, Executive and Judiciary, Constitution and function of parliament, Composition of council of states and house of people, Speaker, Passing of bills, Vigilance, Lokpal and functionaries.

Text Books:

1. Chakraborty, S.K., Values and Ethics for Organizations Theory and Practice, Oxford University Press, New Delhi, 2001.
2. Kapoor, S.K., Human rights under International Law and Indian Law, Prentice Hall of India, New Delhi, 2002.
3. Basu, D.D., Indian Constitution, Oxford University Press, New Delhi, 2002.

Reference Books:

1. Frankena, W.K., Ethics, Prentice Hall of India, New Delhi, 1990.
2. Meron Theodor, Human Rights and International Law Legal Policy Issues, Vol. 1 and 2, Oxford University Press, New Delhi, 2000.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4012**) ENVIRONMENTAL STUDIES**

B.Tech II Year II-Sem: MECH **L T P C**

2 0 0 2

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations.

UNIT-I:

Ecosystems

Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

UNIT-II:

Natural Resources:

Classification of Resources, Living and Non-Living resources, water **resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:

Biodiversity And Biotic Resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waster:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

UNIT-V

Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

Course Outcomes:

After undergoing the course the student would be able to know about

1. Understanding of Ecosystem,
2. Natural resources
   Depletion of natural resources & prevention of natural resources.
3. Biodiversity
   Protection, sharing of the biodiversity.
4. Environmental pollution
   Understanding of water, soil, noise, air pollutions and their control measurements.

SUGGESTED TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagoplalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4^{th} Edition, New age international publishers.
5. Text book of Environmental Science and Technology – Dr. M. Anji Reddy 2007, BS Publications.
6. The syllabus of Environmental Studies prescribed by UGC/JNTUH is approved for adoption.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4203) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

B.Tech II Year II SEM: MECH

L	T	P	C
4	0	0	4

Course Objective:

This course introduces the concepts of basis electrical engineering parameters, quantities, analysis of AC and DC circuits, the construction operation and analysis of transformers, DC and AC machines. It also gives knowledge about operation of diode and transistor, characteristics and its applications.

UNIT- I

Electrical Circuits: Circuits concept, R-L-C Parameters, Voltage and Current sources, Source Transformation, V–I relationship for Passive elements, Kirchoff's Laws, Network reduction techniques – series, parallel, series parallel, star/delta transformations, Nodal Analysis, Mesh analysis with DC excitations.

Network Theorems - Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity Theorems with DC excitation.

UNIT- II

Single Phase AC Circuits - R.M.S. and Average values, Form Factor, steady state analysis of series, Parallel and Series parallel Combinations of R, L and C with Sinusoidal excitation, concept of reactance, Impedance, Susceptance and Admittance – phase and phase difference, Concept of Power Factor, j-notation, complex and Polar forms of representation.

UNIT- III

D.C.Machines: Constructional features, Methods of Excitation, E.M.F. Equation and Applications, Torque development in D.C motor, Characteristics of DC motors, losses, Efficiency, Swinburne's test, Speed control of DC Shunt motors

Single Phase Transformers: Construction and principle of operation, Development of No Load & On Load Phasor diagrams (Basic fundamentals only)

3-Phase Induction Motor: Constructional features, Principle of Operation (Basic fundamentals only)

UNIT- IV

P-N Junction Diode – Qualitative theory of P-N Junction, P-N Junction diode, V-I characteristic(Forward and Reverse), Temperature dependence, Ideal versus practical, Static and dynamic resistances.

Rectifiers and Filters - The P-N junction as a rectifier - A Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Filters-Inductive and Capacitive with qualitative analysis.

UNIT- V

Bipolar Junction Transistor (BJT) - Construction, Principle of Operation, CB, CE and CC configurations.

Junction Field Effect Transistor - Construction, Principle of Operation, V-I Characteristic, Comparison of BJT and FET,

Zener Diode and SCR Devices- Zener diode characteristics, Use of Zener diode as simple regulator, Breakdown Mechanisms in Zener diode, Principle of Operation of SCR.(Basic fundamentals only).

TEXT BOOKS:

1. Electronic Devices and Circuits – R.L. Boylston and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition.
3. Electrical Machines – by P.S.Bimbra

REFERENCES:

1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
2. Electronic Devices and Circuits - K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
3. Electrical Machines – by J.B.Gupta.
4. Network Theory by N.C.Jagan & C.Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

Course outcomes:

After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, and operation of the transformers in the energy conversion process, electromechanical energy conversion, construction operation characteristics of DC machines and the constructional features and also fundamental and characteristics of diode and transistor. With which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ4E02) MANAGERTAL ECONOMICS AND FINANCIAL ANALYSIS

B.Tech II Year II SEM: MECH

L	T	P	C
4	0	0	4

Course Objective:

To enable the student to understand and appreciate, with a practical insight, the imporlance of certain basic issues governing the business operations namely: demand and supply, production function, cost analysis, markets, forms of business organisations, capital budgeting and financial accounting and financial analysis.

Unit I
lntroduction & Demand Analysis.

Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

Unit II
Production & Cost Analysis: Production Function-
lsoquants and lsocosts, MRTS, Least Cost Combination of lnputs, Cobb-Douglas Production function, Laws of Returns, lnternal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III
Markets & New Economic Environment:
Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Objectives and Policies of Pricing. Methods of Pricing. Eusrness; Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment Changing Business Environment in Post-liberalization scenario.

Unit IV
Capital Budgeting:
Capital and its significance, Types of Capitat, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Unit V

Introduction to Financial Accounting & Financial Analysis:

Accounting concepts and conventions - lntroduction IFRS - Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance sheet with simple adjustments).

Financial, Analysis: Analysis and lnterpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart'

References:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand' 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013'
3. M' Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.
4. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi. 2012.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4315) THERMAL ENGINEERING – I

II Year B.Tech. ME-II-Sem **L T P C**
4 1 0 4

UNIT I

I.C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT II

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, 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.

UNIT III

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

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

UNIT IV

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

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

UNIT V

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

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

TEXT BOOKS:

1. Ganesan V., *Internal Combustion Engines,* Tata McGraw-Hill, New Delhi, 1994.
2. Mathur M. L.,Sharma R. P., *A Course in I. C. Engines,*Dhanpat Rai&Sons, N Delhi.

REFERENCE BOOKS:

1. Gill P. W. & Smith J. H., *Fundamentals of I. C. Engines,* Oxford & IBH, New Delhi.
2. Domkundwar A. V. & Domkundwar V. M., *A Course in Internal Combustion Engines,* Dhanpat Rai & Sons, New Delhi**.**

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4316) MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

II Year B.Tech. ME-II-Sem **L T P C**
4 1 0 4

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 and three 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

Boundary Layer Concepts: Definition, thickness, characteristics along thin plate, laminar and turbulent, boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

Closed conduit flow: Reynolds'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, Turbine flow meter

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 don 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, surge tank, water hammer.

UNIT-V

Centrifugal pumps : Classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

Reciprocating pumps : Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Modi and Seth, *Hydraulics and Fluid Mechanics*, Standard Book House, New Delhi.
2. R.K. Rajput, "Fluid Mechanics & Hydraulic Machines", S.Chand & Co.Ltd., New Delhi.

REFERENCE BOOKS:

1. V.L.Streeter, *Fluid Mechanics*, McGraw-Hill book Company, New York.
2. S.W.Yuan, *Foundation of Fluid Mechanics*, Prentice Hall of India, New Delhi.
3. S.M.Yahya, *Fundamentals of Compressible flow*, Wiley Eastern Ltd.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4317) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

II Year B.Tech. ME-II-Sem **L T P C**
0 0 3 2

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

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4204) Basic Electrical and Electronics lab

B.Tech II Year II SEM: MECH

L	T	P	C
0	0	3	2

List of Experiments:

1. Verification of Kirchhoff's Laws.
2. Verification of superposition and Reciprocity Theorems.
3. Verification of Maximum Power transfer theorem.
4. Experimental Determination of Thevenin's theorem.
5. Magnetization characteristics of DC Shunt Generator.
6. Swinburne's Test on DC shunt machine.
7. Brake test on DC shunt motor.
8. OC & SC tests on single phase transformer.
9. PN Junction Diode characteristics (Forward bias, Reverse bias).
10. Zener Diode Characteristics.
11. Transistor CE Characteristics (Input and Output)
12. Rectifier without filters (Full wave & Half wave)
13. Rectifier with filters (Full wave & Half wave)

Note: Student should perform 11 experiments out off 13 experiments.

Experiments 7 & 8 are optional.

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JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ4318) MACHINE DRAWING PRACTICE

II Year B.Tech. ME-II-Sem

L	T	P	C
0	0	3	2

Machine Drawing Conventions :
Need for drawing conventions – introduction to IS conventions

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

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

II. Assembly Drawings:
Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

- 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:
1. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers

REFERENCES:
1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing - Rajput

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJMC01**) GENDER SENSITIZATION**

(An Activity – based Course)

II Year B.Tech. ME-II-Sem

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0	**0**	**3**	**0**

Objectives of the Course:

To develop students sensibility with regard to issues of gender in contemporary India. To provide a critical perspective on the socialization of men and women.

To introduce students to information about some key biological aspects of genders.

To expose the students to debates on the politics and economics of work.

To help students reflect critically on gender violence.

To expose students to more egalitarian interactions between men and women.

Learning Outcomes:

Students will have developed a better understanding of important issues related to gender in contemporary India.

Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

Students will acquire insight into the gendered division of labor and its relation to politics and economics.

Men and women students and professionals will be better equipped to work and live together as equals.

Students will develop a sense of appreciation of women in all walks of life.

Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit – I

UNDERSTANDING GENDER:

Gender: Why should we study it? (Towards a world of Equals: Unit – 1)

Socialization: Making women, making men (Towards a World of Equals: Unit – 2)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together and Equals **(Towards a World of Equals: Unit – 12)**

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers.

Further Reading: Rosa Parks – The Brave Heart.

Unit – II

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit – 4)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit – 10)

Two or Many? Struggles with Discrimination.

Additional Reading: **Our Bodies, Our Health (Towards a World of Equals: Unit – 13)**

Unit – III

GENDER AND LABOUR:

Housework: the Invisible Labor (Towards a World of Equals: Unit – 3)

"My Mother doesn`t Work". *Share the Load*.

Women`s Work: Its Politics and Economics (Towards a World of Equals: Unit – 7)

Fact and Fiction. Unrecognized and Unaccounted work.

Further Reading: Wages and Conditions of Work

Unit – IV

ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (Towards a World of Equals: Unit – 6)

Sexual Harassment, not Eve – teasing – Coping with Everyday Harassment – Further Reading: "Chupulu" **Domestic Violence: Speaking Out (Towards a World of Equals: Unit – 8)**

Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading. New Forums for justice.

Thinking about Sexual Violence (Towards a World of Equals: Unit – 11)

Blaming the Victim – "! Fought for my Life ……" – Further Reading. The Caste Face of Violence.

Unit – V

GENDERS STUDIES:

Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit – 5)

Point of View. Gender and the Structure of Knowledge. Further Reading. Unacknowledged Women Artists of Telangana

Whose History? Questions for Historians and Others (Towards a World of Equals: Unit – 9)

Reclaiming a Past. Writing other Histories. Further Reading. Missing Pages from Telangana History.

Essential Reading: All the Units in the Text books, "Towards a World of Equals: A Bilingual Textbook on Gender" Written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Note: Since it is Innterdisciplinary Course, reasource Persons can be drawn from the fields of English Literature of Sociology or Political Science or any other qualified faculty who has expertise in this field.

Reference Books:

1. Sen, Amartya. "More than Once Million Women are Missing". New York Review of Books 37.20 (20 December 1990). Print. `We Were Making History……' Life Stories of Women in the Telangana People`s Struggle. New Delhi : Kali for Women, 1989.
2. Gautam, Liela and Gita Ramaswamy. "A 'Conversation' between a Daughter and Mother". Broadsheel on Contemporany Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed.Madhumeeta Sinha and Asma Rasheed. Hydrabad: Anveshi research Center for Women`s Studies, 2014.
3. Abdulali Sohaila. " I Fought For My Life…and Won." Abailable online at: http://www.thealternative. In/lifestyle/i-fought-for-my lifeand-won-sohaila-abdulal/
4. Jeganathan Pradeep, Partha Chatterjee (Ed). "Community, Gender and Violence Subaltern Studies XI". Permanent Block and Ravi Dayal Publishers, New Delhi, 2000
5. K. Kapadia. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
6. S. Benhabib. Situating the self: Gender, Community, and Postmodernism in Contemporary Ethics, London:Routledge, 1992.
7. Virginia Woolf A Room of One`s Oxford: Black Swan. 1992.
8. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997.
9. Tripti Lahiri. "By the Numbers: Where India Women Work." Women`s Studies Journal (14 November 2012) Available online at: http://blogs. Wsj.com/India real time/2012/11/14/by – the –numbers – where- Indian- women-works/>
10. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://harpercollints.co.in/BookDetail.asp?Book Code=3732
11. Vimala "Vantilu (The Kitchen)". Omen Writing in India: 600BC to the Present, Volume II The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
12. Shatrughna, Veena et al. Women`s Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, India Council of Medcial Research 1993.
13. Stress Shakti Sanghatana. "We Were Making History….'Life Stories of Women in the Telangana People`s Struggle. New Delhi:Kali of Women, 1989.
14. Menon, Nivedita. Seeing Like a Feminist. New Delhi. Zubaan-Penguin Books, 2012.
15. Jayaprabha, A. "Chupulu (Stares)". Women Writing in India: 600BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
16. Javeed, Shayam and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis". International Journal of Humanilities and Social Science Invention 2, 4(2013).

B.TECH
III YEAR
I & II SEMESTER
SYLLABUS

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5319) THERMAL ENGINEERING-II

III B. Tech - I Semester (ME)	L	T	P	C
	4	1	0	4

Prerequisite: Thermodynamics

Objectives:

1. To learn main features of Rankine cycle and its performance improvement methods
2. To learn about components like boilers boiler accessories.
3. To learn the construction, function and performance of a steam nozzle.
4. To learn the salient features of impulse, reaction turbines and different types of condensers.
5. To learn about different types gas power cycles and its components.
6. To learn about classification and working of jet propulsion and rocket engines.

