3rd Semester Diploma in Engineering (Common)

Subject Title : Development of Life Skills- I

Subject Code :302

Rationale:

In today's competitive world, the nature of organizations is changing at very rapid speed. In this situation the responsibility of diploma holder is not unique. He will be a part of a team in the organization. As such the individual skills are not sufficient to work at his best.

This subject will develop the student as an effective member of the team. It will develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. Such skills will enhance his capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.

THE SUBJECT IS CLASSIFIED UNDER HUMAN SCIENCE. Objectives: The

students will be able to:

1. Develop team spirit i.e. concept of working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

CONTENTS: Interaction by faculty / professional

Chapter	Name of the Topic	Suggested HOURS
1	SOCIAL SKILLS Society, Social Structure, Develop Sympathy And Empathy.	01
2	Swot Analysis – Concept, How to make use of SWOT.	01
3	**Inter personal Relation** Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	02

4	**Problem Solving** **I)STEPS IN PROBLEM SOLVING,** 1)Identify and clarify the problem, 2)Information gathering related to problem, 3)Evaluate the evidence, 4)Consider alternative solutions and their implications, 5)Choose and implement the best alternative, 6)Review **II)Problem solving technique**.(any one technique may be considered) 1) Trial and error, 2) Brain storming, 3) Lateral thinking	02
5	**Presentation Skills** Body language -- Dress like the audience Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board	03
6	**Group discussion and Interview technique** – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making INTERVIEW TECHNIQUE Necessity, Tips for handling common questions.	03
7	**Working in Teams** Understand and work within the dynamics of a groups. Tips to work effectively in teams, Establish good rapport, interest with others and work effectively with them to meet common objectives, Tips to provide and accept feedback in a constructive and considerate way , Leadership in teams, Handling frustrations in group.	02
8	**Task Management** Introduction, Task identification, Task planning ,organizing and execution, Closing the task	02
	TOTAL	16

CONTENTS: PRACTICAL -

List of Assignment: (Any Eight Assignment)

1. SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.
    a) Your past experiences,
    b) Achievements,
    c) Failures,
    d) Feedback from others etc.
2. Undergo a test on reading skill/memory skill administered by your teacher.
3. Solve the true life problem.
4. Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group)
5. Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6. Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme. ####
7. Conduct an interview of a personality and write a report on it.
8. Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
9. Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

Mini Project on Task Management: Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

LEARNING RESOURCES:

 BOOKS:

Sr. No	Title of the book	Author	Publisher
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton (Canada – India Project)	ISTE New Delhi

11	Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

INTERNET ASSISTANCE

1. http://www.mindtools.com
2. http://www.stress.org
3. http://www.ethics.com
4. http://www.coopcomm.org/workbook.htm
5. http://www.mapfornonprofits.org/
6. http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7. http://eqi.org/
8. http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9. http://www.mapnp.org/library/ethics/ethxgde.htm
10. http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11. http://members.aol.com/nonverbal2/diction1.htm
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. http://snow.utoronto.ca/Learn2/modules.html
14. http://www.quickmba.com/strategy/swot/

Engineering Materials

L T   P   **Total Theory Hrs 42**
3   **FM   100 (80+20) Hrs**

Subject Code :- MEC304

1.   Engineering Materials and Their Properties   6 hrs

1.1 Introduction, Classification and Application of Engineering materials, I.S specification of materials like plain carbon steel, Grey Cast iron, low alloy steels & bearing Materials.

1.2 Properties of metals:-Strength, elasticity, ductility, malleability, plasticity, toughness, hardness, Harden ability, brittleness, fatigue, thermal conductivity, electrical conductivity, thermal coefficient of linear expansion.

1.3 Imperfection in Crystals:- Basic concept of crystal, crystal pattern of unit cells, ideal crystal and crystal imperfection. Classify crystal imperfections or defects such as point defects, line defects, surface defect and volume defects. State types of dislocation.

2.   Ferrous Metals and Alloys   10 (6+4) hrs

2.1- Ferrous Metals

2.1.1   Characteristics and application of ferrous metals , Flow diagram for production of Iron and Steel, Classification, composition and uses of cast iron, effect of alloying elements like sulphur, silicon and phosphorous on cast iron.

