 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																
COURSE NAME : MECHANICAL ENGINEERING GROUP																
COURSE CODE : ME / PG / PT / MH / MI																
DURATION OF COURSE : 6 SEMESTERS for ME/PG/PT/AE (8 SEMESTERS for MH/MI) WITH EFFECT FROM 2012-13																
SEMESTER : THIRD DURATION : 16 WEEKS																
PATTERN : FULL TIME - SEMESTER SCHEME : G																
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17300)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Applied Mathematics \$	AMS	17301	03	--	--	03	100	40	--	--	--	--	--	--	
2	Mechanical Engineering Drawing β	MED	17302	03	--	04	04	100	40	--	--	25#	10	50@	20	
3	Mechanical Engineering Materials	MEM	17303	04	--	--	03	100	40	--	--	--	--	--	--	
4	Strength of Materials β	SOM	17304	04	--	02	03	100	40	--	--	--	--	25@	10	50
5	Electrical Engineering	ELE	17305	03	--	02	03	100	40	--	--	--	--	25@	10	
6	Computer Aided Drafting β	CAD	17016	01	--	04	--	--	--	50#	20	--	--	25@	10	
7	Professional Practices-I β	PPO	17017	--	--	03	--	--	--	--	--	--	--	50@	20	
TOTAL				18	--	15	--	500	--	50	--	25	--	175	--	50
<p>Student Contact Hours Per Week: 33 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 800</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, β - Common to AE / PS / FE</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work</p> <ul style="list-style-type: none"> ➤ Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW). ➤ Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms. ➤ Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code. ➤ For CAD software subject MSBTE should decide the contents of the practical every year through identified experts and ensure that these practicals only performed in the institute. 																

Course Name : All Branches of Diploma in Engineering & Technology

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI**

Semester : Second

Subject Title : Applied Mathematics

Subject Code : 17301

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	--	03	100	--	--	--	100

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

Rationale:

Applied mathematics is designed for its applications in engineering and technology. It includes the topics integration, differential equation, probability distribution. The connection between applied mathematics and its applications in real life can be understood and appreciated.

Derivatives are useful to find slope of the curve, maxima and minima of function, radius of curvature. Integral calculus helps in finding the area, volume, mean value R. M. S value etc .In analog to digital converter and modulation system integration is important. Differential equation is used in finding curve, rectilinear motion. Probability is used in Metrology and quality control. The fundamentals of this topic are directly useful in understanding engineering applications in various fields.

General Objectives:

Students will be able to:

1. Apply derivatives to find slope, maxima, minima and radius of curvature.
2. Apply integral calculus to solve different engineering problems.
3. Apply the concept of integration for finding area, mean value, R. M. S value, and volume of solid of revolution.
4. Apply differential equation for solving problems in different engineering fields.
5. Apply the knowledge of probability to solve the examples related to the production process.

Learning Structure:

Applications

Apply the principles of mathematics to solve examples in Electrical, Electronics, Mechanical and Chemical fields

Procedure

Solving problems of tangent, normal. Finding maxima, minima and radius of curvature

Solving problems on methods of integration and its properties. Finding area, volume of solid of revolution, mean and R.M.S. value

Methods of solving differential equations of first order and first degree. Solving examples in different engineering fields

Solving different examples on binomial, poisson and normal distribution

Principle

Methods of finding slope, curvature, maxima and minima

Methods of finding integration, definite integration and its properties

Methods of differential equations of first order and first degree

Formulae for binomial, normal, and poisson distribution

Concept

Geometrical meaning of derivatives, increasing and decreasing functions

Integration of standard functions. Rules of integration, integration by parts, partial fractions

Order and degree of differential equation. Formation of differential equation

Probability of repeated trails of random experiments

Facts

First order and second order derivatives

Derivatives, notation of integration, definition of integration

Integration, definition of differential equation

Permutation, Combination, probability of an event

Theory:

Topic and Contents	Hours	Marks
<p>Topic-1 Applications of Derivative Specific objectives : ➤ Find slope, curvature, maximum and minimum value of functions related to different engineering applications.</p> <ul style="list-style-type: none"> • Geometrical meaning of derivative with proof. Examples for finding slope , equations of tangent and normal to the curve • Maxima and minima. • Radius of curvature. 	05	12
<p>Topic-2 Integral Calculus</p>		
<p>2.1 Integration ----- 22 Specific objectives : ➤ Integrate function using different method.</p> <ul style="list-style-type: none"> • Definition of integration as anti derivative, rules of integration. • Integration of standard functions • Methods of integration <ul style="list-style-type: none"> Integration by substitution. Integration of rational functions. Integration by partial fractions. Integration by trigonometric transformation. Integration by parts. 	14	48
<p>2.2 Definite Integrals ----- 12 Specific objectives : ➤ Solve problems on definite integrals using the properties.</p> <ul style="list-style-type: none"> • Definite integral- Definition, examples. • Properties of definite integrals and simple examples. 	06	
<p>2.3 Application of Definite Integrals -----14 Specific objectives : ➤ Find area, mean value, R. M. S value, volume of solid of revolution.</p> <ul style="list-style-type: none"> • Area under the curve. • Area between the two curves. • Mean and R. M. S. Value. • Volume of solid of revolution. 	06	
<p>Topic 3 - Differential Equation.</p>		
<p>3.1 Differential equation Specific objectives : ➤ Solve the differential equation of first order and first degree ➤ Solve different engineering problems using differential equation</p> <ul style="list-style-type: none"> • Differential equation- Definition, order and degree of a differential equation. Formation of differential equation containing single constant. • Solution of differential equation of first order and first degree for following types <ul style="list-style-type: none"> Variable separable form , Equation reducible to variable separable form. Linear differential equation. Bernoulli differential equation. Homogeneous differential equation. 	10	20

<p>Exact differential equation.</p> <ul style="list-style-type: none"> • Geometrical application of differential equation. • Motion under variable acceleration • Motion under uniform (constant) acceleration 			
Topic 4 - Probability			
<p>4.1 Probability Specific objectives : ----- 08</p> <p>➤ Solve different engineering problems related to production process.</p> <ul style="list-style-type: none"> • Definition of random experiment, sample space, event , occurrence of event and types of event (impossible, mutually exclusive, exhaustive , equally likely) • Definition of probability, addition and multiplication theorems of probability. 	03	20	
<p>4.2 Probability Distribution ----- 12</p> <ul style="list-style-type: none"> • Binomial distribution • Poisson's Distribution • Normal distribution 	04		
Total		48	100

Learning Resources:

1) Books:

Sr. No	Title	Authors	Publication
1	Mathematic for Polytechnic	S. P. Deshpande	Pune Vidyarthi Girha Prakashan' Pune
2	Calculus : Single Variable	Robert. T. Smith	Tata McGraw Hill
3	Higher Engineering mathematics	B. V Ramana	Tata McGraw Hill
4	Higher Engineering mathematics	H. K. Dass	S .Chand Publication
5	Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Delhi
6	Applied Mathematics	P. N. Wartikar	Pune Vidyarthi Griha Prakashan, pune