UNIT – I

Basic Concepts: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance – Regeneration & reheating. Combustion: fuels and combustion, concepts of heat of reaction, adiabatic flame temperature, stoichiometry and flue gas analysis.

UNIT II

Boilers: Classification – working principles – with sketches including H.P.Boilers – Mountings and Accessories – working principles

Steam Nozzles : Function of nozzle – applications - types, Flow through nozzles, thermodynamic analysis – assumptions -velocity of nozzle at exit-Ideal and actual expansion in nozzle, velocity coefficient, condition for maximum discharge, critical pressure ratio, criteria to decide nozzle shape: Super saturated flow, its effects, degree of super saturation and degree of under cooling - Wilson line.

UNIT – III

Steam Turbines: Classification – Impulse turbine; Mechanical details – Velocity diagram – effect of friction – power developed, axial thrust, blade or diagram efficiency – condition for maximum efficiency. Velocity and Pressure variation along the flow – combined velocity diagram for a velocity compounded impulse turbine. Reaction Turbine**:** Mechanical details – principle of operation, thermodynamic analysis of a stage, degree of reaction –velocity diagram – Parson's reaction turbine – condition for maximum efficiency.

Steam Condensers : Requirements of steam condensing plant – Classification of condensers – working principle of different types – vacuum efficiency and condenser efficiency – air leakage, sources and its affects, air pump- cooling water requirement.

UNIT – IV

Gas Turbines: Simple gas turbine plant – Ideal cycle, essential components – parameters of performance – actual cycle – regeneration, inter cooling and reheating – Closed and Semi-closed cycles – merits and demerits.

Compressors and combustion chambers: Brief concepts about compressors – classifications of compressors - combustion chambers and its classifications.

UNIT – V-

Jet Propulsion : Principle of Operation –Classification of jet propulsive engines – Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency – Turbo jet engines – Needs and Demands met by Turbo jet – Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation – Methods.

Rockets: Application – Working Principle – Classification – Propellant Type – Thrust, Propulsive Efficiency – Specific Impulse – Solid and Liquid propellant Rocket Engines.

Text books:

1. Thermal Engineering / R.K. Rajput / Lakshmi Publications
2. Gas Turbines – V.Ganesan /TMH

References:

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot
2. Gas Turbines and Propulsive Systems – P.Khajuria & S.P.Dubey - /Dhanpatrai
3. Gas Turbines / Cohen, Rogers and Saravana Muttoo / Addison Wesley – Longman
4. Thermal Engineering-R.S Khurmi/JS Gupta/S.Chand.
5. Thermal Engineering-P.L.Bellaney/ khanna publishers.
6. Thermal Engineering-M.L.Marthur & Mehta/Jain bros.

Outcomes:

1. Study the different thermal power plants and its workings.
2. Understand the cycles of steam power plant.
3. Knowing the working of components of steam power plant.
4. Getting knowledge about gas power plants and its components.
5. Understand the working of jet propulsion and rocket engines.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5321) KINEMATICS OF MACHINERY

III B.Tech-I Semester (ME)	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Prerequisites: Knowledge of Engineering Mechanics

Objectives:

1. The course under Kinematics of machinery has been designed to cover the basic concepts of kinematic aspects of mechanical machines and major parts used in running of the machines.
2. The students will understand the basic concepts of machines and able to understand constructional and working features of important machine elements.
3. The students should be able to understand various parts involved in kinematics of machines for different applications.
4. The students shall also be able to understand requirements of basic machine parts which would help them to understand the design aspects of the machine parts.

UNIT – I

Mechanisms and machines: 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. Inversions of four bar mechanism.

Straight line motion mechanisms: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

UNIT - II

Kinematics: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centroids 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 – III

Steering mechanisms: Conditions for correct steering – Davis Steering gear, Ackerman's steering gear – velocity ratio. Hooke's joint-Single and double Hooke's joint – Universal coupling – application – problems.

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, 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 – IV

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, condition for minimum number of teeth to avoid interference and expressions for arc of contact and path of contact. Introduction to Helical, Bevel and worm gears.

UNIT – V

Gear trains: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains.

Text book:

1. Theory of Machines and Mechanisms-S.S.Rattan, TMH, Publishers

References:

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines / R.K Bansal
3. Theory of Machines Sadhu Singh Pearsons Edn
4. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
5. The theory of Machines /Shiegley/ Oxford.
6. Theory of machines – PL. Balaney/khanna publishers.

Outcomes:

1. Familiarity with common mechanisms used in machines in day to day life.
2. Ability to calculate mobility (number of degrees-of-freedom) and enumerate rigid links and types of joints within mechanisms.
3. Ability to conduct a complete (translational and rotational) velocity, acceleration analysis of the mechanism and to understand steering mechanism and the importance of universal (Hooke's) joint.
4. Helps to understand various cam motion profiles and follower mechanism , their classification and design based on the prescribed follower motion (SHM , constant velocity and acceleration)
5. At the end of this course students are able to understand gear mechanism classification and to become familiar with gear standardization and specification in design.
6. To understand importance of gear trains and their practical applications.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5322) MACHINE TOOLS

III B.Tech-I Semester (ME)	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

Prerequisite: Knowledge in metallurgy and material science and mechanics.

Objectives: The purpose of this course is to make the student aware of:

1. The fundamentals of metal cutting
2. The essentials of cutting tool materials
3. The basics of various machine tools and operations

UNIT -I
Elementary treatment of metal cutting theory – Element of cutting process - Geometry of single point cutting tool and 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, machinability – Tool materials.

UNIT – II
Engine lathe – Principle of working, specification of lathe – types of lathe – Taper turning, thread turning – Lathes and attachments. Turret and capstan lathes – collet chucks – other work holders – tool holding devices –tool layout. Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes.

UNIT – III
Shaping slotting and planning machines – Principles of working – Principal of parts – specification and classification, operations performed. Kinematic scheme of the shaping, slotting and planning machines, machining time calculations.

UNIT – IV
Milling machines – Principles of working – specifications – classifications of milling machines – Principal features of horizontal, vertical and universal milling machines – machining operations Types geometry of milling cutters – milling cutters – methods of indexing – Accessories to milling machines, kinematic scheme of milling cutters – milling cutters – methods of indexing.

UNIT –V
Grinding machines – Fundamentals – Theory of grinding – classification of grinding machine – cylindrical and surface grinding machine –Tool and cutter grinding machine – special types of grinding machines – Different types of abrasives – bonds specification of a grinding wheel and selection of a grinding wheel Kinematic scheme of grinding machines.
Lapping, Honing and Broaching machines – comparison to grinding, lapping and honing. Kinematics- lapping, honing and broaching machines. Constructional features of speed and feed, machining time calculations.
Text books:

1. A text book of manufacturing technology –II by P C Sharma, S .chand,2010
2. Manufacturing Technology, Volume II by P.N.Rao, TMH,2009

References:

1. Machine Tools – C.Elanchezhian and M. Vijayan / Anuradha Agencies Publishers.
2. Work Courseshop Technology – B.S.Raghu Vamshi – Vol II
3. Production Technology by H.M.T. (Hindustan Machine Tools).

Outcomes: At the end of the course, students should be proficient to:

1. Define and explain nomenclature of single point cutting tool in various systems and select
   tool materials & tools and cutting environment for the machining processes.
2. Analyze geometry & characterization of chip and its formation. Determine various
   components of forces acting on single point tool & analyze and study economics of Machining.
3. Identify various M/c tools, tools & required operations to get a component machined, and
   estimate the machining time.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5339) REFRIGERATION AND AIR CONDITIONING

III B. Tech - I Semester (ME)	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

Prerequisites: Thermodynamics, Thermal Engineering, Heat Transfer

Objectives:

1. To understand and acquire the terminology used in refrigeration and air-conditioning.
2. To acquire the knowledge on VCR system.
3. To learn the performance and cycle analysis pertaining to VAR systems.
4. To understand the psychometric processes of air-conditioning systems.
5. To know the concepts of A/C systems and its load estimation procedures for different Air conditioning systems.

UNIT - I

Fundamentals of Refrigeration and Refrigerants: Introduction - Necessity and applications, unit of refrigeration and C.O.P - Heat Engine, Refrigerator and Heat pump - Types of Refrigeration systems, and its Applications. Classification of refrigerants - Desirable properties – Nomenclature - Commonly used refrigerants - Alternate refrigerants – Green house effect, global warming

Air Refrigeration System: Introduction - Air refrigeration system working on Reversed Carnot cycle – Air refrigeration system working on Bell Coleman cycle – COP - Open and Dense air systems, Applications.

UNIT - II

Vapour Compression Refrigeration System: Working principle - Simple vapour compression refrigeration cycle – COP - Representation of cycle on T-S and P-h charts - Effect of Sub cooling and Superheating - Actual Vapour compression cycle and its applications.

VCR System Components: Compressors - Classification-Working - Condensers – Classification - Working - Evaporators –Classification - Working, Expansion devices – Types-Working.

UNIT - III

Vapour Absorption Refrigeration System: Description and working of Aqua - Ammonia system - Calculation of maximum COP - Lithium Bromide - Water system - Principle of operation of Three fluid absorption system, Applications.

Steam Jet Refrigeration System and Non Conventional Refrigeration Systems: Principle of working – Analysis - Applications. Thermo electric Refrigeration, Vortex tube refrigeration, adiabatic demagnetization Refrigeration.

UNIT - IV

Psychrometry: Introduction - Psychrometric properties and relations - Psychrometric chart Psychrometric processes - Sensible, Latent and Total heat – Sensible Heat Factor and Bypass Factor.

Human Comfort: Thermodynamics of Human body - Effective temperature – Comfort chart.

UNIT - V

Air Conditioning Systems: Introduction - Components of Air conditioning system - Classification of Air conditioning systems Central and Unitary systems - Summer, Winter and Year round systems- Cooling load estimation.

Design Of Air Condition Systems: Summer air conditioning – ADP-System with Ventilated and re-circulated air with and without bypass factor- RSHF, GSHF and ESHF.

NOTE: Refrigerants & Psychometric properties- by M.L. Mathur & F.S. Mehta data book will be supplied in the exam hall.

TEXT BOOKS

1. C. P. Arora. , Refrigeration and air conditioning - TMH, 2nd Edition, 2000.
2. S. C. Arora, Domkundwar, A course in refrigeration and air conditioning- Dhanapat Rai& sons 5th Edition 1997. R. Dossat, Principles of Refrigeration - - Pearson 4th Edition 2001.

REFERENCES

1. R. Dossat, Principles of Refrigeration - - Pearson 4th Edition 2001.
2. Manohar Prasad, Refrigeration and Air conditioning, New Age international, 2003.
3. Jones W P, "Air Conditioning Engineering", Elsevier Butterworthy- Heine Mann, 2005.
4. Ananthanarayanan.P.N, "BasicRefrigeration and Air Conditioning", Tata McGraw Hill, 3rd edition, New Delhi, 2006.
5. Stocker W F and Jones J W, "Refrigeration & Air Conditioning" McGraw Hill Book Company, 1985.

Outcomes: After completion of the course, students are able to:

1. Demonstrate the basic concepts of refrigeration and related performance parameters.
2. Analyze the performance of VCR and VAR systems and differentiate with one another.
3. Design and develop the refrigerators using the VCR principles.
4. Demonstrate of psychometric properties and processes used in Air Conditioning.
5. Design and develop the Air-conditioning systems for thermal comfort conditions.

(AJ5340) RENEWABLE ENERGY SOURCES

III B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisite: Thermal Engineering, Heat Transfer

Objectives:

1. To learn the Potential importance of renewable energy sources.
2. To learn the geothermal, Wind Energy systems.
3. To learn Critical issues related to the OTEC and Tidal Energy systems.
4. To learn power generation from Bio mass plants.
5. To learn the Direct Energy Conversion system principles.

UNIT - I

Introduction:

Energy Scenario – Survey of Energy Resources – Classification – Need for Non-Conventional Energy Resources.

Solar Energy and its Applications: The Sun - Sun-Earth Relationship –Solar radiation – Flat plate and concentrating collectors – classifications of concentrating collectors – orientation and thermal analysis – advanced collectors. Solar water Heating, Space Heating – Active and Passive heating – Energy storage – selective surface – solar stills and ponds – solar refrigeration – photovoltaic generation.

UNIT - II

Wind Energy: Wind – characteristics – wind energy conversion systems – types – Betz model – Interference Factor – Power Coefficient – Torque Coefficient and thrust coefficient – Lift machines and drag machines – matching – electricity generation.

Geothermal Energy: Structure of Earth – Geothermal Regions – Hot springs – Hot Rocks – Hot Aquifers – Analytical Methods to estimate Thermal Potential – Harnessing Techniques – Electricity Generation Systems.

UNIT - III

Energy from Oceans: Tidal Energy; Tides – Diurnal and Semi – Diurnal Nature – Power from Tides.

Wave Energy and Ocean Thermal Energy: Waves – Theoretical Energy Available – Calculation of period and phase velocity of waves – wave power systems – submerged devices.

OTEC - Principles – Heat Exchangers – Pumping requirements – Practical Considerations.

UNIT - IV

Bio – Energy: Biomass Energy Sources – Plant Productivity, Biomass Wastes – Aerobic and Anaerobic bio-conversion processes – Raw Materials and properties of Bio-gas.

Bio-gas plant Technology and Status – The Energetic and Economics of Biomass systems – Biomass gasification

UNIT - V

Direct Energy Conversion Systems: Introduction to direct energy conversion systems, Carnot cycle limitations - Peltier effect, seebeck effect, Thomson effect, Figure of merit, materials , applications - Fuel Cells, efficiency of Fuel Cells, and Solar Cells– Thermionic.

Thermoelectric Generation: MHD Generator, principles, dissociation and ionization hall effect, magnetic flux -Open and Closed Systems, applications of direct energy energy conversion systems.

Textbooks:

1. .G.D.Rai, Non-Conventional Energy Sources, 5thEdition 2011, Khanna Publishers, New Delhi, India.
2. G.N.Tiwari, Solar Energy – Fundamentals, Design, Modelling and Applications – Narosa Publication Ltd., 2000.