2.1.2   Classification, composition and application of low carbon steel, medium carbon steel and high carbon steel with their chemical composition.

2.1.3   Magnetic materials: - Properties & Applications of commonly used magnetic materials (Permanent magnets and temporary magnets).

2.1.4   Fe-C Phase Equilibrium Diagram – Critical temperature lines, study of micro constituents of iron and steel.

2.1.5   Introduction of TTT curves.

2.2 -   Alloy Steels

2.2.1   **Alloy Steels:** - Low alloy steel, high alloy steel, tools steel & stainless steel. Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium, etc.

2.2.2   **Tool Steels**: - High speed Steels (HSS), Hot & cold Working dies, shear, punches etc., properties & applications.

2.2.3   **Special Cutting Tool Materials** – Diamond, Stelites & Tungsten Carbide.

3.   Non Ferrous Metals and Alloys   6 hrs

3.1   Properties, applications & chemical compositions of Copper alloys (naval brass, muntz metal, Gun metal & bronzes), Aluminum alloys (Y-alloy & duralumin)

3.2   Various Lead and Zinc alloys. Alloys used for high temperature services.

3.3   Bearing materials like white metals, leaded bronzes & copper lead alloys and their desired properties.

4. **Heat Treatment of Steels** **8 hrs**

4.1 Basic concept of Heat treatment processes - Annealing, Normalizing, Hardening, Tempering. Aus tempering & Mar tempering.
4.2 Basic concept of Surface Hardening Processes - Flame Hardening, Induction Hardening, Nit riding, Cyaniding, Carburizing, Carbonic trading.

5. **Non Metallic Materials** **6 hrs**

5.1 Polymeric Materials – Introduction to Polymers- types, characteristics, properties and uses.
5.2 Thermoplastic Plastics & Thermosetting Plastics - characteristics and uses of, Acrylics, Nylons polyesters, Epoxies, Melamine's & Bakelite's.
5.4 Rubbers – Neoprene, Butadiene, Buna & Silicones – Properties & applications.
5.5 Properties and applications of following Engineering Materials – Ceramics, Abrasive, Adhesive and Insulating materials such as Cork, Asbestos, Thermocole and Glass Wool
5.6 Introduction to Composite Materials – Laminated & Fiber, reinforced materials - Structure, Properties & Applications.

6. **Destructive & Nondestructive Testing** **6 hrs**

6.1 Destructive Testing – Types, Concept and processes of Hardness & Toughness.
6.2 Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing.
6.3 Nondestructive testing methods - Radiography (X-Ray & Gamma Ray), Ultrasonic crack detection, Dye penetrate test.

Books Recommended :

1   A Text Book of Material Science & Metallurgy   OP Khanna
2   Material Science & Metallurgy   R K Rajput
3   Material Science & Metallurgy   V D Kodgire
4   Material Science   W. Callister

Diploma in Engineering (All branch except Mining, Arch & Non Tech)

Semester   :   Third

Subject Title : Engineering Mathematics-III

Subject Code: 301

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
L TH	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
03	01		100	80	20	26	40	3 Hrs

NOTE:Internal marks will be allotted on the basis of two snap tests and 2 assignment of equal marks to be conducted by the faculty teaching the subject.

Rationale:

        The subject is extension of Engineering Mathematics – 1 & 2 of First year and stepping into the prerequisites to learn Applied Mathematics applicable in engineering solutions. Engineering Mathematics lay down the foundation to understand and express principles and laws involved in other technological subjects. The study of Engineering Mathematics will help to develop the skills essential for new emerging avenues.

Objective:

The student will be able to acquire knowledge of mathematical terms, concepts and principles. They can acquire sufficient mathematical techniques and can develop the ability to apply mathematical methods to solve technical and day to day practical problems and to execute management plans with precision.

Sub Objective:

This course is divided into five units. After completion of this course one could become able to learn the following.