2) Websites :

- i) www.khan.academy

Course Name : Mechanical Engineering Group

Course Code : AE/ME/MH/MI/PG/PT

Semester : Third

Subject Title : Mechanical Engineering Drawing

Subject Code : 17302

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	04	100	--	25#	50@	175

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**
- **Students should use two separate A3 size sketchbooks, one for class work and another for assignment.**
- **Students should solve assignment on each topic.**
- **Use half imperial size drawing sheet for term work.**

Rationale:

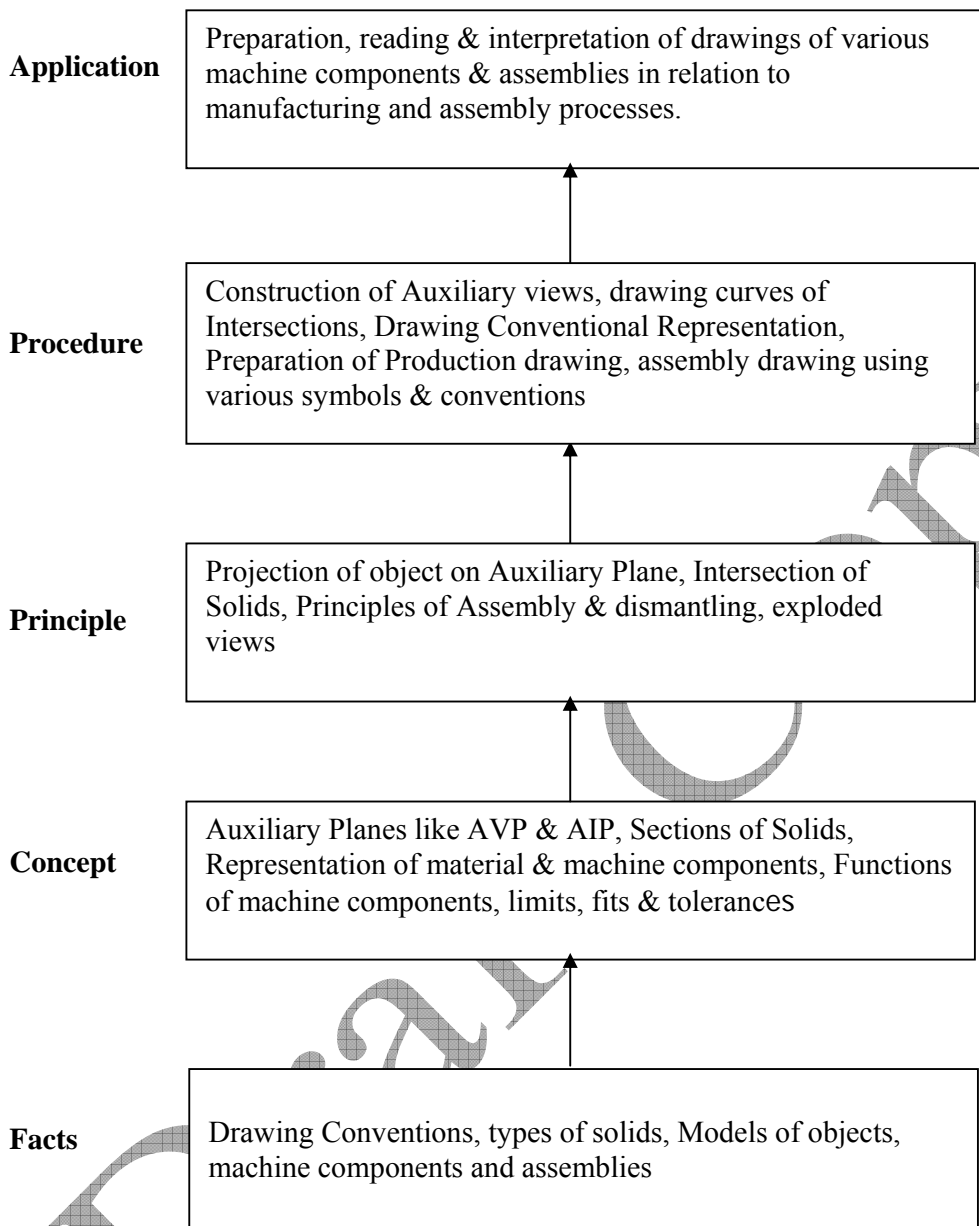
A Mechanical Engineer, irrespective of their field of operation in an industry, is expected to possess a thorough understanding of drawing, which includes clear visualization of objects and the proficiency in reading and interpreting a wide variety of production drawings. Besides, they are also expected to possess certain degree of drafting skills depending upon job function, to perform day to day activity i.e. communicating and discussing ideas with supervisors and passing on instructions to subordinates unambiguously. This course envisages reinforcing and enhancing the knowledge and skill acquired in the earlier two courses viz. Engineering Graphics & Engineering Drawing.

Objectives:

The student will be able to –

1. Interpret simple industrial drawings.
2. Interpret instructions related to manufacturing of components.
3. Use IS convention of representing various machine components.
4. Appreciate the significance & use of tolerances of size, forms & positions.
5. Visualize the assembly of a given set of details of machine components.

Learning Structure:



Theory:

Topics and Contents	Hours	Marks
<p>1. Auxiliary views: - Specific Objectives</p> <ul style="list-style-type: none"> ➤ Understand and draw the projection of objects on auxiliary planes <p>1.1 Study of auxiliary planes, Projection of objects on auxiliary planes. Completing the regular views with the help of given auxiliary views (Use first angle method of projection)</p>	06	08
<p>2. Intersection of solids:- Specific Objectives</p> <ul style="list-style-type: none"> ➤ Visualize and draw lines and curves of intersection of the surfaces of different solids <p>Following cases to be considered</p> <p>2.1 Prism with prism, Cylinder with cylinder, Prism with Cylinder When (i) the axes are at 90° and intersecting (ii) The axes are at 90° and Offset</p> <p>2.2 Cylinder with Cone When axis of cylinder is parallel to both the reference planes and cone resting on base on HP and with axis intersecting and offset from axis of cylinder</p>	10	16
<p>3. Conventional Representation:- Specific Objectives</p> <ul style="list-style-type: none"> ➤ Understand and draw the projection of Conventional Representation <p>3.1. Standard convention using SP – 46 (1988)</p> <p>3.2 Materials- C.I., M.S, Brass, Bronze, Aluminium, wood, Glass, Concrete and Rubber</p> <p>3.3 Long and short break in pipe, rod and shaft.</p> <p>3.4 Ball and Roller bearing, pipe joints, cocks, valves, internal / external threads.</p> <p>3.5 Various sections- Half, removed, revolved, offset, partial and aligned sections.</p> <p>3.6 Knurling, serrated shafts, splined shafts, and keys and key ways</p> <p>3.7 Springs with square and flat ends, Gears, sprocket wheel, chain wheels</p> <p>3.8 Countersunk & counter bored holes.</p> <p>3.9 Convention of Tapers</p>	06	12
<p>4. Production Drawings Specific Objectives</p> <ul style="list-style-type: none"> ➤ Understand attributes of Production Drawing and Process Sheet of various components ➤ Interpret various symbols shown on the drawing and select manufacturing processes accordingly <p>4.1 Limits, fits and tolerances 4 marks Definitions, Introduction to ISO system of tolerancing- unilateral and bilateral and its representation on drawing, dimensional tolerances, elements of interchangeable system, hole & shaft base systems, tolerance diagram, Selection of fit (clearance, transition and interference) for engineering applications.</p> <p>4.2 Geometrical tolerances 4 marks Definitions, Tolerances of form and position and its geometric representation-tolerance frame, datum feature, magnitude of tolerance and symbol, interpretation of a given symbol on drawing, simple examples.</p> <p>4.3 General welding symbols 4 marks</p>	06	16