References:

1. John Twidell&Tony Weir, Renewable Energy Resources – 2ndEdition, Taylor & Francis.
2. Sukhatme, Solar Energy.
3. Malcolm Flesher &ChrrisLawis Biological Energy Resources – Routledge Publishers.
4. Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw-Hill, 1978.
5. Ashok V Desai, Non-Conventional Energy- Wiley Eastern, 2000.

Outcomes: After the completion of course, students are able to

1. Design the various types of solar systems.
2. Develop the skills to operate and analyze geothermal energy plant.
3. Analyze the power generating capacities of Tidal, Ocean and Thermal Energy Conversion systems.
4. Design and Develop simple bio gas plants
5. Design and Develop the Direct Energy conversion systems.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5341) MECHATRONICS

III B.Tech-I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Fundamentals of Electrical and Electronics Engineering.

Objectives:
To provide an exposure on how to simulate a system or a process or an activity for detailed analysis, optimization and decision making which is essential to reduce the product design and development cost and time.

UNIT – I
Introduction: Definition – Trends - Control Methods: Standalone, PC Based (Real Time Operating Systems, Graphical User Interface, and Simulation) - Applications: SPM, Robot, CNC, FMS, CIM.
Signal Conditioning : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , sped channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps – Software - Digital Signal Processing – Low pass , high pass , notch filtering

UNIT – II
Precision mechanical systems : Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems -Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings – Harmonic Transmission - Bearings- Motor / Drive Selection.

UNIT – III
Electronic interface sub systems : TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resettable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – IV
Electromechanical drives : Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.
Microcontrollers overview : 8051 Microcontroller , micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming – Assembly, C (LED Blinking, Voltage measurement using ADC).

UNIT – V

Programmable logic controllers : Basic Structure - Programming : Ladder diagram - Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling - Analog input / output - PLC Selection - Application.

Programmable motion controllers : Introduction - System Transfer Function – Laplace transform and its application in analyzing differential equation of a control system - Feedback Devices : Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive , Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers - P , PI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles – Trapezoidal - S. Curve - Electronic Gearing -Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear , Circular - Core functionalities – Home , Record position , Go to Position - Applications : SPM, Robotics.

Text books:

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W
Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

References:

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publisers.
3. Mechatronics System Design / Devdas shetty/Richard/Thomson.

Outcomes:

The students will be able to design and develop products using simulation techniques**.**

- Be able to model and analyze electrical and mechanical systems and their interconnection.
- Be able to integrate mechanical, electronics, control and computer engineering in the design of
- Mechatronics systems. Be able to do the complete design, building, interfacing and actuation of a mechatronic system for a set of specifications.
- Be proficient in the use of Lab VIEW software for data acquisition.
- Be proficient in the programming of microcontrollers.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5320) THERMAL ENGINEERING LAB

III B. Tech - I Semester (ME)	L	T	P	C
	0	0	3	2

Prerequisites: Thermal Engineering

Objectives:
1. To learn the construction and working principle of I.C. Engines practically.
2. To understand the working principle and performance of air compressor practically.
3. To learn the heat balance test of an I.C. Engine.
4. To acquire the priorities given to the efficient use of energy and the minimization of environmental pollution.
5. To understand the usage of data acquisition systems.

LIST OF EXPERIMENTS:

At least 10 Experiments are required to be conducted

1. I.C. Engines Valve & Port Timing Diagrams
2. Performance Test on single cylinder 4 -Stroke Diesel Engine by using Mechanical Dynamometer
3. Performance Test on Reciprocating Air – Compressor.
4. Evaluation of Engine friction by conducting Motoring/Retardation test on 4-stroke Diesel Engine.
5. Study of boilers.
6. I.C. Engine Heat Balance sheet.
7. Performance Test on single cylinder 2-Stroke Petrol Engine.
8. Performance test on Multi cylinder 4-stroke petrol engine by using Hydraulic Dynamometer.
9. Performance Test on Variable Compression Ratio single cylinder 4-Stroke Diesel Engine By using Eddy Current Dynamometer
10. Evaluation of Engine friction by conducting Morse test on 4-Stroke Multi cylinder Petrol Engine.
11. Determine of economical speed test for fixed load on 4-stroke engine
12. Assembly / Disassembly of Engines.

Outcomes: After completion of the course students are able to:

1. Find the efficiency and performance of an engine system for a given set of conditions.
2. Analyze the Volumetric efficiency of air compressor.
3. Develop skills in data acquisition systems.
4. Evaluate the engine performance and explore the ways to improve the efficiency of engines.
5. Realize the need to minimize the losses in engines.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ5323) MACHINE TOOLS LAB

III B.Tech-I Semester (ME)	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

Objectives:

To acquire skills to perform various machining operations on various machine tools namely Lathe, Milling, Shaping, Slotting, Planning, Drilling, Surface Grinding, Cylindrical Grinding Tool Cutter Grinding.

List of Exercises to perform:

1. Machining operations on Lathe. (Three Exercises)
2. Machining operations on Radial drilling machine. (Two Exercises)
3. Machining operations on Shaping Machine. (One Exercise)
4. Machining operations on Planning Machine. (One Exercise)
5. Machining operations on Slotting Machine. (One Exercise)
6. Machining operations on Milling Machine. (Two Exercises)
7. Machining operations on Cylindrical Grinding Machine. (One Exercise)
8. Machining operations on Surface grinding Machine. (One Exercise)
9. Tool and cutter grinder Machine. (One Exercise)

Outcomes:

Student has an ability to perform various machining operations on various machine tools such as Lathe, Milling, Shaping, Slotting, Planning, Drilling, Surface Grinding and Cylindrical Grinding Tool Cutter Grinding.

(UGC AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ6324) HEAT TRANSFER

III B. Tech - II Semester (ME)	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Prerequisites: Applied Mathematics- I, II, Thermodynamics, Thermal Engineering

Objectives:

1. To learn the basic differential equations of heat transfer in conduction, convection and radiation.
2. To acquire the phenomenon of critical thickness of Insulation, Heat Transfer in Fins.
3. To understand the significance of Non Dimensional Numbers in Heat Transfer
4. Natural and Forced Convection Mechanisms and correlations
5. To learn the basics of phase change processes of boiling and condensation in thermal systems and laws of radiation.
6. To learn about the LMTD, NTU concepts used in heat exchangers.

UNIT-1

Introduction and basic concepts of heat transfer: Modes and mechanisms of heat transfer - Basic laws governing conduction convection and radiation heat transfer – general discussion about applications of heat transfer.

Conduction heat transfer: Fourier heat transfer equation; Conduction-Basic Equations: Derivation of general form heat conduction equation in rectangular coordinates, heat conduction equation in cylindrical and spherical coordinates. Simplification forms of field equation - steady, unsteady and periodic heat transfer - Initial and boundary conditions of conduction problems.

UNIT-II

One dimensional steady state conduction: Steady state conduction in a homogeneous slab, hollow cylinders and spheres with and without heat generation, overall heat transfer coefficient, electrical analogy - critical thickness of insulation. 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: Transient heat conduction in slab, long cylinder and sphere, systems with negligible internal resistance – significance of Biot and Fourier numbers - Use of transient temperature charts.

UNIT-III

Convective heat transfer: Classifications of systems based on causation of flow, condition of flow, configuration of flow and medium of flow. Dimensional analysis as a tool for experimental investigation – Buckingham's π-theorem and method - Significance of non-dimensional numbers – concepts of continuity, momentum and energy equations.

Forced convection and Free or natural convection: External flows: concepts about hydrodynamic and thermal boundary layer- use of empirical correlations for convective heat transfer - flow over a flat plate, horizontal plate, over a cylinder. Internal flows – concepts about hydrodynamic and thermal boundary layer and use of empirical relations

for horizontal pipe flow and annulus flow. Development of hydrodynamic and thermal boundary layer along a vertical plate - use of empirical relations for vertical, horizontal plates and cylinders.

UNIT-IV

Heat transfer with phase change

Heat exchangers: Classification of heat exchangers, overall heat transfer coefficient and fouling factors. Concept on LMTD and NTU methods – Problems. Concept on heat pipe.

Boiling and Condensation:: Pool boiling – Regimes Calculations on Nucleate boiling, critical heat flux and film boiling. Types of condensation - Nusselt's theory of condensation - vertical flat surface film thickness and horizontal cylinders using empirical correlations.

UNIT-V

Radiation heat transfer: Introduction, absorption and reflection of radiant energy, Emission, Radiosity and irradiation. Emission characteristics and laws of black-body radiation

Irradiation: Total and monochromatic quantities – laws of Planck, Wien, Kirchhoff, 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. P.K.Nag, *Heat & Mass Transfer*, TMH, 2008. ISBN:0-07-047337-4
2. Holman, J.P., "Heat Transfer", Tata McGraw Hill Book Company, 1988

References:

1. D.S. Kumar/S.K. Kataria and sons, heat and mass transfer.
2. R.K.Rajputh, *Heat & Mass Transfer*, S.Chand & Company Ltd, 3rd Edition, 2006. ISBN :81-219-1777-8
3. Sachdeva, KC, "Fundamentals of Engineering Heat and Mass Transfer", New Age International Publishers, NewDelhi,1996
4. Heat transfer: A practical / Yunus Cengel, Boles/ TMH.
5. Heat and mass transfer: R yadav/CPH
6. Kothandaraman, CP., "Fundamentals of Heat and Mass Transfer", Second Edition

Outcomes:

1. Analyze the basic heat transfer concepts and their practical relevance in Planes, Cylinders and Spherical components.
2. To solve practical problems of steady and unsteady state heat transfer.
3. Develop skills to identify suitable Nusselt number empirical correlation for Planes, Cylinders.
4. To formulate the radiation heat exchange between two surfaces.
5. Design simple heat exchanger units of moderate capacity.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ6326) DYNAMICS OF MACHINERY

III B.Tech-II Semester (ME)	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Prerequisites: Knowledge of Engineering Mechanics and Mechanics of solids.

Objectives:

1. To understand concepts of static and dynamic mass balancing and energy fluctuations in flywheels.
2. To understand the concepts regarding various types of clutches, brakes and dynameters.
3. To develop the knowledge on various governors and reciprocating mass balancing.
4. Model the suspension system of light duty vehicle by using various concepts related to vibrational analysis.
5. Case Study on advanced systems in brakes.

UNIT – I

Precession: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships. Static and dynamic force analysis of planar mechanisms.

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

UNIT –II

Brakes and dynamometers: Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types. General description and methods of operations.

UNIT – III

Turning moment diagram and fly wheels: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

Governors: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxiliary springs. Sensitiveness, isochronisms and hunting.

UNIT – IV

Balancing: Balancing of rotating masses Single and multiple – single and different planes.

Balancing of reciprocating masses: Primary, Secondary and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing – Hammer blow, Swaying couple, variation of tractive efforts.

UNIT – V

Vibration: Free Vibration of mass attached to vertical spring – oscillation of pendulums, centers 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 and torsional vibrations, two and three rotor systems. Simple problems on forced damped vibration Vibration Isolation & Transmissibility.

Text books:

1. Theory of Machines / S.S Rattan/ McGraw Hill Publ.

References:

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers

Outcomes:

1. Able to solve problems of static and dynamic mass balancing and energy fluctuations in flywheels.
2. Able to apply the concepts of various types of clutches, brakes and dynameters.
3. Able to acquire the knowledge on various governors and reciprocating mass balancing.
4. Able to model the suspension system of light duty vehicle by using various concepts related to vibrational analysis.
5. Capable to do Case Study on advanced systems in brakes.

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ6327) DESIGN OF MACHINE ELEMENTS

III B.Tech-II Semester (ME)	L	T	P	C
	4	1	0	4

Pre requisites: Mechanics, Strength of materials.

Objective:

1. To understand concepts of various types of stress concentration factors and application of failure theory geometries
2. To understand the concepts regarding riveted, welded, bolted joints and eccentric loading.
3. To understand the concepts of stresses in various joints like keys, cotters and knuckle.
4. To understand the concepts regarding design of bearings, shafts and different engine parts.
5. To acquire the concepts related to design and analysis of spur and helical gears.

UNIT – I

Strength of machine elements : Stress concentration – Theoretical stress Concentration factor – 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. Riveted and welded joints – Design of joints with initial stresses – eccentric loading.

Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – locking devices – both of uniform strength, different seals.

UNIT - II

Keys, Cotters and Knuckle joints: Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

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

UNIT – III

Shaft coupling: Rigid couplings –Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified).**Mechanical Springs :** Stresses and deflections of helical springs – Extension -compression springs – Springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Co-axial springs, leaf springs.

UNIT – IV

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.

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, Cylinder liners.

UNIT – V

Spur & Helical gear drives: Spur gears- Helical gears – Load concentration factor – Dynamic load factor. Surface compressive strength – Bending strength – Design analysis of spur gears – Estimation of centre distance, module and face width, check for plastic deformation. Check for dynamic and wear considerations.

Text books:

1. Machine Design, V.Bandari Tmh Publishers
2. Machine Design, S MD Jalaludin, AnuRadha Publishers
3. Design Data hand Book, S MD Jalaludin, AnuRadha Publishers

References:

1. Design of Machine Elements / V.M. Faires
2. Machine design / Schaum Series.
3. Machine design – Pandya & shah.

Outcomes:

1. Able to apply the concepts of various types of stress concentration factors and application of failure theory geometries
2. Able to design riveted, welded, bolted joints for eccentric loading.
3. Able to design keys, cotters and knuckle joints using the concepts of stresses
4. Able to design bearings, shafts and different engine parts.
5. Able to design and analysis of spur and helical gears.

(AJ6342) FINITE ELEMENT METHOD

III B.Tech-II Semester (ME)	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

Prerequisites: Pre-requisites for FEM can be:

- Tensor calculus
- Strength of materials
- Basic solid mechanics

For a general knowledge of FEM including basic to detailed discussion, I can suggest the three-volume FEM book by O C Zienkiewicz & R L Taylor.