- Intuitive meaning and Methods of finding integration definite integration and its properties.
- Application of Integration in finding Area, volume of irregular shapes.
- Methods of solving differential equation of first order and first degree.
- Methods for finding approximate roots by using bisection, Regula-falsi, Newton-Raphson method, Gauss elimination, Jacobi and Gauss- Seidal methods.
- Use of Binomial, Normal and Poisson distributions for solving different examples.

- Use of Laplace transform for solving problems of Differential Equations.
- Use of Fourier series for expansion of function at the given intervals

Contents: Theory

Chapter	Name of the Topic	Hours	Marks

01	**Integration:**
	1.1 Definition of integration as anti-derivative. Integration of standard function.
	1.2 Rules of integration (Integrals of sum, difference, scalar multiplication).
	1.3 Methods of Integration.
	    1.3.1 Integration by trigonometrical transformation.
	    1.3.2 Integration by substitution
	    1.3.3 Integration by parts.
	    1.3.4 Integration of rational and irrational functions.
	    1.3.5 Integration by Partial fractions.
		7	16

	1.4 Definite Integration.
	    1.4.1 Concept of definite integrations with examples.
	    1.4.2 Properties of definite integral with simple problems.
		3	

	1.5 Applications of definite integrals. 1.5.1 Area under the curve. 1.5.2 Area bounded by two curves.	3	
2	**Differential Equation** 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation. 2.2 Solution of differential equations of first order and first Degree such as variable separable form, reducible to Variable separable, Homogeneous and Linear Differential Equation.	6	16
	2.3 Applications of Differential equations. 2.3.1 Rectilinear motion (motion under constant and variable acceleration) 2.3.2 Newton's Law of Cooling	3	
3	**Numerical Methods** **3.1 Solution of algebraic equations** Bisection method, Regula falsi method and Newton–Raphson method.	3	16
	3.2 Solution of simultaneous equations containing 3 unknowns		

	3.2.1 Gauss elimination method. 3.2.2 Jacobi's Iterative method. 3.3.3 Gauss Seidal method.	3	
	3.3 Interpolation 3.3.1 Concept of interpolation and extrapolation. 3.3.2 Different operators $(\Delta, \nabla \,\&\, E)$, relation between them, some problems based on operators , formation of Difference Table. 3.3.3 Newton's Forward and Backward difference interpolation formulae. 3.3.4 Lagrange's interpolation formula. 3.3.5 Problems based on above.	6	
	3.4 Numerical Differentiation &Integration. 3.4.1 Newton's forward and backward difference formulae for first and second order differentiation at any point. 3.4.2 Numerical integration Trapezoidal rule and Simpson's 1/3rdrule.	3	
4	**4.1 Probability:** 4.1.1 Definition of random experiment, sample space, event occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely) 4.1.2 Definition of probability, addition and multiplication theorems of probability.	05	16
	4.2 Probability Distribution 4.2.1 Binomial distribution. 4.2.2 Poisson's distribution. 4.2.3 Normal distribution 4.2.4 Simple examples based on above .	05	
5	**Laplace Transform** 5.1 Definition of Laplace transforms Laplace transform of standard functions**.** 5.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by t^{n}, division by t. 5.3 Inverse Laplace transforms. Properties-linearly first shifting, second shifting. Method of partial fractions,	3	
6	**Fourier Series** 6.1 Definition of Fourier series (Euler's formula). 6.2 Series expansion of continuous functions in the intervals $(0,2l),(-l,l),(0,2\pi),(-\pi,\pi)$	3	16

	Linear Programming 7.1 Introduction 7.2 Solution of Linear Programming problem (LPP) by Graphical Method.		
7		3	
	TOTAL:	56	80

Tutorial: Tutorials are to be used to get enough practice for solving problems. It is suggested that in each tutorial at least five problems should be solved.