Symbolic representation in Engineering practices and its interpretation. 4.4 Characteristics of surface roughness 4 marks Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods, using ISO code. Relation of surface roughness values with manufacturing processes.		
5. Details to Assembly drawing Specific Objectives <ul style="list-style-type: none"> ➤ Visualize and draw Details to Assembly ➤ Understand the procedure for assembly of components i. Introduction- Basic principles of process of assembly. ii. Couplings – Universal couplings & Oldham’s Coupling iii. Bearing – Foot Step Bearing & Pedestal Bearing iv. Lathe tool Post (Single point tool post), shaper tool holder v. Machine vice & Pipe Vice vi. Screw Jack vii. Valves- Steam Stop Valve, Non – Return Valve viii. Assembly of IC engine piston.	10	24
6. Assembly to Details Specific Objectives <ul style="list-style-type: none"> ➤ Visualize and draw Details from Assembly drawing ➤ Understand the sequence of dismantling the assembly into components i. Introduction – basic principles of dismantling process ii. Pedestal Bearing iii. Lathe Tail Stock iv. Drilling Jig v. Piston & connecting rod assembly. vi Stuffing box Assembly vii Steam stop Valve. viii. Screw Jack	10	24
TOTAL	48	100

Note: - For topic no. 5 and 6 any other assembly containing at least 6 to 10 components may be considered.

Skills to be developed for Practical:

Intellectual Skills:

- To interpret the projection of objects on auxiliary planes
- Understand interpenetration of solids.
- Interpret Conventional symbols as per IS code SP46.
- Interpret limits, fits and tolerances on a given drawing.
- Understand Production drawing of m/c components
- Identify various components in a given assembly and find the sequence of dismantling it
- Visualize details of components and determine the sequence of components assembly.

Motor Skills:

- To draw the projection of objects in auxiliary planes
- Draw front view and top view of solids Penetrating one with other and find the shape of the interpenetration curve.
- Assign and draw surface roughness values and symbols on a part drawing.
- Conventionally represent limit, fits and tolerances on a given drawing as per the functional requirements of components.
- To draw the production drawing of m/c components.
- Prepare bill of materials in assembly drawing.
- To dismantle machine and prepare production drawing of various components of assembly.

List of Practical:	
1. Auxiliary views ➤ One sheet containing minimum two problems	4 hours
2. Intersections of Solids ➤ One Sheet containing at least three problems.	8 hours
3. Conventional Representation ➤ Conventional Representation of machine components as per SP – 46 (1988) - one sheet ➤ Limit, Fit, Tolerances, geometric tolerances, Machining Symbols, welding symbols – one sheet	12 hours
4. Production Drawing of at least one component- one sheet.	6hours
5. Assembly to details drawing ➤ Prepare component drawings of given assembly, including conventional representation, tolerances and surface finish symbols. - One sheet	14 hours
6. Details to Assembly drawing ➤ From a given drawings of components prepare an assembly with two views. Prepare a part list / bill of material. Show overall dimensions of the assembly –One sheet	14 hours
7. Dismantle any machine assembly having 6 to 10 part. Prepare the sketches in sketchbook with dimension and then draw assembly.-----	6 hours

List of Assignments:

1. Auxiliary views: At least two problems
2. Intersections of Solids: At least four problems
3. Assembly to details drawing: At least one problem
4. Details to Assembly drawing: Solve at least two problems.

Note: Above assignment is the part of term work.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publication & Edition
1	N.D.Bhatt	Machine Drawing	Charotar Publication, Anand, Reprint 2010
2	L. K. Narayanan, P. Kannaich, K.VenkatReddy	Production Drawing	New Age International Publication, 2010

3	N Sidheswar P Kannaiah V V S Sastry	Machine Drawing	Tata McGraw Hill Education Pvt. Ltd., 2010
4	N. D.Junnarkar	Machine Drawing	Pearson, Third Impression 2011
5	Goutam Pohit Goutam Ghosh	Machine Drawing with AutoCAD	Pearson, Reprint 2009
6	Basudeb Bhattacharyya	Machine Drawing	Oxford, 2011
7	IS Code SP 46 (1988)	Code of practice for general engineering drawing.	Engineering Drawing Practice for School and colleges, 2005