Objectives: Upon successful completion of this course, the student will be able to:

1. Apply vector mechanics as a tool for problem solving
2. Understand the need in Design for the Finite Element Method
3. Tie his/her understanding of mechanical engineering design concepts to use the Finite Element Method software correctly and efficiently
4. Analyze a physical problem; develop experimental procedures for accurately investigating the problem, and effectively perform and document findings.
5. Understand forces associated with different parts of a machine

Unit-I

Introduction to FEM: Basic Concepts, historical background, application of FEM, General description, comparison of FEM with methods, Basic equations of elasticity, Stress-strain and strain-displacement relations. Rayleigh-Ritz method, weighted residual methods.

Unit-II

One Dimensional problems: Stiffness equations for a axial bar element in local co-ordinates using potential energy approach and virtual energy principle-properties of stiffness matrix. Finite element analysis of uniform stepped and tapered bars subjected to mechanical and thermal loads-Assembly of global stiffness matrix and load vector-Quadratic shape functions.

Unit-III

Stiffness equations for a truss bar element oriented in 2D plane-Finite element analysis of trusses- Planes truss and space truss elements-methods of assembly, Analysis of beams: Hermite shape functions-Elements stiffness matrix – Load vector-Problemss

Unit-IV

2-D Problems: CST element –Stiffness matrix and load vector- Isoparametric element representation-Shape functions- Convergence requirements-Problems Two dimensional four noded isoparametric elements – numerical integration –finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements- 3-D problems. Tetrahedran elements.

Unit-V

Scalar field problems: 1-D Heat conduction – 1D Finite elements- Composite slabs – 2D Heat conduction- analysis of thin plates-Problems. Dynamic Analysis: Dynamic

equations- Lumped and consistent mass matrices-Eigen values and Eigen Vectors-mode shapes-modal analysis for bars and beams.

Text book:

1. The Finite Element Methods in Engineering –SS Rao-Elsevier-4th Edition
2. Introduction to Finite Elements in Engineering –Tirupathi K.Chandragupta and Ashok D.Belagundu.

References:

1. Introduction of Finite Element Analysis – S.Md.Jalaludeen - Anuradha Publications
2. An introduction to Finite Element Method – JN Reddy- Mc Graw Hill
3. The Finite Element Method in engineering science –O.C. Zienkowitz, Mc. Graw Hill
4. Finite Element Methods/ Alavala/TMH
5. Concepts and application of finite element analysis-Robert Cook –Wiley.

Outcomes:

Upon successful completion of this course, the student will be able to:

1. Understand the numerical methods involved in Finite Element Theory
2. Understand the role and significance of shape functions in finite element formulations and use linear, quadratic, and cubic shape functions for interpolation
3. Understand direct and formal (basic energy and weighted residual) methods for deriving finite element equations
4. Understand global, local, and natural coordinates
5. Understand the formulation of one-dimensional elements (truss and beam)
6. Understand the formulation of two-dimensional elements (triangle and quadrilateral continuum and shell elements)
7. Understand the formulation of three-dimensional elements (tetrahedral and brick elements)
8. Select appropriate space (planar (plane stress or strain), axisymmetric, or spatial), idealization (type of element), and modeling techniques
9. Perform and verify FEA using commercial FEA software

(AJ6343) PLANT LAY OUT AND MATERIAL HANDLING

III B.Tech-II Semester (ME)	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

Pre requisites: Knowledge of operations in industries.

Objectives: After the completion of this course the students will be able to:

1. Understand and be able to complete the following charts with regard to a specific product: assembly chart, route sheet, operations process chart, from-to chart, and activity relationship chart Identify equipment requirements for a specific process.
2. Understand the benefit of an efficient material handling system.
3. Understand what effect process layout has on the material handling system.
4. Recommend improvements to existing plant layouts from the standpoint of material handling and product flow Design flexibility into a plant layout to accommodate changes in product volume or product line Integrate concepts and techniques learned through this course in order to design and efficient plant layout in a team environment.

UNIT-I:
Introduction – Classification of Layout, Advantages and Limitations of different layouts, Layout design procedures, Overview of the plant lay out, Process layout & Product layout selection, specification, implementation and follow up, comparison of product and process lay out.

UNIT-II:
Heuristics for plant layout –ALDEP,CORELAP,CRAFT.

UNIT-III:
Group layout-Fixed position layout-Quadratic assignment model, Branch and bound method.

UNIT-IV:
Introduction, material handling systems, material holding properties, classification of material handling equipment, relationship of material handling to plant lay out ,Basic material handling systems: selection material handling method –path, equipment and function oriented systems.

UNIT-V:
Methods to minimize cost of Material Handling maintenance of material handling equipments, safety in handling, Ergonomics of material handling equipment, design, miscellaneous equipments.

TEXT BOOKS:
1. Operations Management/PB Mahapatra/PHI
2. Aspects of Material handling/Dr.KC Arora & Shinde, Laxmi publiocations

Outcomes:

1. At the end student able to the arrangement of physical facilities and material handling to optimize the interrelationships among operating personnel, material flow, and the methods required in achieving enterprise objectives efficiently, economically, and safely.

(AJ6344) AUTOMATION IN MANUFACTURING

III B.Tech-II Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Fundamentals of operations involved in manufacturing industries.

Objective:
This course aims to acquaint the students with principles, concepts and techniques that are essential in Automation in Manufacturing.

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 transfer the automaton.
Automated flow lines: Methods or work part transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – II
Analysis of Automated flow lines: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.
Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT –III
Automated material handling: 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; work in process storage, interfacing handling and storage with manufacturing.

UNIT – IV
FUNDAMENTALS OF INDUSTRIAL CONTROLS: Review of control theory. Logic controls, sensors and actuators, Data communication and LAN in manufacturing.

UNIT- V
Business process Re-engineering: Introduction to BPE logistics, ERP, Software configuration of BPE, concurrent Engineering, Techniques of Rapid Proto typing.

Text book:
1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./
PE/PHI, 2009.

References:
1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.
4. Computer Aided Manufacturing,Tien-Chien Chang, Richard A.Wysk and Hsu-Pin Wang,

Pearson,2009

Outcomes:
Able to design and analyze automated flow lines and automated material handling systems. Able to apply BRP and BPE logistics.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ6325) HEAT TRANSFER LAB

III B. Tech - II Semester (ME)	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

Prerequisites: Study the heat transfer subject thoroughly.

Objectives:
The objective of this heat transfer lab is to know the practical knowledge of various heat transfer modes and its applications.

List of experiments:

1. Composite Slab Apparatus — Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere.
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin
6. Experiment on Transient Heat Conduction.
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection
9. Parallel and counter flow heat exchange.
10. Emissivity apparatus.
11. Stefan Boltzmann Apparatus.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.
14. Film and Drop wise condensation apparatus.

Outcomes

1. Obtain the practical knowledge of heat transfer by conduction, convection, and radiations.
2. Gain knowledge about how heat transfer will take place practically.
3. Also obtain how heat transfer takes place in extended surfaces.
4. Phase changes in different applications like heat exchanger, boiling and condensation.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ6328) PRODUCTION DRAWING PRACTICE

III B.Tech-II Semester (ME)	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

OBJECTIVES:

1. To understand conversional representation of various joints and circuits on the part drawings.
2. To understand the representation of positional and geometrical tolerances, surface roughness indication and heat treatment symbols on the part drawings.

UNIT – I

Conventional representation of Materials – conventional representation of parts – screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits – methods of indicating notes on drawings.

UNIT – II

Form and Positional Tolerances: Introduction and indication of the tolerances of from and position on drawings, deformation of runout and total runout and their indication.

UNIT – III

Surface roughness and its indication: Definitions – finishes obtainable from various manufacturing processes, recommended surface roughness on mechanical components.

UNIT – IV

Heat treatment and surface treatment symbols used on drawings.

Detailed and Part drawings: Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors etc.

UNIT – V

Part drawing using computer aided drafting by AutoCAD software.

Text books:

1. Production and Drawing – K.L. Narayana & P. Kannaiah/ New Age
2. Machine Drawing with Auto CAD- Pohit and Ghosh, PE

Reference:

1. Geometric dimensioning and tolerancing- James D. Meadows/ B.S Publications
2. Engineering Metrology, R.K. Jain, Khanna Publications.

Outcomes: Able to prepare part drawings and process planning sheets.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES

(UGC-AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ6329) PRODUCT DESIGN LAB

III B.Tech-II Semester (ME)	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

Objective: To understand preparation of part drawings, modeling and analysis of various parts using application software.

- Solid modeling –Extrude, Revolve, Sweep, etc and Variational sweep, Loft ,etc
- Surface modeling –Extrude, Sweep, Trim...etc and Mesh of curves, Free form etc
- Feature manipulation – Copy, Edit, Pattern, Suppress, History operations etc.
- Assembly-Constraints, Exploded Views, Interference check
- Drafting - Layouts, Standard & Sectional views, Detailing & Plotting.

Exercises in Modeling and drafting of Mechanical Components - Assembly using Parametric and feature based Packages like AutoCAD and PRO-E.

- Model analysis, structural analysis and thermal analysis of various parts using ANSYS.

Outcome:

1. Able to prepare part drawings various components using AutoCAD.
2. Able to model the various parts using ProE software.
3. Able to perform analysis of various parts using ANSYS software.

B.TECH
IV YEAR
I & II SEMESTER
SYLLABUS

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7330) METROLOGY AND INSTRUMENTATION

IV B. Tech - I Semester (ME) **L T P C**

4 1 0 4

Objectives:

1. To understand the importance of limits: fits tolerances in mass production. Learn how to design limit gauges. Also learn length standards and how to measure linear, angular and taper dimensions.
2. To learn surface roughness measurement, Gear tooth profile and screw thread measurement.
3. To learn generalized instrumentation system, and measurement methods used to measure various physical quantities such as displacement, strain, temperature, pressure, speed, flow and acceleration.

UNIT- I

System of limits and Fits: Theory of limits, fits and tolerances – Fundamental deviation – types – Grades of tolerances – Fits – Types of fits - Hole basis and shaft basis systems – Interchangeability and selective assembly. Limit Gauges - Taylor's principle – GO and NO GO gauges – plug and ring gauges.

Linear, Angle, Taper and Optical Measurements: Slip gauges – Dial indicators – Micrometer.

Bevel protractor – Angle slip gauges —sine bar – Taper determination using Rollers and spheres. Optical flats – NPL Interferometer.

UNIT – II

Surface roughness measurement : Surface roughness and surface texture – Numerical assessment of surface finish – CLA – RMS- Ten point height of irregularity - Measuring Instruments - Profilograph – Talysurf.

Screw Thread Measurement and Gear Measurement: Element of measurement-errors in

Screw Thread –Measurement of effective diameter using 2-wire and 3-wire method, angle of thread and thread pitch. Gear tooth profile measurement, measurement of diameter, pitch pressure angle and tooth thickness.

UNIT-III

Basic principle of measurement-Generalized configuration and functional description of measuring instruments. Static and dynamic characteristics.

Displacement measurement: Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, Capacitance and Resistance type transducers.

Strain measurement: Various types of strain measurements, electrical resistance strain gauge, gauge factor - configurations to measure tensile, compressive and bending strains.

UNIT-IV

Temperature Measurement: various principles of temperature measurements, expansion thermometers, resistance thermometers, thermistors, thermocouples, pyrometers.

Pressure Measurement: classification-different principles used. Bourdon pressure gauges, bellows, and diaphragm gauges. Low pressure measurement-thermal conductivity gauges, ionization pressure gauges, McLeod pressure gauge.

UNIT –V

Flow measurement: Rotometer, magnetic, ultrasonic, turbine flow meter, hot wire anemometer and Laser Doppler anemometer (LDA).

Measurement of Speed: Mechanical and electrical tachometers, Stroboscope and non contact type tachometers.

Measurement of acceleration and vibration: Principles of seismic instruments-vibrometer and Accelerometer.

Textbooks:

1 Engineering Metrology by R.K.Jain, 20th ed., Khanna Publishers New Delhi, 2009

2. Instrumentation and mechanical measurements by A.K.Tayal, Galgotiya publications

Reference:

1. R.K. Rajput, "Mechanical Measurements & Instrumentation", 3rd ed., S.K. Kataria & Sons,
2010.
2. E.O. Doebelin, "Measurement Systems", 6th ed., Tata Mc Graw Hill, New Delhi, 2011
3. D.S.Kumar, "Mecahnical Measurements & Controls", 5th ed., Metropolitan Book Pvt. Ltd.,
2012.

Outcomes:

1. Able to understand the importance of limits; fits tolerances in mass production. Learn how to design limit gauges. Also learn length standards and how to measure linear, angular and taper dimensions.
2. Able to learn surface roughness measurement, Gear tooth profile and screw thread measurement.
3. Able to learn generalized instrumentation system, and measurement methods used to measure various physical quantities such as displacement, strain, temperature, pressure, speed, flow and acceleration.

IV B. Tech - I Semester (ME)	**L**	**T**	**P**	**C**
	4	**1**	**0**	**4**

Objectives:

1. Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
2. Model the 3-D geometric information of machine components including assemblies, and
   automatically generate 2-D production drawings.
3. Improve visualization ability of machine components and assemblies before their actual
   fabrication through modeling, animation, shading, rendering, lighting and coloring,
4. Model complex shapes including freeform curves and surfaces,
5. Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering,
6. Implement CNC programs for milling and turning machining operations, - Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.
7. Integrate the CAD system and the CAM system by using the CAD system for modeling design information and converting the CAD model into a CAM model for modeling the manufacturing information
8. Use full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

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, and solid modeling.

UNIT – III

Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT – IV

Group Tech: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, Computer aided testing, integration of CAQC with CAD/CAM.