Learning Resources:

Text Book:

Sr. No	Title	Authors	Publications
1	Higher Engg. Mathematics	B. S. Grewal	Dhanpat Rai

Ref. Books:

Sr. No	Title	Authors	Publications
1	Engineering Mathematics	H.K.Das	S.Chand & Company LTD, New Delhi
2	Higher Engineering Mathematics	B.V,Ramana	Mcgraw Hill Education (India) Private limited , New Delhi
3	Practical Mathematics	I.B. Prasad	Khanna
4	Introductory Method of Numerical Analysis	S.S.Shastri	P.H.I
5	Linear Programming	G. Hadley	
6	A text book for class 12, Part- I & II	NCERT	NCERT, Delhi

Note:

In board examination, question setter may be advised to select 20% questions of objective, 30% of short type and remaining 50% of long type based on basic concepts, formula and calculations respectively.

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Engineering Mechanics

L   T   P   **Total Theory Hrs 42**
3   2   **F M: 100Th + 50Pr**

Subject Code- MEC305

1. Introduction to Engineering Mechanics   2
Definitions of mechanics, Engineering Mechanics, statics, dynamics, kinematics, kinetics, particles, body, rigid body, mass, weight, length, time, scalar and vector, S.I. units.

2. Force   10

2.1   Force & Force system: - Definition of a force, S.I. unit of a force, representation of a force by vector and by Bow's notation method, classification of force system
According top lane and line of action, Characteristic sofa force, effects of a force, principle of transmissibility.

2.2   Resolution of a force: Definition, Method of resolution, Types of C o m p o n e n t o f a force – Perpendicular component and Non-perpendicular component.

2.3   Moment of a force:- Definition, measurement of moment of a force, SI Unit, geometrical meaning of moment of a force, classification ofmoments according to direction of rotation, sign convention, law of moments, Varignon's theorem of moment and its use.

2.4   Couple–Definition, S.I. unit, measurement of a couple, properties of couple.

2.5   Composition of Forces: - Definition, Resultant force, methods of composition of forces, Analytical methods: Trigonometric method(law of parallelogram of forces) and Algebraic method(method of resolution) for calculation of result and for all force systems.

3. Equilibrium: 8

3.1   Conditions of equilibrium-analytical and graphical conditions of equilibrium for concurrent, parallel force system, non-concurrent nonparallel force system, free body and free body diagram.

3.2   Lami's Theorem–Statement and explanation, Application of Lami's theorem for solving various engineering problem shaving two unknown only.

3.3   Equilibrant–Definition, relation between result and equilibrant, equilibrant of concurrent and non-concurrent force system.

3.4   Collision- Collision of elastic and inelastic bodies, coefficient of restitution, loss of kinetic energy during impact.(simple problem related with collision)

3.5   Truss - Introduction, Reaction at supports, Forces in a member by method of joints and method of section, Simple problems on methods of joints only).

4. Centroid and Centre of Gravity: 6

4.1 Centroid: Definition of centroid & moment o f an area about an axis, centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite Geometrical figures.

4.2 Centre of gravity: Definition, centre of gravity of simple solids such as cylinder, sphere, Hemisphere, Cone, cube, and rectangular block, centre of gravity of composite solids
(Any types of hollow solids shall not be considered).

5. Friction: **8**
5.1 Definition and basic concept of- friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation among angle of friction, angle of repose and coefficient of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages of friction.
5.2 Equilibrium of bodies on level plane–external force applied horizontal and inclined (Pull & Push)
5.3 Equilibrium of bodies on inclined plane– external forces is applied parallel to the plane.
5.4 Ladder Friction & Wedge Friction (simple numerical only).

6 . Simple Machines: **8**
6.1 Basic concept and definition of load, effort, mechanical advantage, velocity ratio and efficiency of a simple lifting machine, relation among mechanical advantage, velocity ratio and efficiency of a machine, Ideal machine, ideal effort and ideal load, friction in machines.
6.2 Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine (no derivation) and self-locking machine.
6.3 Basic concept of Lever& their types, Pulleys (fixed & movable), simple wheel and axle, winch crab, worm &worm wheel and screw jack (simple problems on lever only).