Draft Copy

Course Name : Mechanical Engineering Group

Course Code : ME/MH/MI/PG/PT

Semester : Third

Subject Title : Mechanical Engineering Material

Subject Code : 17303

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	--	03	100	--	--	--	100

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

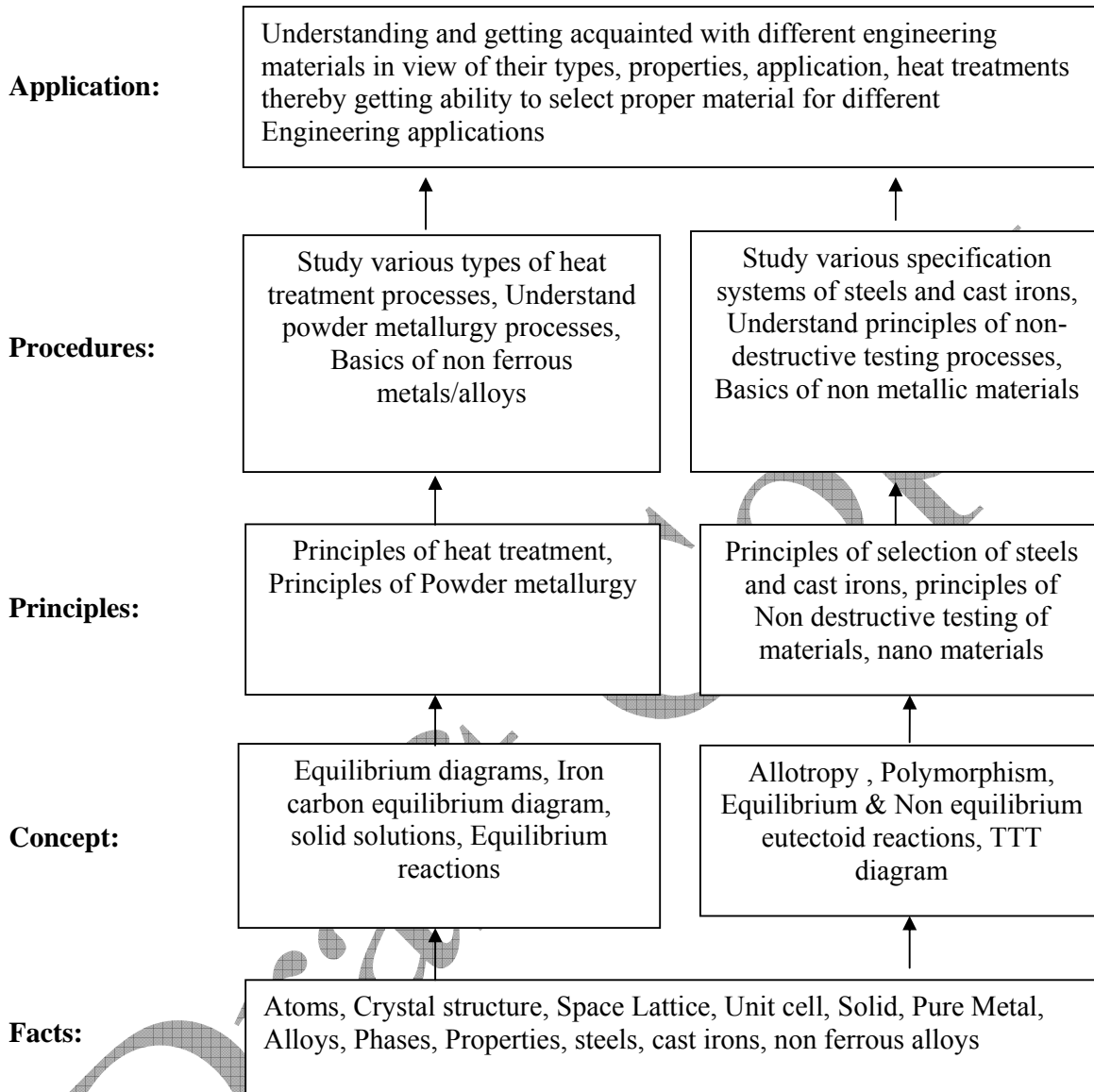
Rationale:

Practical field in engineering involves different materials with varied composition, properties with numerous applications. Diploma engineers should have a good knowledge of composition, properties, and applications of these materials. In order to inculcate the same, this subject is designed. Ferrous & Non ferrous metals and alloys find major applications. Amongst these, steels and cast iron are the main alloys with major applications in engineering practice. Sound knowledge about types, properties, composition and heat treatment of steels and cast irons is absolutely necessary to diploma engineers. He should be able to identify steels and cast irons by their specifications and be able to select them for proper applications. Materials like plastics polymers, are also finding importance in engineering application areas. Powder metallurgy process also finds application in manufacturing of special parts with typical properties. Non destructive testing methods are also extensively used in practice today. Diploma engineers should have basic knowledge of these areas.

General Objectives: Students will be able to

- Understands about basics of engineering materials as regards classification, structure and properties.
- Understand basics of structure - property relationships of heat treatments.
- Analyze various types of steels and cast irons along with their specifications.
- Understand about types, composition and field of application of various non ferrous metals and alloys & non metallic materials
- Understand about types, composition and field of application of various Non metallic materials.
- Understand about basic process of powder metallurgy and applications.
- Understand about various Nondestructive testing methods and their applications.

Learning Structure:



Theory Content:

Topic and Contents	Hours	Marks
<p>1. Engineering Materials - structure and Properties Specific Objectives: ➤ List basic types and crystal structure of materials ➤ Compare properties of material ➤ Define steel and cast iron</p> <p>Contents: 1.1 Introduction, Classification of materials as amorphous and crystalline , ferrous and non ferrous, Crystal structure Properties of metals Physical Properties, Mechanical Properties, unit cell and space lattice, Concept of packing efficiency 1.2 Introduction to steels and Cast irons as alloys of iron and carbon.</p>	06	10
<p>2. Equilibrium Diagrams Specific Objectives: ➤ Define pure metal, alloy, solid solutions ➤ Learn different equilibrium Diagrams ➤ Draw Iron carbon phase equilibrium diagram, locate fields of steels and cast iron on diagram</p> <p>Contents: 2.1 Definitions of phase, pure metal, alloy and solid solutions. • Types of solid solutions -substitutional and interstitial. • Solid solubility</p> <p>2.2 Solidification of pure metal and Alloys: • Cooling curves equilibrium diagrams for isomorphous, Eutectic, Eutectoid systems.</p> <p>2.3 Iron Carbon Equilibrium diagram • Study of various phases • Critical temperatures & significance • Reactions on Iron carbon equilibrium diagram • Introduction of steels and cast irons • Classification of steels on various basis as low , medium, high carbon steels, Hypo, Hyper eutectoid steels</p>	06	16
<p>3. Heat Treatment Of Steels Specific Objectives: ➤ Represent various heat treatment processes on TTT diagram ➤ Suggest different heat treatment processes ➤ Compare surface heat treatment processes for different steels</p> <p>Contents: -----16 Marks 3.1 Transformation in steel on heating under equilibrium conditions • Transformation of pearlite to austenite • Transformation of Austenite to Pearlite • T T T diagrams/isothermal diagram for plain carbon and alloy steels</p> <p>3.1.1 Annealing: • Purposes of annealing, Annealing temperature range • Types of annealing like conventional / full annealing, isothermal</p>	14	24

<p>annealing, spheroidizing annealing, Process Annealing</p> <p>3.1.2 Normalizing:</p> <ul style="list-style-type: none"> • Purposes of Normalizing, Temperature range, • Broad applications of Normalizing <p>3.1.3 Hardening:</p> <ul style="list-style-type: none"> • Purposes of hardening, Hardening temperature range • Conventional hardening process, Structure of martensite and properties • quenching mediums, hardening defects. <p>3.1.4 Tempering:</p> <ul style="list-style-type: none"> • Purpose of tempering • Variations of properties of hardened steel with tempering temperatures • Types of tempering as low, medium and high temperature tempering. • Martempering, Austempering and patenting processes <p>3.2 Surface Heat Treatment 8 Marks</p> <ul style="list-style-type: none"> • Need of Surface heat treatment, • Types of Surface heat treatments like Surface hardening and case hardening. • Surface hardening methods like Flame Hardening , Induction Hardening • Case hardening methods like Carburizing, Nitriding, Cyaniding. 		
<p>4. Steels and Cast Irons: --- 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List different types of steels and cast irons ➤ Know manufacturing processes of steels & cast irons ➤ Refer to specifications systems of steels and cast irons ➤ Suggest suitable steels/ cast irons in specifications for particular applications. <p>Contents:</p> <p>4.1 Broad Classification of steels, Plain carbon steels</p> <ul style="list-style-type: none"> • Definition, Types & Properties • Compositions and applications of low, medium and high carbon steels. <p>4.2 Alloy Steels:</p> <ul style="list-style-type: none"> • Definition & Effects of alloying elements on properties of alloy steels. • Tool steels: Cold work tool steels, Hot work tool steels, High speed steels(HSS), HCHC and OHNS • Stainless Steels • Spring Steels <p>4.3 Cast Irons: Classification of cast irons and applications. Types of cast irons as white, gray, nodular, malleable</p> <p>4.4 Specifications of steels and cast Irons:</p> <ul style="list-style-type: none"> • Bureau Of Indian Standards BIS, AISI / SAE , British Standard B.S. specifications of steels & their equivalents Specifications of cast irons • Selection of appropriate steels and cast irons for engineering 	12	20