UNIT – V

Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

Text book:

1. CAD / CAM A Zimmers & P.Groover/PE/PHI
2. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH

References:

1. Automation, Production systems & Computer integrated Manufacturing/ Groover/P.E
2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
3. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
4. CAD/CAM: Concepts and Applications/Alavala/ PHI
5. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

Outcomes:

1. Able to learn the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
2. Able to Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.
3. Able to Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring,
4. Able to Model complex shapes including freeform curves and surfaces.
5. Able to understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverses engineering and virtual engineering.
6. Able to Implement CNC programs for milling and turning machining operations, - Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.
7. Able to Integrate the CAD system and the CAM system by using the CAD system for modeling design information and converting the CAD model into a CAM model for modeling the manufacturing information
8. Able to Use full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

(AJ7345) OPERATION RESEARCH

IV B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites

1. Prerequisites Familiarity with linear algebra is required (e.g. Math 511 Linear Algebra or a basic Linear Algebra class)
2. Required readings Hiller, F.S. and Lieberman, G.J., Introduction to Operations Research (9th ed.), McGraw-Hill, 2009
3. Recommended readings Winston, W.L., Introduction to Mathematical Programming (4th ed.), Duxbury Press, 2002

Objectives

1. To formulate a real-world problem as a mathematical programming model
2. To understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
3. To understand the relationship between a linear program and its dual, including strong duality and complementary slackness
4. To perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change
5. To solve specialized linear programming problems like the transportation and assignment problems
6. To solve network models like the shortest path, minimum spanning tree, and maximum flow problems
7. To understand the applications of, basic methods for, and challenges in integer programming
8. To understand how to model and solve problems using dynamic programming
9. To model a dynamic system as a queuing model and compute important performance measures
10. To earn optimality conditions for single- and multiple-variable unconstrained and constrained non-linear optimization problems, and corresponding solution methodologies.

UNIT – I

Development – Definition– Characteristics and Phases – Types of models – operation Research models – applications.

Allocation: Linear Programming Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT – II

Transportation problem – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy. Assignment problem – 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 – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle– m X 2 & 2 X n games -graphical method.

UNIT –I V
Waiting lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.
Inventory : Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

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.

Text book:
1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller & Libermann (TMH).

References:
1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.
2. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman
3. Operations Research / R.Pannerselvam,PHI Publications.
4. Operations Research / Wagner/ PHI Publications.
5. Operation Research /J.K.Sharma/MacMilan.
6. O.R/Wayne L.Winston/Thomson Brooks/cole
7. Introduction to O.R /Taha/PHI

Outcomes:
1. Student able to understand about Operations research (OR) has many applications in science, engineering, economics, and industry and thus the ability to solve OR problems is crucial for both researchers and practitioners.
2. Being able to solve the real life problems and obtaining the right solution requires understanding and modeling the problem correctly and applying appropriate optimization tools and skills to solve the mathematical model.
3. The goal of this course is to teach you to formulate, analyze, and solve mathematical models that represent real-world problems.

(UGC AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ7346) RELIABILITY ENGINEERING

IV B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Engineering Mathematics, Probability, Statistics.

Objectives: To understand basic principles of Reliability for ensuring sustainable product design. - Application to system requirements, design, manufacturing and testing. Understand in detail Asset Management, Maintenance, Quality and Productiveness,

UNIT I

Fundamental concepts of Reliability: Reliability terminologies, Role of the reliability function in the organization, Interrelationship of safety, quality and reliability, life characteristic phases, Product liability-Significance, importance of reliability, Introduction to maintainability, availability.

Concepts of Failure, failure density, failure Rate, hazard rate, pdf, cdf. Modes of failure, Mean Time to Failure (MTTF), Mean Time Between Failure (MTBF), Numericals based on calculation of failure rate, hazard rate. Warranty Management and Life cycle cost.

UNIT II

Probability Concepts and System Reliability: Basic probability concepts, Laws of probability, Introduction to independence, mutually exclusive, conditional probability, Discrete and continuous probability distributions, Comparison of probability distributions -binomial, normal, lognormal, Poisson, Weibull, exponential.

Standard deviation, variance, mean, mode and Central Limit Theorem. Analysis of series, parallel, mixed configuration systems. Concept of k- out of n structure, Conditional probability method, delta-star method for conditional probability analysis, Tie-set and Cut Set method .

UNIT III

System reliability Analysis: Reliability Improvement- Redundancy, element redundancy, unit redundancy, standby redundancy types of stand by redundancy, parallel components single redundancy, multiple redundancies (Numericals).

Introduction to Reliability allocation or apportionment, reliability apportionment techniques - equal apportionment, AGREE, ARINC, Minimum effort method (Numericals).

UNIT IV

Reliability Management: Objectives of maintenance, types of maintenance, Maintainability, factors affecting maintainability, system down time, availability - inherent, achieved and operational availability (Numerical treatment).

Introduction to Reliability Centered Maintenance. Design for maintainability and its considerations, Reliability and costs, Costs of Unreliability, Standards for Reliability-MIL Handbook 217F & Carderock Model. Technology aspects in Reliability Management, BIT (Built in testing).

UNIT V

Reliability in Design & Development: Reliability techniques- Failure mode, effects analysis (FMEA),Failure mode, effects and criticality analysis (FMECA)-Case Studies, Basic symbols, Fault Tree construction and analysis, Monte Carlo Simulation.
Introduction to Design of Experiments (DOE) and Taguchi Method. Human factors in design and design principles.

Text books:

1. Reliability Engineering, by L.S.Srinath, EWP , 4th Edition 2011
2. Quality and Reliability in Engineering by Chandrupatla, Cambridge Uni. Press, India

Referances:

1. Reliability in engineering Design‖ by Kapur, Wiley india
2. Reliability Based Design, by S S. Rao, McGraw Hill Inc. 1992
3. Reliability Engineering Handbook by Bryan Dodson, Dennis Nolan, Marcel Dekker Inc, 2002
4. Terotechnology and Reliability Engineering by Basu S.K, Bhaduri , Asian Books Publication
5. Reliability Engineering Theory and Practice, by Alessandro Birolini, Springer
6. Market Leadership by Quality and Reliability by R.M. Parkhi, Vidyanand Publications 2012
7. Reliability Engineering and Life Testing, by V.N.A. Naikan, PHI Learning 2010
8. Reliability and Maintainability Engineering, by Charles E. Ebeling, TMH 2009
9. The New Weibull Handbook by Dr. Robert B. Abernathy,

Outcomes:

After completion of the course students would be able to, - Understand and analyze different methods of failure. - Calculate MTTF, MTBF, failure rate and hazard rate. - Different probability methods applied to Reliability. - Optimize Cost & reliability. - Perform FEMA, FMECA, DOE, Taguchi method.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7347) MODELLING AND SIMULATION OF MANUFACTURING SYSTEMS

IV B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: To learn various concepts related to numerical optimization and different manufacturing techniques.

Objectives:

1. The primary objective of this course is to provide an insight into how simulation modeling can aid in effective decision-making.
2. The bulk of the time in the course is spent on discrete event simulation modeling.
3. Simulation model building aspects of discrete systems (such as manufacturing and logistics facilities, supply-chains) are covered in detail.
4. It is also demonstrated how computer simulation can be used to successfully model, analyze and improve systems under study.
5. A simulation software (Arena) is used to demonstrate building and executing the models.

Systems dynamics and continuous simulation are also covered in earlier part of the course.

UNIT - I

System - ways to analyze the system - Model - types of models - Simulation - Definition - Types of simulation models - steps involved in simulation - Advantages & Disadvantages. Parameter estimation - estimator - properties - estimate - point estimate - confidence interval estimates - independent - dependent - hypothesis - types of hypothesis- step - types l& 2 errors - Framing - string law of large numbers.

UNIT - II

Building of Simulation model validation - verification - credibility - their timing - principles of valid simulation Modeling - Techniques for verification - statistical procedures for developing credible model. Modeling of stochastic input elements - importance - various procedures - theoretical distribution - continuous – discrete their suitability in modeling.

UNIT - III

Generation of random variables - factors for selection methods - inverse transform - composition - convolution - acceptance - rejection - generation of random variables - exponential - uniform - weibull - normal Bernoullie - Binomial uniform - poisson - Simulation languages - comparison of simulation languages with general purpose languages Simulation languages vs Simulators - software features - statistical capabilities - G P S S - S1MAN- SIMSCRIPT - Simulation of WMJI queue - comparison of simulation languages.

UNIT - IV

Output data analysis - Types of Simulation w. r. t output data analysis – warm up period- Welch algorithm - Approaches for Steady - State Analysis - replication - Batch means methods - corn pan Sons.

UNIT - V

Applications of Simulation - flow shop system - job shop system - M/MI1 queues with infinite and finite capacities - Simple fixed period inventory system – New boy paper problem.

Text book:

1. Simulation Modelling and Analysis / Law, A.M.& Kelton / Mc Graw Hill, Edition/ New York,
1991.

References:

1.Discrete Event System Simulation *I* Banks J. & Carson J.S., PH *I* Englewood Cliffs N/ 1984.
2. Simulation of Manufacturing Systems / Carrie A. / Wiley, NY, 1990.
3. A Course in Simulation / Ross, S.M., McMillan, NY, 1990.
4.Simulation Modelling and S1MNET/ Taha HA. / PH, Englewood Cliffs, NJ, 1987

Outcomes: Student Able to learn:

1. The bulk of the time in the course is spent on discrete event simulation modeling.
2. Simulation model building aspects of discrete systems (such as manufacturing and logistics
facilities, supply-chains) are covered in detail.
3. It is also demonstrated how computer simulation can be used to successfully model, analyze
and improve systems under study.
4. A simulation software (Arena) is used to demonstrate building and executing the models.
Systems dynamics and continuous simulation are also covered in earlier part of the course.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7348) POWER PLANT ENGINEERING

IV B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Thermal Engineering and Internal Combustion engines Gas Turbines

Objectives:

1. To learn about features and performance of a thermal power plant cycle
2. To learn about diesel engine and gas turbine power plants.
3. To learn about the hydroelectric and nuclear power plants.
4. To learn about nonconventional power plants.
5. To learn the procedure of power tariff calculations and economics of power generations

UNIT - I

Introduction: Various Energy sources - Types of power plants - Resources and Development of Power in India.

Steam power plant: Plant Layout - Working of Different circuits - Types of Coal - Coal handling systems - Coal storage - Overfeed and underfeed fuel beds -Pulverized Fuel burning system - Ash handling systems - Dust collection and its disposal - Mechanical type - Electrostatic Precipitator - Cooling Towers and heat rejection.

UNIT - II

Diesel power plant: Plant layout with auxiliaries - Fuel storage and Fuel supply system - Air supply system - Exhaust system - Water cooling system - Lubrication system - Starting system - Supercharging - Advantages and Disadvantages of Diesel plants over Thermal plants.

Gas turbine plant: Introduction - Classification - Layout with auxiliaries - Principles of working of Closed and Open cycle gas turbines - Combined cycle power plants and comparison.

UNIT - III

Hydro electric power plant: Hydrology - Hydrological cycle – Rainfall - Run off Hydrograph - Flow duration curve - Mass curve - Site selection of hydro plant - Typical layout - Different types of hydro plants.

Nuclear power plant: Nuclear Fission and Fusion - Nuclear Fuels – Breeding - Components of Reactor - Types of Nuclear Reactors - Pressurized water reactor(PWR) - Boiling water reactor(BWR) - CANDU reactor - Gas cooled reactor - Liquid metal cooled reactor - Fast Breeder Reactor - Nuclear waste and its Disposal.

UNIT - IV

Power from non-conventional sources: Solar power plants - Utilization of Solar collectors - Principle of working of Wind energy – Types – HAWT, VAWT - Tidal Energy.

Direct energy conversion system: Solar cell - Fuel cell - Thermo Electric and Thermo ionic conversion system - MHD generation.

UNIT - V

Power plant economics: Fixed cost - Operating cost - Fluctuating loads - General arrangement of Power Distribution - Load curves - Load duration curve - Connected load - Maximum demand - Demand factor - Average load - Load factor - Diversity factor - Plant capacity factor.

Pollution and control: Introduction - Particulate and gaseous pollutants - Air and Water pollution by thermal power plants and its control - Acid rains - Methods to control pollution.

Text books:

1. P.C.Sharma, Power Plant Engineering, 9th Revised & Reprint Edition 2012 S.K.Kataria&sons.
2. Arora & Domkundwar, A course in Power Plant Engineering- Dhanpat Rai & Company 5th Revised Reprint Edition, 2004.

References:

1. R.K.Rajput, a Text book of Power Plant Engineering, Laxmi Publications, 2nd Edition 2001.
2. P.K.Nag, Power Plant Engineering, 3rd Edition, 2008 TMH, New Delhi.
3. M.M.ElWakil, Power plant technology, 3rd Edition 2010 TMH.
4. G.R.Nagpal, Power plant engineering, Khanna Publishers.14th Edition 2000.
5. K.K.Ramalingam, "Power Plant Engineering ", Scitech Publications, 2002.
6. G.D.Rai, "Introduction to Power Plant technology" Khanna Publishers, 1995.

Outcomes:

1. Develop awareness on different types of power generation systems.
2. Differentiate conventional and non conventional power plants.
3. Distinguish between polluting and non polluting power plants.
4. Acquire knowledge on the economic viability of various power generation systems.
5. Apply the power plant engineering concepts practically in developing low cost systems.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7349) ADVANCED STRENGTH OF MATERIALS

IV B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisite: Mechanics.

Course:

1. To establish an understanding of the fundamental concepts of mechanics of deformable solids; including static equilibrium, geometry of deformation, and material constitutive behavior.
2. To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.
3. To discuss the basic mechanical principles underlying modern approaches for design of various types of structural members subjected to axial load, torsion, bending, and transverse shear and combined loading.
4. To build the necessary theoretical background for further structural analysis and design courses.

UNIT-I

Introduction: Introduction to Continuum Mechanics. Review of vector calculus. Analysis of Stress: Definition and notation of stress, normal and shear stress components, specification of stress at a point, stress Tensor, Differential equations of equilibrium, Principal stresses and the Mohr Diagram, Stresses in Polar coordinates.

Analysis of Strain: Definition and notation of strain, Strain components, Specification of strain at a point, Strain Invariants, Mohr's Circle for strains. Strains in Polar coordinates. Compatibility equations.

UNIT-II

Stress-Strain Relations and the General Equations of Elasticity: Idealization of Engineering Materials, Generalized Hooke's law in terms of Engineering elastic constants, Saint-Venant's principle. Thermal Stresses, Thermo elastic stress-strain relations, strain-displacement relations. General equations in cylindrical coordinates. Plane-Stress and Plane-Strain conditions. Combined Loads: Analysis of biaxial state of stress at a point, principal stresses, Mohr's circle representation of stresses. Applications to combined axial, torsion, eccentric and flexural loads, equivalent bending and twisting moments.