Recommended Books:
   1. **Engineering Mechanics**   **R K Bansal**
   2. **Engineering Mechanics**   **D S Kumar**
   3. **Engineering Mechanics**   **R S Khurmi**
   Reference Books
   1. **Vector Mechanics for Engineers: Statics & Dynamics**   **Beer & Jhonson**
   2. **Engineering Mechanics : Statics & Dynamics**   **I H Shames**

Subject :   Engineering Mechanics Lab

Subject Code :   MEC308

List of Practical's:-

1) To verify law of polygon of forces.
2) To verify law of moments.
3) To verify Lami's theorem.
4) To determine the forces in members of a Jib crane.
5) Comparison of coefficient of friction of various pair of surfaces and Determination of angle of repose.
6) To verify force transmitted by members of truss.
7) Experimental location of center of gravity of plane plate of uniform thickness.
8) Find MA,VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency of Worm and worm wheel
9) Find MA,VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency of Differential axle and wheel
10) Find MA,VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency of Simple screw jack.
11) Study of   Single purchase winch crab and Double purchase winch crab
12) Study of reversibility of the simple screw jack.

Machine Drawing

L   T   P   **Total Theory Hrs 42**
3   2

Subject Code:- MEC303

1. **Auxiliary views**   **2+4**
   1.1   Study of auxiliary planes,
   1.2   Projection of objects on auxiliary planes.
   1.3   Completing the regular views with the help of give an auxiliary views
   Sectional Views.
   1.4   Types of sections
   1.5   Conversion of pictorial view into sectional orthographic views (Simple Machine Parts)

2. **Conversion of Projections**   **3+6**
   2.1 Introduction to Orthographic & Isometric projections.
   2.2 Conversion of isometric view into Ortho graphic Views(Simple Machine Parts)
   2.3 Draw missing view from the given Ortho graphic views-simple components
   2.4 Conversion of orthographic views into is metric Views(Simple Machine Parts)

3. **Fasteners, Rivet and Riveted Joints**   **2+4**
   3.1 Introduction and classification
        (Types of threads, nuts, bolts, assembly of bolts and nuts with washers)
   3.2 Shape of Rivet heads
   3,3 Types of Riveted joints

4. **Conventional Representation**   **3+6**
   4.1 Standard convention using SP–46(1988)
    (a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber
    (b) Long and short break in pipe, rod and shaft.
    (c) Ball and Roller bearing, pipe joints, cocks, valves, internal/External threads.
    (d) Various sections-Half, removed, revolved, offset, partial and aligned sections.
    (e) Knurling, serrated shafts, splinted shafts, and chain wheels.
    (f) Springs with square and flat ends, Gears, sprocket wheel
    (g) Counter sunk& counter bore.
    (h) Tapers
   4.2 Conventional Representation of holes, bolts, nuts and rivets.

5. **Limits, Fits and Tolerances:**   **2+4**

   5.1 Characteristics of surface roughness-Indication of machining symbol showing
        direction of lay, roughness grades, machining allowances, manufacturing
        methods.
   5.2 Introduction to ISO system of to lerance, dimensional tolerances, elements of
        inter change able system, hole & shaft based system, limits, fits & allowances.
        Selection of fit.
   5.3 Geometrical to lerances, to lerances of form and position and its geometric
        representation.

6.   Details to Assembly   **7+14**
   6.1   Introduction
   6.2   Bearing–Foot Step Bearing & Pedestal Bearing
   6.3   Lathe tool Post
   6.4   Keys, Knuckle Joint and Cotter Joint
   6.5   Screw Jack
   6.6   Steam Stop Valve
   6.7   Pipe Joints (Union Joint, Expansion Joint &Spigot & Socket Joint)

7.   Assembly to Details   **7+14**
   7.1 Introduction–
   7.2 Pedestal Bearing
   7.3 Lathe Tail Stock
   7.4 Drilling Jig
   7.5 Automotive parts (Piston & connection rod)
   7.6 Couplings–Flange Couplings, Flexible Couplings Universal couplings & Oldham's
   coupling
   7.7 Fast & loose pulley
   7.8 Valve– Not more than eight parts