applications like Shafts, axles, Nuts, bolts, Levers, crank shafts, camshafts, Shear blades, agricultural equipments, House hold utensils, machine tool beds, car bodies.		
<p>5. Non ferrous Metals and Alloys --- 10 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Select various non ferrous metals/alloys in view of their composition, properties for applications <p>Contents:</p> <p>5.1 Chemical compositions, properties and applications of Copper alloys - brasses, bronzes</p> <p>5.2 Aluminium alloys --Y-alloy, Hindalium, duralium with their composition and applications. Bearing materials like white metals (Sn based), aluminium bronzes. Porous self lubricating bearings.</p>	08	10
<p>6. Non Metallic Materials</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Select non metallic materials in view of their composition, properties and applications <p>Contents:</p> <p>6.1 Polymeric Materials</p> <ul style="list-style-type: none"> • Polymers- types, characteristics, • Properties and uses of Thermoplastics, Thermosetting Plastics & Rubbers. <p>6.2 Thermoplastic and Thermosetting Plastic materials</p> <ul style="list-style-type: none"> • Characteristics and uses of ABS, Acrylics. Nylons and Vinyls, • Epoxides, Melamines & Bakelites <p>6.3 Rubbers :</p> <p>Neoprene, Butadiene, Buna & Silicons – Properties & applications.</p> <p>6.4 Other Engineering Materials of importance -Properties and applications– Ceramics, glasses, Glass Wool. Introduction to Composite Materials like, Laminated & Fibre reinforced materials Nano materials – nature, properties and applications</p>	08	12
<p>7. Powder Metallurgy & Nondestructive Testing -- 08 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know concepts of powder metallurgy process with their applications ➤ Compare Different Non destructive testing processes <p>Contents:</p> <p>7.1 Powder Metallurgy :</p> <ul style="list-style-type: none"> • Advantages, limitations and applications of Powder Metallurgy for engineering products. • Brief Description of Process of Powder Metallurgy – Powder making, blending, compacting, sintering, infiltration & impregnation. • Applications of Powder metallurgy for tungsten carbide tip tools & porous bearing. <p>7.2 Non destructive Testing:</p> <ul style="list-style-type: none"> • Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing. • Nondestructive testing methods - Radiography (X-Ray & Gamma 	10	08

Ray), Ultrasonic crack detection, Dye penetrant test, Magnaflux test – Comparison & applications		
Total	64	100

Learning Resources:

1. Books:

Sr. No.	Title	Author	Edition	Publisher
01	A Text Book of Material Science and Metallurgy	O.P.Khanna	2005	Dhanpat Rai and Sons
02	Engineering Material and Metallurgy	Shrinivasan	1st	Tata Mc-Graw Hill
03	Material Science And Metallurgy	Dr.V.D.Kodgire	----	Everest Publishing House
04	Engg.Metallurgy	Ramarao & Vyas	1995	Nit -Din Publications,Nagpur
05	Elements of Material Science and Engineering	Lawrence H. Van Vlack	2012	Person Education
06	Introduction to Physical metallurgy	Sidney H. Avner	2006	Tata Mc Graw Hill edition (2nd)
07	Material science & Engg.Materials	Smith	---	--
08	Physical Metallurgy	Yu Lakhtin	---	Mir Publication

2. CD's PPTs, Video clips on basics of steels, Iron Carbon Diagram, Heat Treatments, Manufacturing of steels, Powder Metallurgy and Non destructive testing

3. Charts, Models , Transparencies on basics of steels, Iron Carbon Diagram, Heat Treatments, Manufacturing of steels, Powder Metallurgy and Non destructive testing

4. Specifications of steels-standards

- a) Bureau Of Indian Standards (BIS) Specifications of steels
- b) British Specifications (B.S.) of steels
- c) American Iron & Steel Institute (AISI) / Society of Automotive Engineers (SAE) specifications of steels
- d) Mahindra Ugine Steel Company (MUSCO) steel book

5. Web sites of following companies for reference

- Mukand Iron Ltd
- Jindal steels
- Tata steels
- Rajuri steels
- Roopam steels
- TISCO
- Kalika steels

Course Name : Civil, Chemical, Mechanical and Electrical Engineering Group

Course Code : ME/PG/PT/AE/MH/MI/FE

Semester : Third

Subject Title : Strength of Materials

Subject Code : 17304

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

NOTE:

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Rationale:

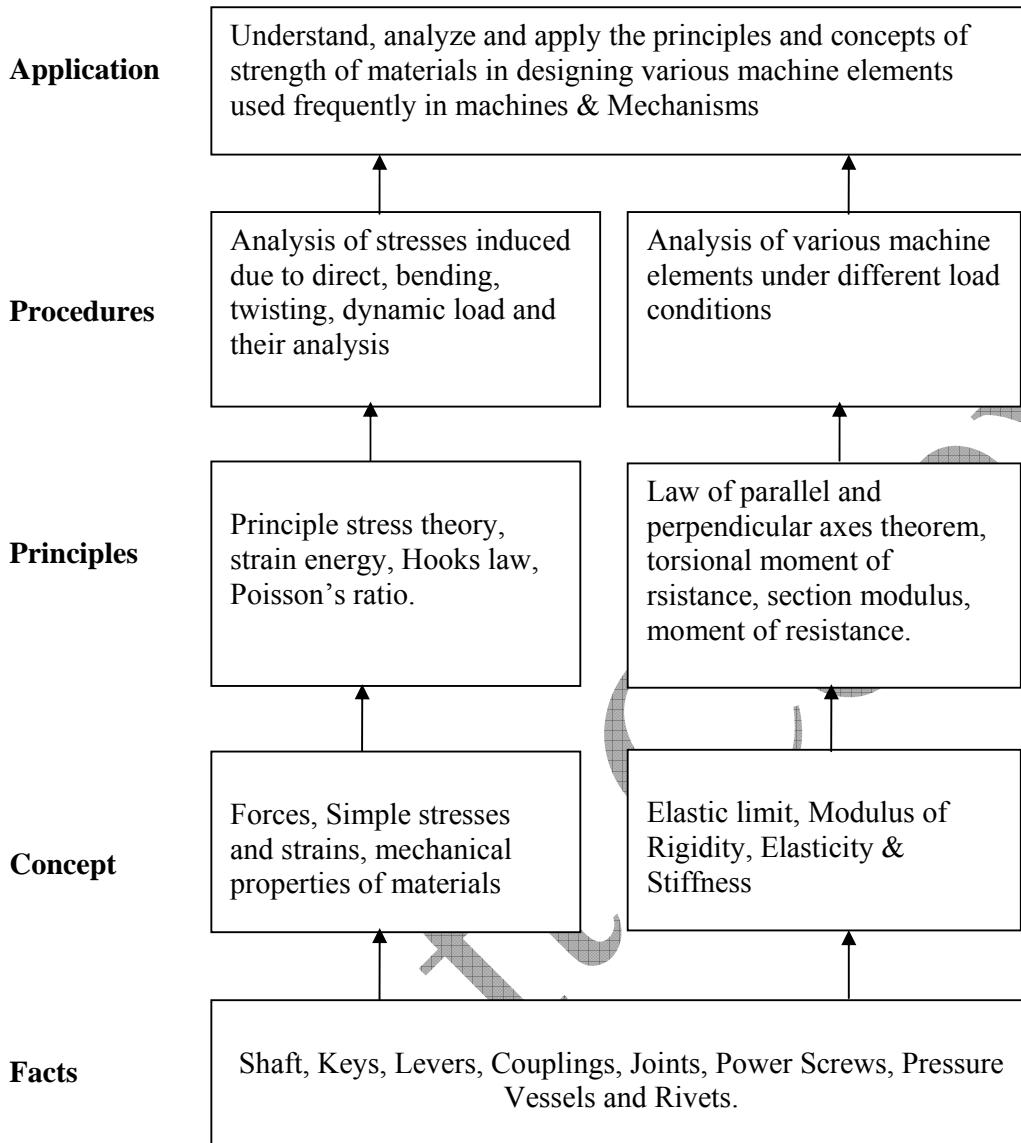
Strength of Material is a core technology subject. It aims at enabling the student to understand & analyze various types of loads, stresses & strains along with main causes of failure of machine parts. The subject is pre-requisite for understanding principles of machine design. Understanding mechanical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

General Objectives:

The Student will be able to:

1. Understand the fundamentals of solid mechanics.
2. Acquire elementary knowledge of stresses, strains & material properties.
3. Understand & analyze the basic principles involved in the behavior of machine parts under load in the context of designing it.
4. Understand & analyze the mechanical properties of the various materials.

Learning structure:



Theory

Topic and Contents	Hours	Marks
<p>1. Mechanical Properties of Materials, Simple Stresses & Strains Specific Objectives. ➤ Acquire elementary knowledge of stresses, strains and material properties. ➤ Study and apply Euler’s theory</p> <p>Contents 1.1 Mechanical properties and Concept of Simple stresses & strains. -- 8 Marks</p> <ul style="list-style-type: none"> • Elasticity, Plasticity, Plastic flow, Ductility, Malleability, Stiffness & Strength. • Types of loads, stresses- tensile, compressive, Shear, single & double shear, concept of plain strain –tensile ,compressive, direct shear strain, torsional shear strain, lateral strain, Hooke’s law, • Poisson ratio common values for C.I.& M.S. Relation between stress-strain. Stress-strain diagram for tensile & brittle materials, important points on the stress- strain diagram, • Modulus of elasticity & modulus of rigidity, Volumetric Strain, Bulk modulus, relation between modulus of elasticity & modulus of rigidity. • Thermal stresses - <ul style="list-style-type: none"> ○ Temperature stresses & strains of uniform section. <p>1.2 Composite section. -- 4 Marks ➤ Stress & strains in bars of stepped & uniformly varying sections subjected to axial load at ends only, composite sections having same length.</p> <p>1.3 Buckling of long columns -- 4 Marks ‘Euler’s theory, Rankine’s theory – equivalent length of the column for the cases below</p> <ul style="list-style-type: none"> • Both ends hinged, One end fixed and other free, Both ends fixed, One end fixed and other end hinged. (simple numerical only) 	10	16
<p>2. Principal stresses and planes. Specific Objectives. ➤ Acquire elementary knowledge of hoop stresses & principal stresses.</p> <p>Contents 2.1 Concept of Principal stresses and Principal planes. Stresses on an oblique section of a body subjected to -- 4 Marks</p> <ul style="list-style-type: none"> • Direct stresses on one plane. • Direct stresses on mutually perpendicular planes. • Direct and Shear stress on one plane. • Direct and Shear stress on mutually perpendicular plane (No derivations). • Mohr’s circle method for finding principle stresses and planes (only simple numericals). <p>2.2 Thin Cylindrical shell -- 4 Marks</p> <ul style="list-style-type: none"> • Stresses in thin closed cylindrical vessels subjected to internal pressure, Hoop stress, Radial & Axial Stress.(Simple numericals only) 	05	08

<p>3:- Bending Moment & Shear Force Specific Objectives. ➤ Understand & analyse the basic principles involved in the behaviour of machine parts under load in the context of designing it</p> <p>Contents 3.1 Concept & definition of Shear force & bending moment</p> <ul style="list-style-type: none"> • Relation between rate of loading, shear force & bending moment. • Shear force & bending moment diagrams for cantilevers, simply supported beam & over hanging beam subjected to point loads & uniformly distributed load. Location of point of contra flexure 	08	16
<p>4 Moment of Inertia Specific Objectives. ➤ Determine Area Moment of Inertia of regular and composite sections.</p> <p>Contents</p> <ul style="list-style-type: none"> • 4.1 Concept & definition of Moment of inertia, Parallel & perpendicular axes theorem. • (No derivation) • Moment of inertia of solid sections-square, rectangular, circular, semicircular, Triangular Hollow sections- square, rectangular & circular cross sections only. • Moment of Inertia of angle section, Channel section, Tee- section, I - section about centroidal axis & any other axis parallel to centroidal axis. • Polar moment of inertia. 	06	16
<p>5 Bending stresses Specific Objectives. ➤ Acquire and apply knowledge of bending stresses & shear stresses</p> <p>Contents</p> <p>5.1 Theory of simple bending,</p> <ul style="list-style-type: none"> • Assumptions in the theory of bending, moment of resistance, section modulus ,neutral axis. Stress distribution diagram for Cantilever & simply supported beam. Equation of bending (Simple numericals based on formula) -- 6 marks <p>5.2 Concept of direct & transverse shear stress. . Transverse Shear stress equation (No derivation). Shear stress distribution diagrams Average shear stress & Maximum shear stress for rectangular & circular section -- 6 marks</p>	06	12
<p>6. Direct and Bending Stresses Specific Objectives. ➤ Acquire and apply knowledge of bending stresses and direct stresses.</p> <p>Contents</p> <p>6.1 Concept of Axial load, eccentric load, direct stresses, bending stresses, maximum & minimum stresses. Stress distribution diagram. -- 4 marks</p> <p>6.2 Problems on the above concepts for strut, machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame etc. -- 8 marks</p> <p>6.3 Condition for no tension in the section, core of section -- 4 marks</p>	07	16
<p>7. Torsion Specific Objectives.</p>	06	16

<p>➤ Understand and apply the concept of pure torsion and stresses due to Power Transmission</p> <p>Contents</p> <p>7.1 Concept of Pure Torsion,</p> <ul style="list-style-type: none"> Assumptions in theory of pure Torsion, Torsion equation for solid and hollow circular shafts, stress distribution across solid circular shaft.(No derivation) Power transmitted by a shaft. --10 marks <p>7.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft) -- 6 marks</p>		
Total	48	100

Practicals:

Skills to be developed:

Intellectual skills:-

1. Identify different stresses in machine parts.
2. Interpret the test results.
3. Test different metals & compare experimental results.
4. Calculate the shear force & bending moment.