UNIT-III

Theories of Elastic Failure: The importance of failure theories in design, maximum normal strain, theory maximum shear stress theory, Max. axial strain theory, Energy distortion theory, applications. Fatigue Loads: Types of Fatigue loads, phenomenon of Fatigue failure, endurance limit, Stresses concentration and its importance in design, stress concentration factor, notch sensitivity, Soderberg equation, Goodman line, Gerber's parabola, fatigue design under Combined loading.

UNIT-IV

Bending of Curved Bars: Stresses in bars of small initial curvature, strength in bars of large initial curvature, Extension of curved bars, practical design application. Springs: Closed coiled helical springs, deflection and stresses in helical springs, concentric springs, springs under variable loads.

UNIT-V

Energy Principles and Variational Methods: Principle of Potential energy, Principle of complementary energy. The Principles of potential and complementary energy considered as variational principles. Rayleigh-Ritz method, Galerkin method. Reciprocal Theorem and Castigliano's Theorems.

Text books:

1. A.C.Ugural and S.K.Fenster, Advanced Strength and Applied Elasticity, 3/e, PTR Printice
Hall, Eaglewood Cliffs, New Jersey, 1995
2. L.S. Srinath, Advanced Mechanics of Solids, 2e, Tata McGraw-Hill, New Delhi, .

Reference:

1. C.T. Wang, Applied Elasticity, McGraw-Hill, New York, 1953.
2. Hibbeler, R.C., "Mechanics of Materials", 6th SI edition, Prentice Hall Reference
3. Beer, F.P., Johnston, E.R., DeWolf, J.T., "Mechanics of Materials", 4th edition, McGraw Hill.
4. Craig, R.R., "Mechanics of Materials", 2nd edition, John Wiley and Sons.
5. E.P.Popov, Engineering Mechanics of Solids, Pearson Education, New Delhi

Outcomes:

1. An ability to apply knowledge of mathematics, science and engineering
2. An ability to design a system, component, or process to meet desired needs such as economic, environmental, safety, manufacturability, and sustainability
3. An ability to identify, formulate and solve engineering problems
4. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice Course Assessment: Course will be assessed on the basis of the accomplishments regarding the course objectives and the contributions to the program outcomes.
5. The evaluation will consist mainly of the responses from the students, who will provide their comments to various course related questions in the final week of the semester.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7350) MECHANICS OF COMPOSITE MATERIALS

IV B. Tech - I Semester (ME)	L	T	P	C
	3	1	0	3

Objectives:

1. To analyze problems on macromechanical behavior of lamina
2. To analyze problems on micromechanical behavior of lamina
3. To analyze problems on macromechanical behavior of laminate
4. To analyze problems on bending, buckling, and vibration of laminated plates and beams
5. To obtain laminate behavior using a computer program
6. To perform literature search on a selected advanced material topic and giving class presentation

UNIT I

Introduction to composite materials: Definition-Matrix materials-polymers-metals-ceramics - Reinforcements: Particles, whiskers, inorganic fibers, metal filaments-ceramic fibers- fiber fabrication- natural composite wood, Jute - Advantages and drawbacks of composites over monolithic materials. Mechanical properties and applications of composites, Particulate-Reinforced composite Materials, Dispersion-Strengthened composite, Fiber-reinforced composites Rule of mixtures-Characteristics of fiber-Reinforced composites, Manufacturing fiber and composites.

UNIT II

Manufacturing of composites: Manufacturing of Polymer Matrix Composites (PMCs)-handlay-up, spray technique, filament winding, Pultrusion, Resin Transfer Moulding (RTM)-, bag moulding, injection moulding, Sandwich Mould Composites (SMC) – Manufacturing of Metal Matrix Composites (MMCs) – Solid state, liquid state,vapour state processing, Manufacturing of Ceramic Matrix Composites (CMCs) – hot pressing-reaction bonding process-infiltration technique, direct oxidation- interfaces

UNIT III

Introduction, lamina constitutive equations: Lamina Constitutive Equations: Lamina Assumptions – Macroscopic Viewpoint. Generalized Hooke's Law. Reduction to Homogeneous Orthotropic Lamina – Isotropic limit case, Orthotropic Stiffness matrix (Qij), Definition of stress and Moment Resultants. Strain Displacement relations. Basic Assumptions of Laminated anisotropic plates. Laminate Constitutive Equations – Coupling Interactions, Balanced Laminates, Symmetric Laminates, Angle Ply Laminates, Cross Ply Laminates. Laminate Structural Moduli. Evaluation of Lamina Properties from Laminate Tests. Quasi-Isotropic Laminates. Determination of Lamina stresses within Laminates.

UNIT IV

Lamina strength analysis and analysis of laminated flat plates: Introduction – Maximum Stress and Strain Criteria. Von-Misses Yield criterion for Isotropic Materials. Generalized Hill's Criterion for Anisotropic materials. Tsai-Hill's Failure Criterion for Composites. Tensor Polynomial (Tsai-Wu) Failure criterion. Prediction of laminate

Failure Equilibrium Equations of Motion. Energy Formulations. Static Bending Analysis. Buckling Analysis. Free Vibrations – Natural Frequencies

UNIT V

Thermal analysis: Assumption of Constant Co-efficient of Thermal Expansion (C.T.E.) – Modification of Hooke's Law. Modification of Laminate Constitutive Equations. Orthotropic Lamina C.T.E's. C.T.E's for special Laminate Configurations – Unidirectional, Off-axis, Symmetric Balanced Laminates, Zero C.T.E laminates, Thermally Quasi-Isotropic Laminates.

Text Books:

1. Madhujit Mukhopadhyay, "Mechanics of Composite Materials and Structures", University
Press (India) Pvt. Ltd., Hyderabad, 2004 (Reprinted 2008)
2. Chung, Deborah D.L., "Composite Materials: Science and Applications", Ane Books Pvt.
Ltd./Springer, New Delhi, 1st Indian Reprint, 2009

References:

1. Gibson, R.F., Principles of Composite Material Mechanics, McGraw-Hill, 1994, Second
Edition – CRC press in progress.
2. Hyer, M.W., "Stress Analysis of Fiber – Reinforced Composite Materials", McGraw-Hill,
1998
3. Issac M. Daniel and Ori Ishai, "Engineering Mechanics of Composite Materials", Oxford
University Press-2006, First Indian Edition – 2007
4. Mallick, P.K., Fiber –"Reinforced Composites: Materials, Manufacturing and Design",
Maneel Dekker Inc, 1993.
5. Halpin, J.C., "Primer on Composite Materials, Analysis", Techomic Publishing Co., 1984.
6. Agarwal, B.D., and Broutman L.J., "Analysis and Performance of Fiber Composites", John
Wiley and Sons, New York, 1990.
7. Mallick, P.K. and Newman, S., (edition), "Composite Materials Technology: Processes and
Properties", Hansen Publisher, Munish, 1990.

Outcomes:

1. Ability to understanding of types, manufacturing processes, and applications of composite materials
2. Ability to analyze problems on macromechanical behavior of lamina
3. Ability to analyze problems on micromechanical behavior of lamina 4. Ability to analyze problems on macromechanical behavior of laminate
5. Ability to analyze problems on bending, buckling, and vibration of laminated plates and beams
6. Ability to obtain laminate behavior using a computer program
7. Ability to perform literature search on a selected advanced material topic and giving class presentation

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7331) METROLOGY AND INSTRUMENTATION LAB

IV B. Tech - I Semester (ME)	L	T	P	C
	0	0	3	2

List of experiments to perform:

Section (A):

1. Measurement of lengths, heights, diameters by vernier calipers micrometer etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, vernier calipers and checking the chordal addendum and chordal height and tooth thickness of spur gear.
4. Machine tool alignment of test on the lathe.
5. Machine tool alignment test on milling machine.
6. Tool maker's microscope and its applications
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Effective diameter of screw thread measurement by Two wire/ Three wire method/Tool makers microscope.
9. Surface roughness measurement by Taly Surf.

Section (B):

1. Calibration of pressure Gauge.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of McLeod gauge for low pressure.

Note: Any 6 Experiments to be performed from each section.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7333) CAD / CAM LAB

IV B. Tech - I Semester (ME)	L	T	P	C
	0	0	3	2

1**. Drafting:**
Development of part drawings for various components in the form of orthographic and isometric. Representation of Dimensioning and tolerances scanning and plotting. Study of script, DXE AND IGES FILES.

2. **Part Modeling:**
Generation of various 3D Models through Protrusion, revolve, shell sweep.
Creation of various features. Study of parent child relation. Feature based and Boolean based
modeling surface and Assembly Modeling. Study of various standard Translators. Design simple
components.

3. **FEA:**
a). Determination of deflection and stresses in 2D and 3D trusses and beams.
b). Determination of deflections component and principal and Von-mises stresses in plane
stress, plane strain and Axisymmetric components.
c). Determination of stresses in 3D and shell structures (at least one example in each case)
d). Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
e). Steady state heat transfer Analysis of plane and Axisymmetric components.

4. CAM:
a). Development of process sheets for various components based on tooling Machines.
b). Study of various post processors used in NC Machines.
c). Development of NC code for free form and sculptured surfaces using CAM packages.
d). Machining of simple components on NC lathe and Mill by transferring NC Code / from a
CAM package.
e). Quality Control and inspection.

Software Packages: Use of Auto CAD, Pro-E, ANSYS, Cut viewer etc.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ8351) AUTOMOBILE ENGINEERING

IV B. Tech - II Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Internal Combustion Engines & Gas Turbines, Thermal Engineering

Objectives:

1. To understand components of an automobile and functions of each component.
2. To learn working of fuel injection pumps and advanced injection systems used.
3. To understand detailed study of sensors and modern Ignition systems.
4. To understand the working of transmission system components.
5. To acquire knowledge about suspension and braking systems in automobiles and Concept of steering geometry related to Vehicle dynamics applications.

UNIT – I

Introduction: Components of four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive.

Types of automobile engines and engine components: engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarburization, Nitriding of crank shaft.

UNIT – II

Fuel System, S.I. Engine and C.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters – carburetor – types – air filters – petrol injection. Multipoint fuel injection for S.I. Engines - Requirements of diesel injection systems, types of injection systems, fuel pump - nozzle, spray formation, injection timing, testing of fuel pumps. Common rail diesel injection systems

Cooling system and Emission from Automobiles : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.– Pollution standards National and international – Pollution Control Techniques –Energy alternatives.

UNIT – III

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge– oil pressure
gauge, engine temperature indicator etc.

UNIT – IV

Transmission System: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter.

Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

UNIT – V

Steering System: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

Suspension System and Braking System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system. Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

Text books:

1. Automotive Mechanics – Vol. 1 & Vol. 2 / Kirpal Singh.
2. Automobile Engineering / William Crouse

References:

1. Automotive Engineering / Newton Steeds & Garrett
2. Automotive Mechanics / G.B.S. Narang
3. Automotive Mechanics / Heitner
4. Automotive Engines / Srinivasan
5. Automobile Engineering – K.K. Ramalingam / Scitech Publications (India) PVT. LTD.

Outcomes:

1. Develop different components of an automobile.
2. Develop the fuel feed systems in SI and CI engines, Sensors and Ignition systems.
3. Design various transmission systems.
4. Analyze the simple design oriented problems related to suspension systems, steering systems and braking systems

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ8352) ROBOTICS

IV B. Tech - II Semester (ME)	L	T	P	C
	3	1	0	3

Objective: To be familiar with the automation and brief history of robot and applications.

1. To give the student familiarities with the kinematics of robots.
2. To give knowledge about robot end effectors and their design.
3. To learn about Robot Programming methods & Languages of robot.
4. To give knowledge about various Sensors and their applications in robots.

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.

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 locomotive devices.

UNIT – II

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 – III

Differential transformation and manipulators: Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formations – Problems. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

UNIT IV

Robot actuators and Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

UNIT V

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

Text books:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

References:

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983
London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons
(ASIA) Pte Ltd.

Outcome: Students will be equipped with the automation and brief history of robot and applications.

1. Students will be familiarized with the kinematic motions of robot.
2. Students will have good knowledge about robot end effectors and their design concepts.
3. Students will be equipped with the Programming methods & various Languages of robots.
4. Students will be equipped with the principles of various Sensors and their applications in robots.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ8353) GAS DYNAMICS

IV B. Tech - II Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Thermodynamics and fluid mechanics.

Objectives:
1. To understand the compressible flow fundamentals
2. To study the compressible flow with friction and heat transfer.
3. To know the application of normal shock in compressible flow.
4. To know the application of oblique shock in compressible flow

UNIT I

Introduction: Concept of continuum and control volume, continuity equation- - momentum equation, streamline - steady one dimensional dynamics equation of a fluid flow with without friction - energy equation.

Properties of atmosphere, standard atmosphere, relative pressure - use of air and gas tables. Condition for neglecting compressibility - Compressible flow, acoustic velocity, Mach number, Mach cone, Mach angle.

UNIT II

Isentropic flow: Stagnation enthalpy, density, pressure and temperature - local acoustic speed, maximum speed - variation of Compressibility with Mach number. Von – Karma's rules for supersonic flow.

Differences between Incompressible and Compressible flows:Variable flow, criteria for acceleration and deceleration - critical condition, nozzle discharge co-efficient, nozzle efficiency - operation of nozzles under varying backpressure.

UNIT III

Flow in constant area ducts Fanno flow: Fanno curves - Equation and its solution - Variation of flow properties with duct length - Applications. Isothermal flow with friction -Variation of flow properties.

Applications Rayleigh flow: Rayleigh flow equation - Rayleigh line -Variation of flow properties - Maximum heat transfer - Applications. Non Isothermal flow with heat transfer and friction.

UNIT IV

Diabatic flow: Flow of perfect gases in constant area duct with heat exchange – density temperature – pressure and Mach number relationship – limiting conditions reyleigh line. Types of waves, normal shock-equations of motion - the normal shock relations for perfect gas.

UNIT V

Shock intensity – Rayleigh – Pitot equation for normal shock. Oblique shocks-Relation between β-θ-M, Shock Polar, Detached Shocks, Expansion waves, Prandtl-Meyer Flow, Simple and Non simple Regions.
Flow with shocks and expansion waves at the exit of a convergent-divergent nozzle, Method of Characteristics.