8.   Study of Production Drawing (Minimum 02 sheets)   **2+4**

Resource Book:-

01	N.D. Bhatt	Machine Drawing	Charotar Publication, Anand
02	IS Code SP46 (1988)	Code of practice for general engineering	Engineering Drawing PracticeforSchooland colleges
03	L.K. Narayanan, P. Kannaich, K.Venkat	Production Drawing	New Age International Publication
04	P.S. Gill	Machine Drawing	S.K. KatariaandSons
05	M.L. Dabhade	Engineering Graphics(For Topicon Auxiliary Views)	--
06	Sidheshwar	Machine Drawing	Tata Mc Graw Hill
07	R K Dhawan	Machine Drawing	S Chand

Machine Drawing Lab :

Subject Code : MEC307

List of Experiments:-

(Use first angle method of projection)

1. Auxiliary Views

   One sheet containing three problems on Auxiliary views.

2. Conversion of projection

   i) One sheet containing orthographic to isometric.

   ii) One sheet containing isometric to orthographic.

   iii) One sheet containing missing view.

3. Rivet and Riveted joints, Conventional Representation as per SP–46 (1988) –one sheet

4. Limit, Fit, Tolerances and Machining Symbols– one sheet

5. Details to Assembly

   (i) One sheet covering any one assembly and its details.

   (ii) Solve at least two problems as home assignment.

6. Assembly to detailed drawings of components including conventional representation of Tolerances and surface finish symbols:

   (i) One sheet covering any one assembly and its details
   (ii) At least two problems as home assignment.

7. Solve at least two problems on production drawing.

8. Two problems on assembly drawings using any AutoCAD Package.

3rd Semester Mechanical Engineering

Subject Title : Strength of Materials

Subject Code: MEC306

Teaching and Examination Scheme:

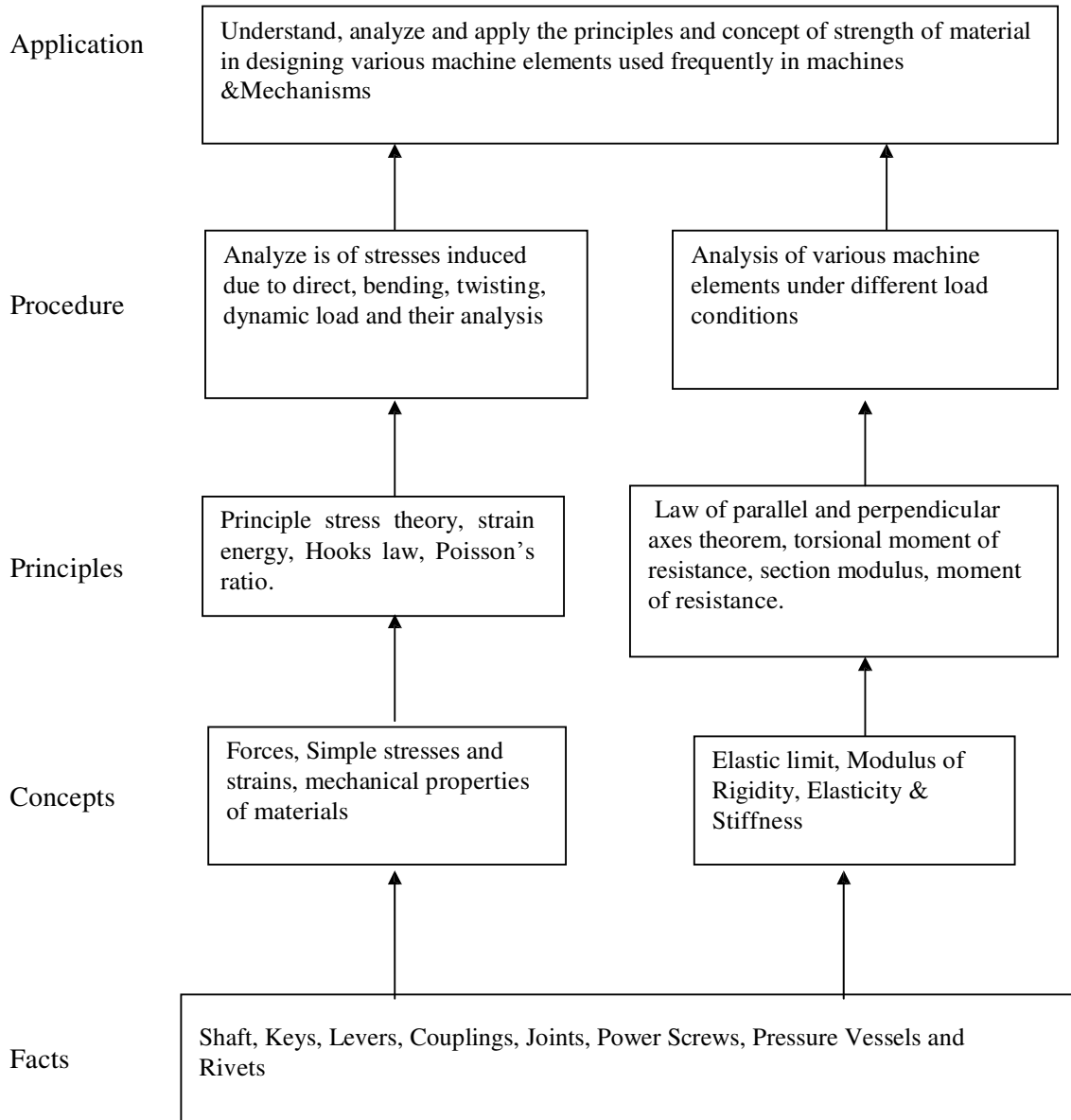| Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	Th Fin	Th Internal	Pr	TOTAL
03	--	02	03	100	80	20	50	150