Motor skills:-

1. Use of instruments and equipments.
2. Sketching of standard specimen.
3. Prepare machines for tests.
4. Observe & compare behaviour of different materials during test.
5. Draw shear force & bending moment diagram for different types of loading on beams.

Practicals:

Sr. No	Name of Practical
1	Study & demonstration of Universal Testing Machine and its attachments
2	Study & demonstration of Extensometer
3	Tension test on mild steel, aluminum & compression test on cast iron on Universal Testing Machine
4	Direct Shear test of mild steel on Universal Testing machine.
5	Hardness test on mild steel by any one method and find equivalent values by other method.
6	Impact test on a standard specimen (Charpy or Izod impact test)
7	Torsion Test on Mild steel bar and find breaking torsional shear strength and stiffness .

Note—Use relevant IS codes for conducting the tests.

List of Assignments:

1. Problems on Shear force & bending moment diagram to be drawn on graph paper. (Minimum four)
2. Problems on principal plane and principal stresses by Mohr's circle method. (Minimum four)

Learning Resources:**1. Books:**

Sr. No.	Title	Author	Edition	Publisher
01.	Strength of material	R.S.Khurmi	Reprint 2005	S.Chand Company Ltd. Delhi
02.	Fundamentals of Strength of Materials	Debabrata Nag & Abhijit Chanda	Reprint 2011	Wiley India
03.	Strength of Materials	S.S. Ratan	Second Edition 2008, Reprint 2011	Tata McGraw Hill New Delhi
04.	Strength of Materials	R. Subramanian	Second Edition 2010	Oxford University Press
05.	Strength of Material	S Ramamrutham & R. Narayanan	6 th Edition	Dhanpat Rai & Publication New Delhi
06.	Strength of Material	S. S. Bhavikatti	Third edition	Vikas publishing House Pvt. Ltd

2. ISO, IS, BS Codes:

I S:1982(PART -I),
I S:5242-1979,
I S:1500-1983,
I S:1598-1977,
I S:1757-1973,
I S:1717,
I S:800,

Course Name : Mechanical Engineering Group

Course code : ME/MH/MI/PG/PT

Semester : Third

Subject Title : Electrical Engineering

Subject Code : 17305

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	---	25@	125

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

Rationale:

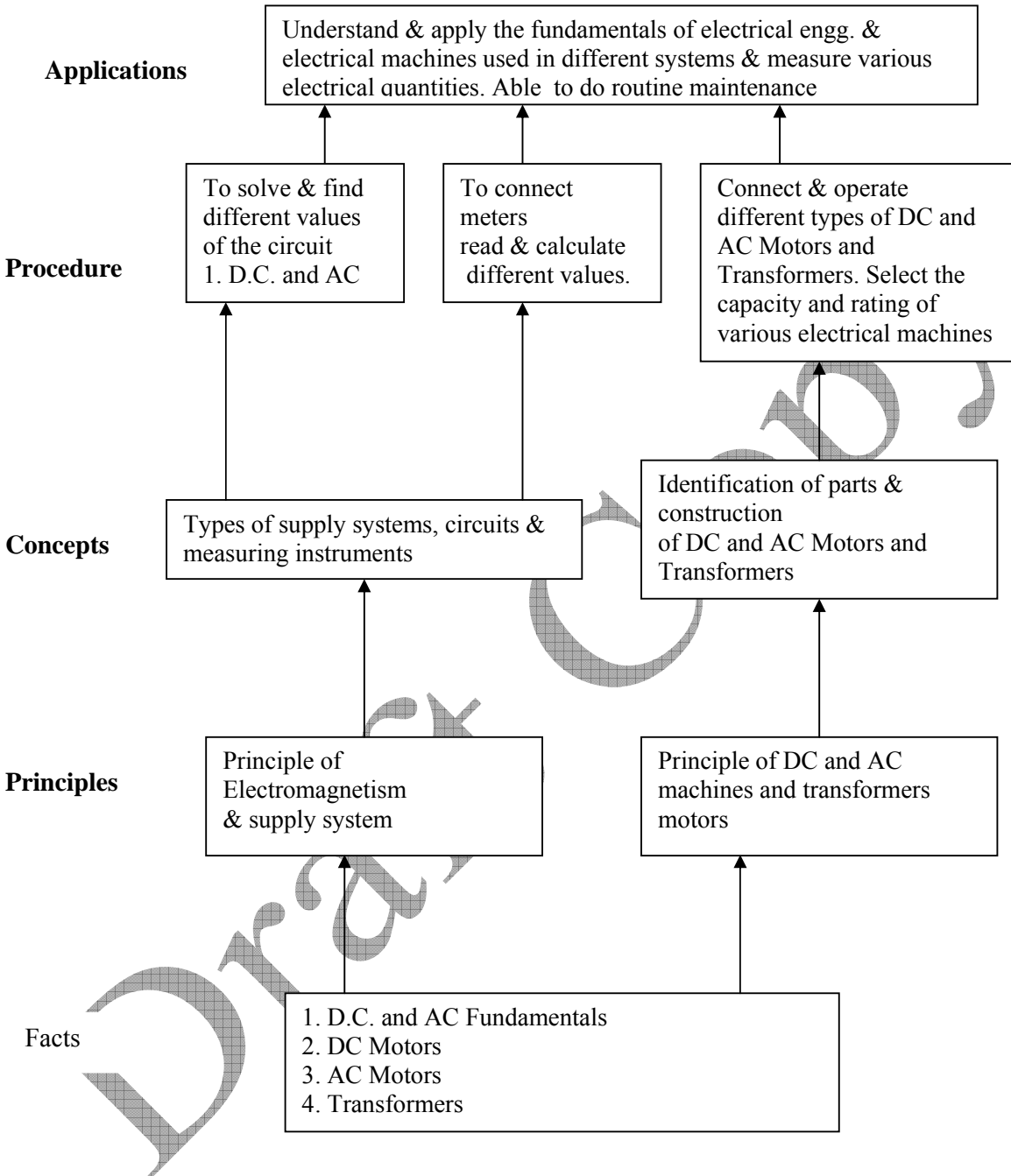
This subject is introduced with intention to teach students of mechanical branch facts, concepts, principles and procedure of operating electrical machines, circuits and systems and their applications. This subject is most important in regards to selection of electrical drives for various applications and will provide sufficient knowledge about electrical machines, equipments used in industry/field. This subjects deals with measurements of electrical quantities to judge the performance of electrical machines

General Objectives:

Student will be able to:

1. Differentiate between a.c. and d.c. supply.
2. Identify different type's motors, transformers and drives.
3. Select suitable drive as per the requirements.
4. Understand various types of electric heating and welding operations in manufacturing processes.
5. Supervise routine maintenance of electrical machines and supply systems.
6. Use the tariff system.
7. Calculate energy requirements and cost of energy.