Text books:

1. Yahya S.M.,"Fundamental of Compressible flow", New Age International (P) Ltd., 2003.
2. Zoeb Hussain,"Gas dynamics through problems" WILEY EASTERN LTD.

References:

1. Gas Dynamics, E. Rathakrishnan, Third Edition, Prentice Hall of India pvt. Ltd, New
2. Elements of Gas Dynamics, H.W. Lipmann and A. Roshko.
3. Compressible Fluid Dynamics, Thomson P.A, McGraw-Hill, New York, 1972.
4. Anderson, J.D., Modern Compressible flow, McGraw Hill, 2004.
5. P.H.Oosthaizen, W.E. Carscallen (1999), Compressible Fluid Flow, McGraw-Hill ISE.

Outcomes:

After successful completion of the course, the students should be able to

1. Know the differences between compressible and incompressible flows.
2. Solve problems in Rayleigh and Fanno flow.
3. Understand the shock formation in sub sonic flows and supersonic flows.

(UGC AUTONOMOUS, AFFILIATED TO JNTUH)

(AJ8354) UNCONVENTIONAL MACHINING PROCESSES

IV B. Tech - II Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites:
Knowledge on materials and machining processes

Objective:
To learn about various unconventional machining processes, the various process Parameters and their influence on performance measures and their applications.

UNIT – I
Introduction – Need for non-traditional machining methods-classification of modern machining processes – considerations in process selection. materials and applications.

UNIT – II
Ultrasonic machining – Elements of the process, mechanics of metal removal process parameters,economic considerations, applications and limitations, recent development.
Abrasive jet machining, Water jet machining and abrasive water jet machine, Magnetic abrasive finishing: Basic principles, equipments, process variables, and mechanics of metal removal, application and limitations.
Chemical machining: principle- maskants –etchants- applications.

UNIT - III
Electro–chemical processes: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tool design, and Surface finish and accuracy. Economic aspects of ECM. Problems for estimation of metal removal rate. Advantages, limitations and applications of ECM.

UNIT - IV
Thermal metal removal processes : General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Mechanics of metal removal in EDM, Process parameters, selection of tool electrode and dielectric fluids, methods surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT – V
Electron beam machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes, influence of process parameters. Advantages, limitations and applications of EBM
Laser Beam Machining: –General Principle and application of thermal features, cutting speed and accuracy of cut.
Plasma Arc Machining: Application of plasma for machining, metal removal mechanism, process parameters, accuracy and surface finish and other applications of plasma in manufacturing industries.

Text book:

1**.** Advanced machining processes/ VK Jain/ Allied publishers.

Reference:

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.
2. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.
2. Modern Production / Operations Management / Baffa & Rakesh Sarin.

Outcomes:

After completion of this course, the students can capable to express different Unconventional machining processes and,

1. able to select suitable machining process for suitable materials
2. able to select optimum parameters for the respective machining process
3. able to Influence of difference process parameters on the performance and their applications

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ8355) COMPUTATIONAL FLUID DYNAMICS

IV B. Tech - II Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Fluid Mechanics; Numerical Methods in Computation; Heat Transfer

Objectives:

1. Computational Fluid Dynamics (CFD) is a core course in the graduate Thermal and Fluid Sciences Curriculum.
2. To study the numerical methods for physical simulations of gas and liquid flows and various computational problems in fluid dynamics.
3. To learn the software packages Matlab and ANSYS/FLUENT are used and the course provides an introduction to relevant features of the program.
4. A computational project using Matlab/FLUENT completes the course.

UNIT I:

Elementary details in numerical techniques: Number system and errors, representation of integers, fractions, floating point arithmetic.

Loss of significance and error propagation, condition for instability, computational methods for error estimation. Convergence of sequences.

UNIT II:

Applied Numerical Methods: Solutions of a system of simultaneous Linear Algebraic Equations. Iterative schemes of Matrix Inversion, Direct Methods for Matrix Inversion. Direct methods for banded matrices.

UNIT III:

Finite Difference Applications in Heat conduction and convection – Heat conduction, steady heat conduction in a rectangular geometry, transient hear conduction, finite difference application in convective heat transfer closure.

Finite differences, discritization, consistency, stability and Fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, and Implementation aspects of finite-difference, consistence, explicit and implicit methods.

UNIT IV:

Introduction to first order wave equation: stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling conservative property, the upwind scheme.

Review of equitation governing fluid flow and heat transfer: Introduction, conservation of mass. Newton second law of motion, expended forms of Navier-Stokes equations.

UNIT V:

Steady flow, dimensionless form of Momentum and Energy equations. Strokes equations, conservative body force heat, and Stream function –Vorticity formulation.

Finite volume method: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, liner interpolation and quadratic interpolation.

Text books:

1. Numerical heat transfer and fluid flow/ Sohas V. Patankar, Hema shava publishers corporations & Mc Graw Hill.
2. Computational Fluid Flow and Heat Transfer/ Muralidaran-Narosa Publications.

References:

1. Computational fluid Dynamics: Basics with applications – Jonn D Anderson.Mc Graw Hill
2. Fundamentals of Computational Fluid Dynamics- Tapan K. sengapta/ Universiteis Press.
3. An introduction to Computational fluid Dynamics – H.K.versteeg & W. Malalasekera longman Scientific & Technical

Outcomes:

1. Students are expected to learn how to formulate and solve computational problems arising in the flow of fluids.
2. They should be able to assess the accuracy of numerical solutions by comparison to known solutions of simple test problems and by mesh refinement studies.
3. Students should learn how CFD is used to predict forces on airfoils. Students are expected to communicate their work graphically and in writing.
4. Teamwork and oral communications are sometimes emphasized, depending on enrollment.
5. Able to undertake flow computations using current best practice for model and method selection, and assessment of the quality of results obtained.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ8356) PRODUCTION PLANNING AND CONTROL

IV B. Tech - II Semester (ME)	L	T	P	C
	3	1	0	3

Prerequisites: Industrial Management

Objectives:
1. To understand the problems and opportunities faced by the operations manager in Manufacturing and service organizations.
2. To develop an ability to apply PPC concepts in a various areas like marketing, accounting, finance, engineering, personnel management, logistics, etc.
3. To integrate operations concepts with other functional areas of business
4. To understand the PPC function in both manufacturing and service organizations.
5. To examine several classic Operations Management planning topics including Production planning and inventory control.

UNIT – I
Introduction : Definition – Objectives of production Planning and Control – Functions of production planning and control – Elements of production control – Types of production – Organization of production planning and control department – Internal organization of department.

UNIT – II
Forecasting – Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods.

UNIT – III
Inventory management – Functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems – Introduction to MRP & ERP, LOB (Line of Balance), JIT inventory, and Japanese concepts.

UNIT –IV
Routing – Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing Procedure. Schedule –definition – Difference with loading, Scheduling Policies – Techniques, Standard scheduling methods, Line Balancing, Aggregate planning, Chase planning, Expediting, controlling aspects.

UNIT –V
Dispatching – Activities of dispatcher – Dispatching procedure – follow up – definition – Reason for existence of functions – types of follow up, applications of computer in production planning and control.

Text books:
1. Elements of Production Planning and Control / Samuel Eilon.
2. Modern Production/ operation managements / Baffa & Rakesh Sarin

References:
1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.

3. Reliability Engineering & Quality Engineering by Dr. C. Nadha Muni Reddy and Dr. K. Vijaya
Kumar Reddy, Galgotia Publications, Pvt., Limited.
4. Production Control A Quantitative Approach / John E. Biegel.
5. Production Control / Moore.
6. Operations Management / Joseph Monks.

Outcomes: Upon completion of this course the student will be able to:

1. Recognize the objectives, functions, applications of PPC and forecasting techniques.
2. Explain different Inventory control techniques.
3. Solve routing and scheduling problems
4. Summarize various aggregate production planning techniques.
5. Describe way of integrating different departments to execute PPC functions

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5360) MATERIAL SCIENCE

L	T	P	C
3	0	0	3

Prerequisites: Brief knowledge about Physical science and its basic applications

Objectives:

6. To understand concept of atomic structure and crystal structures of materials.
7. To acquire the knowledge on Fick's law and its application.
8. To learn the concept of iron carbide diagram.
9. To understand the concepts of different advanced materials and tools.
10. To know the concepts of different material properties.

UNIT-I

Structure: Atomic structure and bonding in materials. Crystal structure of materials, crystal systems, unit cells and space lattices, determination of structures of simple crystals by x-ray diffraction, miller indices of planes and directions, packing geometry in metallic, ionic and covalent solids. Concept of amorphous, single and polycrystalline structures and their effect on properties of materials. Crystal growth techniques. Imperfections in crystalline solids and their role in influencing various properties.

Diffusion: Fick's laws and application of diffusion in sintering, doping of semiconductors and surface hardening of metals.

UNIT-II

Metals and Alloys: Solid solutions, solubility limit, phase rule, binary phase diagrams, intermediate phases, intermetallic compounds, iron-iron carbide phase diagram, heat treatment of steels, cold, hot working of metals, recovery, recrystallization and grain growth. Microstrcture, properties and applications of ferrous and non-ferrous alloys. Basic fundamentals of Ceramics, polymers and composites.

UNIT-III

Advanced Materials and Tools: Smart materials, exhibiting ferroelectric, piezoelectric, optoelectric, semiconducting behavior, lasers and optical fibers, photoconductivity and superconductivity, nanomaterials , synthesis, properties and applications, biomaterials, superalloys, shape memory alloys. Materials characterization techniques such as, scanning electron microscopy, transmission electron microscopy, atomic force microscopy, scanning tunneling microscopy, atomic absorption spectroscopy, differential scanning calorimetry.

UNIT-IV

Mechanical Properties: Stress-strain diagrams of metallic, ceramic and polymeric materials, modulus of elasticity, yield strength, tensile strength, toughness, elongation, plastic deformation, viscoelasticity, hardness, impact strength, creep, fatigue, ductile and brittle fracture.

UNIT-V

Thermal Properties: Heat capacity, thermal conductivity, thermal expansion of materials. **Electronic Properties:** Concept of energy band diagram for materials - conductors, semiconductors and insulators, electrical conductivity effect of temperature on conductility, intrinsic and extrinsic semiconductors, dielectric properties.

Optical Properties: Reflection, refraction, absorption and transmission of electromagnetic radiation in solids.

Magnetic Properties: Origin of magnetism in metallic and ceramic materials, paramagnetism, diamagnetism, antiferro magnetism, ferromagnetism, ferrimagnetism, magnetic hysterisis. **Environmental Degradation**: Corrosion and oxidation of materials, prevention.

Text books:

1. Elements of Material science / V. Rahghavan
2. Material Science and Metallurgy/kodgire.

References:

1. Materials Science and engineering / William and collister.
2. Material science & material / C.D.Yesudian & harris Samuel
3. Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books
4. Essential of Materials science and engineering/ Donald R.Askeland/Thomson.
5. Material Science by O.P.Khanna. Publisher, Dhanpat Rai,

Outcomes: After completion of the course, students are able to:

1. Understand concept of atomic structure and crystal structures of materials.
2. Acquire the knowledge on Fick's law and its application.
3. Learn the concept of iron carbide diagram.
4. Understand the concepts of different advanced materials and tools.
5. Know the concepts of different material properties.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ6365) MECHANICS OF SOLIDS

L	T	P	C
3	0	0	3

Prerequisites: Brief knowledge about engineering mechanics.

Objectives:

1. To understand concept of simple stresses and strain.
2. To draw the SFD and BMD.
3. To learn the theory of simple bending.
4. To solve the problems on deflection of beams.
5. To learn the strain theory.

UNIT-I:

Simple stress and strain: Types of Loads, Definition of Stress, Strain, Types of stresses, strains, Stress Tensor, Strain tensor, stress strain diagrams for ductile and brittle materials, Generalized Hooke‟s law, relation between elastic constants, Compound bars, Thermal stresses & strains.

UNIT-II:

Shear force and bending moment: Types of supports, types of determinate beams simply supported, cantilever and overhang beams. Shear force and bending moment diagrams, principle of superposition.

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UNIT-III:

Theory of simple bending: Assumption, flexure formula, bending stresses in rectangular beams

Deflections of beams: Double integration method slope and deflection for statically determinate beams.

UNIT-IV:

Torsion of circular shafts: Theory of pure torsion in solid and hollow circular shafts, Torsional shear stresses and angle of twist, transmission of power. Compound shafts, torsion of tapered shafts.

Shear stresses in beams: Flexural shear stress distribution in various shapes of cross sections of beams.

UNIT-V:

Strain theory : Strain Energy, Resistance , proof Resistance Modulus of Resistance strain energy due to gradually applied load, strain energy due to suddenly applied load , impact loading ,impact factor, strain energy due to freely falling weight , strain energy due to shear ,strain energy due to torsion ,strain energy due to bending.

Text book:

1. Strength of Materials – R.S.Khurmi and Gupta.

Reference::

1. F.P.Beer and E.R.Johnston,Jr., *Mechanics of Materials*, 2/e, McGraw-Hill,1992.
2. I.H.Shames and J.M.Pitarrew, *Introduction to Solid Mechanics*,3/e, , Prentice-Hall of India, New Delhi,
3. W.F.Riley and L.W. Zachary, *Introduction to Mechanics of Materials*, John Wiley.

Outcomes:

Student has an ability to perform various machining operations on various machine tools such as Lathe, Milling, Shaping, Slotting, Planning, Drilling, Surface Grinding and Cylindrical Grinding Tool Cutter Grinding.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ6361) THERMAL SCIENCES

L	T	P	C
3	0	0	3

Prerequisites: Thermal engineering, fluid mechanics, heat transfer and refrigeration and air-conditioning.

Objectives:

1. To study the energy sources in various engineering fields.
2. To study the behavior of fluids and fluid flows.
3. To study the thermal behavior.
4. To study the heat transfer in different fields.
5. To study the requirements of human comforts in refrigeration and air-conditioning

UNIT-I

Energy sources: Energy classifications - renewable and non renewable – solar energy, wind energy, tidal power, ocean power, geothermal energy, hydrogen energy and energy from biomass.