Rationale:

Strength of Material is a core technology subject. It aim sat enabling the student to understand & analyze various types of loads, stresses & strains along with main causes of failure of machine parts. The subject is pre-requisite for understanding principles of machine design. Understanding mechanical properties of materials will help in selecting the suitable materials for various engineering applications.

Objectives:

The Student should be able to:

1. Understand the fundamentals of solid mechanics.
2. Acquire elementary knowledge of stresses, strains & material properties.
3. Understand&analyzethebasicprinciplesinvolvedinthebehaviorofmachinepartsunderloadin the context of design in gait.
4. Understand& analyze the mechanical properties of the various materials.

Learning Structure:

Application	Understand, analyze and apply the principles and concept of strength of material in designing various machine elements used frequently in machines &Mechanisms

Procedure	Analyze is of stresses induced due to direct, bending, twisting, dynamic load and their analysis	Analysis of various machine elements under different load conditions

Principles	Principle stress theory, strain energy, Hooks law, Poisson's ratio.	Law of parallel and perpendicular axes theorem, torsional moment of resistance, section modulus, moment of resistance.

Concepts	Forces, Simple stresses and strains, mechanical properties of materials	Elastic limit, Modulus of Rigidity, Elasticity & Stiffness

Facts	Shaft, Keys, Levers, Couplings, Joints, Power Screws, Pressure Vessels and Rivets

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	**Mechanical Properties of Materials, Simple stresses & Strains** 1.1 Mechanical properties– Elasticity, Plasticity, Rigidity, Ductility, Malleability, Toughness, Hardness, Brittleness, Creep, Fatigue. 1.2 Concept & Definition of Simple stresses &strains Types -tensile,compressive,Shear,single&doubleshear,Punchingshear,Hooke'slaw,Young'smodulus,ModulusofRigidity,Changeinlengthofthebarhavinguniform&steppedcrosssection stress-straincurvesforductile&brittlematerials. 1.3 Volumetric Strain, Bulk modulus, Poisson's ratio. Bi-Axial &Tri-axial stresses & strains. Relationship among E,G,&K. 1.4 Stresses & strains in bar so uniformly varying section subjected to axial load attend sonly, Composite sections having same length. 1.5 Temperatures tresses & strains of uniform & *composite* Sections. 1.6 Buckling of long columns 'Euler's theory, Rankin's theory – equivalent length of the column for the cases of Both ends hinged, One end fixed and other free, Both ends fixed, One end fixed and other end hinged. (simple numerical only)	8	
02	**Bending Moment & Shear Force** 2.1 Concept & definition of Shear force & bending moment. Relation between rate of loading, shear force & bending moment. 2.2 Shear force & bending moment diagrams for cantilevers, simply supported beam & over hanging be am subjected to point loads, Uniformly distributed load, Uniformly varying load. 2.3 Location of point of contra flexure. (Problem to be based on simply supported and cantilever beams with point load and UDL only)	06	
03	Principal stresses and planes. 3.1 Determine normal stress, shear stress and resultant stress on oblique plane 3.2 Define principal plane & principal stress 3.3 Determine principle plane, principal stresses analytically 3.4 Determine principal stress from Mohr's circle (only simple numerical). Thin Cylindrical shell -- 4 Marks • Stresses in thin closed cylindrical vessels subjected to internal pressure, Hoop stress, Radial & Axial Stress.(Simple numerical sonly)	06	