UNIT-II

Fluid mechanics: Fluid statistics: Properties of fluids- measuring instruments of fluids and its applications - Fluid kinematics: classification of fluid flows – stream lines, streak lines and stream tube – equation of continuity for one dimensional and three dimensional flows.

Fluid dynamics: surface and body forces – Euler's and Bernouli's equations for flow along a stream line. Boundary layer concepts – basics of turbo machinery - classifications of hydraulic turbines and its performances – centrifugal pumps.

UNIT-III

Thermodynamics: Fundamental concepts – Laws of thermodynamics – first law, second law, third law and its applications – gas power cycles. I.C. engines – combustion in SI and CI engines and its performances.

Compressors: classifications of compressors – reciprocating, rotary, dynamic, axial flow compressors and its working principles. Concepts on steam power cycles – boilers and boiler mountings, steam turbines, steam condensers and their working principles. Concept on gas power cycles – Air compressors, combustion chambers, gas turbines and their working principles. Jet propulsions and rockets.

UNIT-IV

Heat transfer: Modes of heat transfer and laws of heat transfer – conduction, convection, radiation heat transfer. Fourier's laws of heat conduction – steady and unsteady state heat transfer with and without heat generation - convection heat transfer – forced and free convection and its applications – significance of non-dimensional numbers. Radiation heat transfer - Introduction, absorption and reflection of radiant energy, Emission, Radiosity and irradiation. Emission characteristics and laws of black-

body radiation – laws of radiations. Boiling and condensation and its classifications – concept on heat exchangers.

UNIT-IV

Refrigeration and air-conditioning: Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell- Coleman cycle, and Vapour compression cycle - performance Evaluation – vapour absorption cycle- performance evaluation.

Air-conditioning: Psychometric Properties & Processes - Requirements of human comfort and concept of effective temperature- Comfort chart –Comfort Air conditioning - Air Conditioning systems - Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers and heat pumps.

Text books:

1. Thermal Engineering / R.K. Rajput / Lakshmi Publications
2. Thermal Engineering-M.L.Marthur & Mehta/Jain bros.

References:

1. Thermal Engineering-P.L.Bellaney/ khanna publishers.
2. P.K.Nag, Heat & Mass Transfer, TMH, 2008. ISBN:0-07-047337-4
3. Holman, J.P., "Heat Transfer", Tata McGraw Hill Book Company, 1988
4. Refrigeration and Air Conditioning / CP Arora / TMH

Outcomes:

1. Obtaining the power from different types of energy sources
2. Knowing the properties of fluids and its applications.
3. Obtaining the knowledge of IC engine performance.
4. Understand laws of heat transfer and energy balance in thermal engineering systems
5. Acquire the knowledge of systematic approach in solving heat transfer problems
6. Know the requirements of human comforts in refrigeration and air-conditioning

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ5362) ENGINEERING MECHANICS

L	T	P	C
3	0	0	3

Prerequisites: Fundamentals of mathematics and Physics

Objectives:
1. Understand the basic principles of static's applicable to rigid bodies in equilibrium
2. Apply static principles to the solution of a variety of practical problems.
3. Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of references.
4. Apply work, energy, relationships for a particle in motion

UNIT – I
Introduction to Engineering Mechanics – Basic Concepts.
Resultants of Force System: Parallelogram law –Forces and components- Resultant of coplanar Concurrent Forces – Moment of Force -principle of moments – Coplanar Applications – Couples -Resultant of any Force System.

UNIT – II
Equilibrium of Force Systems : Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems .

UNIT – III
Kinematics of a particle: Motion of a particle – Rectilinear motion – motion curves – Rectangular components of curvilinear motion– Kinematics of Rigid Body - Types of rigid body motion -Angular motion - Fixed Axis Rotation.

UNIT-III
Kinetics of a particles: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of plane motion - Angular motion - Fixed Axis Rotation – Rolling Bodies.

UNIT-IV
Work – energy method: Work energy Equations for Translation - Work-Energy Applications to Particle Motion – Work energy applied to Connected Systems - Work energy applied to Fixed Axis Rotation and Plane Motion. Impulse and momentum.

Text books:
1. Engg. Mechanics / S.S. Bhavikatti & K.G. Rajasekharappa / Third edition /New age International Publishers

References:
1. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
2. Engineering Mechanics, Umesh Regl / Tayal.
3. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

Outcomes:

1. Apply engineering science principles to develop algebraic relationships among key physical parameters and variables based on analysis of a specified system
2. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion
3. Apply the principles of mechanics for solving practical problems related to equilibrium of rigid bodies and particle in motion.
4. Use references that provide tabulated physical data that are useful for mechanical engineers.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7366) FINITE ELEMENT ANALYSIS

L	T	P	C
3	0	0	3

Prerequisites: Tensor calculus, Strength of Materials and Basic solid mechanics, For a general Knowledge of FEM including basic to detailed discussion, I can suggest the three-vloume FEM book by O C Zienkiewicz & R L Talyor.

Objectives: Upon successful completion of this course, the student will be able to:

1. Apply vector mechanics as a tool for problem solving
2. Understand the need in Design for the Finite Element Method
3. Tie his/her understanding of mechanical engineering design concepts to use the Finite Element Method software correctly and efficiently
4. Analyze a physical problem, develop experimental procedures for accurately investigating the problem, and effectively perform and document findings.
5. Understand forces associated with different parts of a machine

Unit-I

Introduction to FEM: Basic Concepts, historical background, application of FEM, General description, comparison of FEM with methods, Basic equations of elasticity, Stress-strain and strain-displacement relations. Rayleigh-Ritz method, weighted residual methods.

Unit-II

One Dimensional problems: Stiffness equations for a axial bar element in local co-ordinates using potential energy approach and virtual energy principle-properties of stiffness matrix. Finite element analysis of uniform stepped and tapered bars subjected to mechanical and thermal loads-Assembly of global stiffness matrix and load vector-Quadratic shape functions.

Unit-III

Stiffness equations for a truss bar element oriented in 2D plane-Finite element analysis of trusses- Planes truss and space truss elements-methods of assembly,

Unit-IV

Analysis of beams: Hermite shape functions-Elements stiffness matrix – Load vector-Problemss

2-D Problems: CST element –Stiffness matrix and load vector-Isoparametric element representation-Shape functions- Convergence requirements-Problems

Unit-V

Two dimensional four noded isoparametric elements – numerical integration –finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements- 3-D problems. Tetrahedran elements.

Text book:

1. The Finite Element Methods in Engineering –SS Rao-Elsevier-4th Edition
2. Introduction to Finite Elements in Engineering –Tirupathi K.Chandragupta and Ashok D.Belagundu.

References:

1. Introduction of Finite Element Analysis – S.Md.Jalaludeen - Anuradha Publications
2. An introduction to Finite Element Method – JN Reddy- Mc Graw Hill
3. The Finite Element Method in engineering science –O.C. Zienkowitz, Mc. Graw Hill
4. Finite Element Methods/ Alavala/TMH
5. Concepts and application of finite element analysis-Robert Cook –Wiley.

Outcomes: Upon successful completion of this course, the student will be able to:

1. Understand the numerical methods involved in Finite Element Theory
2. Understand the role and significance of shape functions in finite element formulations and use linear, quadratic, and cubic shape functions for interpolation
3. Understand direct and formal (basic energy and weighted residual) methods for deriving finite element equations
4. Understand global, local, and natural coordinates
5. Understand the formulation of one-dimensional elements (truss and beam)
6. Understand the formulation of two-dimensional elements (triangle and quadrilateral continuum and shell elements)
7. Understand the formulation of three-dimensional elements (tetrahedral and brick elements)
8. Select appropriate space (planar (plane stress or strain), axisymmetric, or spatial), idealization (type of element), and modeling techniques
9. Perform and verify FEA using commercial FEA software
10. Recognize sources of errors in FEA This course contributes to the assessment of the following program (student) outcome: k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ7363) OPTIMIZATION TECHNIQUES AND ITS APPLICATIONS

L	T	P	C
3	0	0	3

Objective: The general objectives of the course is
1. To introduce the fundamental concepts of Optimization Techniques;
2. To make the learners aware of the importance of optimizations in real scenarios;
3. To provide the concepts of various classical and modern methods of for constrained and
unconstrained problems in both single and multivariable.

Unit-I
Introduction: optimal problem formulation: Design variables- constraints-Objective function-Variable bounds. Engineering Optimization problems: classifications & some examples (Just theory & discussion): Truss structure, ammonia structure. Transit schedule and car suspension.

Unit-II
Single variable non-linear optimization problems: local minimum global minimum & inflection point. Necessary & sufficient conditions theorems, some problems based on this. Numerical methods: Exhaustive search methods: Fibonacci method, golden section method & comparison. Interpolation methods: Quadratic.

Unit-III
Multivariable unconstrained non-linear optimization problems: direct search methods: Univariate method, pattern search methods: powell, hook-jeeve's, rosen brock's search and simplex methods.
Multivariable unconstrained non-linear optimization problems:gradient methods: gradient of a function-importache-gradient direction search based methods: streepest descent/ascent method. Conjugate gradient method and variable meteric method.

Unit-IV
Multivariable unconstrained non-linear optimization problems Classical optimization techniques: constraints-equations –lagrangian method-inequalities-kuhn-tucker necessary and sufficient conditions- quadratic problem-statement-wolfe's and beale's methods.

a) Geometric programming: posynomials-arithmetic-geometric inequality-unconstrained GP-constrained GP(d" type only)
b) Integer programming: introduction-formulation-geometric cutting plane algorithm-branch and bound method.

Unit-V
Sensitivity Analysis: linear programming – formulation-simplex method and artificial variable techniques- big-M & two-phase methods- change in the cost coefficients, coefficients & constants of the constraints, addition of variables.

a) Simulation-definition-steps involved-types of simulation models – advantages and disadvantages – simple problems on queuing & inventory.
b) Non-traditional optimization algorithms: genetic algorithms: working principles differences and similarities between gas and traditional methods. Simulated annealing.

Text book:

1. Engineering optimization: theory & practice-S.S rao-New age international publications- thir edition-2003.
2. Optimization for engineering design – kalyanmoy deb-prentice-hall of india Pvt.Ltd. new delhi-2005.
3. Operations research-S.D.Sharma-Kedar Nath & Ran nath Co., New Delhi.

Reference:

1. Optimization theory & practice: beveridge & Schechter. McGraw –Hill international student edition.
2. Optimization in operations research Ronald L.Rardin. Pearson education. Low price Edition.
3. Optimization theory & practice: mohan C. Hoshi & KM Moudgalya. Narosa publishing house, Chennai
4. Operations research: A.P. Verma. S.K. Kataria & sons, New Delhi-110006.

Outcomes: Upon successful completion of this course, students will be able to

1. Formulate optimization problems;
2. Understand and apply the concept of optimality criteria for various types of optimization problems.
3. Solve various constrained and unconstrained problems in single variable as well as multivariable.
4. Apply the methods of optimization in real life situation.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(UGC AUTONOMOUS, AFFILIATED TO JNTUH)
(AJ6364) PROJECT PLANNING AND MANAGEMENT

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Objectives:
To learn about project integration, project scope management, project time and cost management, quality management, human resource considerations, communications, risk management, and procurement management.

UNIT I
Introduction, Understanding Project Management, Defining Project Success, project management growth: concepts and definitions, organizational structures and organizing and staffing the project office and team.

UNIT II
Management functions, management of your time and stress, conflicts, special topics: Introduction, Performance Measurement ,Financial Compensation and Rewards , Critical Issues with Rewarding Project Teams, Effective Project Management in the Small Business, Organization ,Mega Projects ,Morality, Ethics, and the Corporate Culture, Professional Responsibilities, Internal Partnerships, External Partnerships, Training and Education , Integrated Product/Project Teams , Virtual Project Teams , Breakthrough Projects, Case Studies: The Trophy Project, Leadership Effectiveness (A) , Leadership Effectiveness (B), Motivational Questionnaire.

UNIT III
The variables for success: Introduction, Predicting Project Success, Project Management Effectiveness, Expectations. Working with executives: Introduction, The Project Sponsor, and Handling Disagreements with the Sponsor, The Collective Belief, The Exit Champion, The In-House Representatives.

UNIT IV
PLANNING: Introduction ,Validating the Assumptions , General Planning , Life-Cycle Phases, Proposal Preparation Kickoff Meetings , Understanding Participants' Roles , Project Planning , The Statement of Work, Project Specifications, Milestone Schedules ,Work Breakdown Structure , WBS Decomposition Problems, Role of the Executive in Project Selection ,Role of the Executive in Planning, The Planning Cycle ,Work Planning Authorization Why Do Plans Fail? , Stopping Projects, Handling Project Phase outs and Transfers**,** Detailed Schedules and Charts Master Production Scheduling, Project Plan, Total Project Planning, The Project Charter Management Control, The Project Manager–Line Manager Interface, Fast-Tracking, Configuration Management enterprise Project Management Methodologies, Project Audits.

UNIT V
Network scheduling techniques, project graphics: introduction, customer reporting, bar (gantt) chart, other conventional presentation techniques, logic diagrams/networks. pricing and estimating, cost control, trade-off analysis in a project environment, risk

management, learning curves, contract management, quality management, modern developments project management, the business of scope changes, the project office, managing crisis projects, the rise, fall, and resurrection of iridium: a project management perspective.

Text books:

1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th ed. Author: Harold Kerzner, PhD.

Reference books:

1. Richard H. Thayer, Edward Yourdon (2000). Software Engineering Project Management (2nd ed.). Wiley-IEEE Computer Society Press. ISBN 0-8186-8000-8.
2. Fleming, Quentin (2005). Earned Value Project Management (Third ed.). Project Management Institute. ISBN 1-930699-89-1.
3. Filicetti, John, Project Planning Overview, PM Hut (Last accessed 8 November 2009).

Outcomes:

Upon satisfactory completion of the course, the learner should be able to:

1. Recognize issues in a realistic project scenario.
2. Employ work breakdown structures (WBS) in a project application.
3. Demonstrate the use of appropriate network scheduling techniques.
4. Produce a project proposal.
5. Discuss the implementation of a proposed plan.