04	**Moment of Inertia** 4.1 Concept & definition of Moment of inertia, radius of gyration. Parallel & perpendicular axes theorem.(No derivation) 4.2 Moment of inertia of square, rectangular, circular, semicircular, Triangular, Hollow square, Rectangular & circular only. 4.3 MI of angle section, Channel section, Tee- section, I Section about centroidal axis& any other axis parallel to centroidal axis. 4.4 Polar moment of inertia.	06	
05	**Bending and Shear stresses** 5.1 Theory of simple bending, Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis. Stress distribution diagram for Cantilever & simply supported beam. 5.2 Equation of bending (No derivation) 5.3 Simple numeral problem. 5.4 Concept of direct & transverses hear stress. 5.5 Shear stress equation(No derivation) 5.6 Shear stress distribution diagrams Averages hear stress & Maximum shear stress for rectangular &circular section.	06	
06	**Combination of Direct and Bending Stresses** 6.1 Concept of Axial load, eccentric load, direct stresses, bending stresses, maximum & minimum stresses. 6.2 Stress distribution diagram. 6.3 Condition for no tension in the section. 6.4 Problems on the above concepts for machinepartssuchasoffsetlinks,C-clamp,Benchvice,Drillingmachineframeetc. **(Simple problems on the above applications)**	04	
07	**Torsion** 7.1 Concept of Pure Torsion, Assumptions in theory of pure Torsion, Torsion equation for solid and hollow circular shafts. 7.2 Power transmitted by a shaft. 7.3 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft)	03	
08	**Deflection and Slope of Beam** **8.1** Concepts of Deflection & Slope of beams-relation between bending moment and slope. Deflection of simply supported beams and cantilever beams subjected to point load(No Derivation)	03	
	Total	**42**	

Reference Books:

SN	Author	Title	P
01	R K Rajput	StrengthofMaterial	
02	B.K.Sarkar	StrengthofMaterial	TataMcGrawhillNewDelhi
03	Dr.R.K.Bansal	ATextBookstrengthofMaterial	LaxmiPublicationNewDelhi
04	SRamamrutham	StrengthofMaterial	DhanpatRai&PublicationNew
05	R.S.Khurmi	StrengthofMaterial	S.ChandCompanyLtd.Delhi
06	AndrewPytel FedrinandL.Singer	StrengthofMaterial	Addison-WesleyAnimprintofAddisonWesleyLongman,Inc.Fo
07.	S.S. Ratan	Strength of material	TMH

Subject : Strength of Meterials Lab

Subject Code : MEC309

List of Practical's :-

01   Hook's Law verification by Searl's apparatus.

02   Study and demonstration of Universal Testing Machine & its attachments.

03   Tension Test on mild steel/Aluminum on UTM.

04   Compression test on castiro non UTM.

05   Direct Shear Test of mild steel on UTM.

06   Brinell Hardness Test on Mild Steel.

07   Rock well hardness Test on Hardened Steel.

08   Izod & Charpy- Impact tests of a standard specimen.

09   Torsion Test of Mild steel bar.

10   To find Moment of Inertia of a flywheel.