Learning Structure:



Theory:

Topic and Content	Hours	Marks
<p>1. Introduction To Electric Power System And A.C.Supply 20 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Understand various components of power system. ➤ Distinguish between a.c. and d.c. supply. ➤ Calculate electrical quantities of a.c. supply and circuit parameters of R-L and R-C circuits. ➤ Calculate line and phase quantities and various powers in three phase circuit <p>Contents: Introduction: 04 Marks 1.1 Electrical power supply system generation, transmission, distribution. AC supply & DC Supply Study of types of wiring accessories.</p> <p>AC Fundamentals: 08 Marks 1.2 Definitions; cycle, frequency, phase, period, maximum value, average value, r.m.s. value. (Simple Numericals)</p> <p>1.3 Concept of current, voltage, power & energy in series R-L and R-C circuits.(Simple Numericals)</p> <p>Three phase supply: 08 Marks 1.4 Star and Delta circuit, 1.5 Line and Phase relationship, power equation.(Simple Numericals)</p>	10	20
<p>2.Measuring Instruments: 06 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Understand ac and dc meters. ➤ Use multimeter for measurements of current, voltage and passive parameter. <p>Contents: 2.1Introduction to construction, operation and use of AC and DC ammeter, voltmeter (PMMC and MI meters only). 2.2Electro-dynamic wattmeter, energy meter and digital multimeter, Clip on meter.</p>	04	06
<p>3.DC Motor 04 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Understand working principle of d.c. motor. ➤ Select type of d.c. motor as per requirement. <p>Contents: 3.1Construction and principle of operation. 3.2 Speed-torque characteristics. D.C. shunt, series and compound motors. Their specifications and applications.</p>	02	04
<p>4.Transformer: 14 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Understand working principle of transformer. ➤ Calculate transformation ratio, efficiency and regulation from direct load test. <p>Contents:</p>	06	14

4.1 Construction and principle of operation. 4.2 EMF equation and transformation ratio. 4.3 Load test for efficiency and regulation. Specifications and rating. 4.4 Auto transformer & 3 phase transformer concept only. 4.5 Applications of transformers.		
5.AC motor: 24 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ Describe working principle of three phase induction motor. ➤ Calculate slip and rotor frequency and draw speed-torque curves. ➤ Use starter for three phase induction motor. ➤ Understand working principle of single phase induction motor and its types. ➤ Select proper type of single phase induction motor. Contents: 5.1 Three Phase Induction Motor: 10 Marks <ul style="list-style-type: none"> ➤ Construction and principle of operation of 3 phase induction motor. ➤ Speed torque characteristics, slip, speed control of Induction Motor by variable frequency drive(VFD)-working principle and block diagram only, Reversal of rotation, ➤ Starters-Direct ON Line Starters and Star-Delta Starters-Working principle, circuit diagram and applications. 5.2 Single Phase Induction Motors 04 Marks a) Capacitor start, b) Capacitor start and run, c) Shaded pole 5.3 Other Motors: 06Marks Study the following motors with respect to specifications and rating, construction and applications. <ul style="list-style-type: none"> ➤ Universal motor ➤ Servo motor ➤ Stepper motor 5.4 Alternator: 04 Marks Construction, principle of operation & applications. Self and separate excitation.	10	24
6.Utilization of Electrical Energy: 18 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ Classify and select electric drives on the basis of speed-torque characteristics and enclosures. ➤ Understand working principle of electric heating , welding and electroplating. ➤ Use electric motor for electro-agro system. Contents: 6.1 Industrial Applications: 04 Marks <ul style="list-style-type: none"> ➤ Classification of drives ➤ Factors for selection of motor for different drives. ➤ Types of enclosures. 6.2 Electric heating & welding: 10 Marks Working principle & types of heating and welding and their applications. 6.3 Electrometallurgical & Electro Agro Systems: 04Marks Concept and principle used in electroplating. <ul style="list-style-type: none"> ➤ Electrical machines used in electro-agro systems. 	08	18
7.Electric wiring , Illumination , Electric safety, Tariff & Power conservation : 14 Marks	08	14

<p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Do wiring of switchboards. ➤ Select type of lamp as per requirement. ➤ Understand importance of MCB and ELCB and electric safety. ➤ Understand need of earthing and importance of pf. improvement. <p>Contents:</p> <p>7.1 Introduction to switches used in mechanical machines. Simple Electric Installations with 2 sockets, 2 fans, 2 lamps, with switches and fuses</p> <p>7.2 Introduction to different accessories like MCB, ELCB, wires & cables.</p> <p>7.3 Different types of lamps with their ratings and applications.</p> <p>7.4 Concept of energy conservation and energy audit</p> <p>7.5 Necessity of earthing, type, safety tools, first aid.</p> <p>7.6 Types of tariff, pf improvement only methods.</p> <p>7.7 Fire extinguishing methods adopted in electrical engineering</p> <p>7.8 Trouble shooting electrical installations and machines.</p>		
Total	48	100

Skills to be developed for practical:

Intellectual skills

Student will be able to:

1. Identify and give specifications of electrical motors and transformers.
2. Interpret wiring diagrams for various applications.
3. Identify safety equipments required.
4. Decide the procedure for setting experiments.

Motor skills:

Student will be able to:

1. Draw wiring diagram
2. Make wiring connections to connect electrical equipments and instruments.
3. Measure electrical power, earthing resistance and other electrical quantities.
4. Calibrate electrical instruments.
5. Use of safety devices while working.
6. Prepare energy consumption bill with present tariff structure.

List of Practical:

Expt. No.	Name of the Experiment
01	To measure current, power and p.f of series R-L circuit.
02	To measure current, power and p.f of series R-C circuit.
03	To measure line and phase quantities (currents and voltages) in a given 3 phase load (lamp bank or 3-phase motor) by connecting it in a) star and b) delta
04	To conduct load test at full load on single phase 1 kVA, 230/115 V, 50 Hz transformer for determining efficiency and regulation.
05	To measure slip of three phase induction motor by use of tachometer at no load and full load.
06	To reverse the direction of 3-phase induction motor by changing phase sequence.
07	To prepare switchboard for two lamps, one fan and one 5A socket.
08	To connect Single phase energy meter in simple lamp circuit for measurement of energy consumption for one hr.
09	To search fault in a faulty machines / installation.
10	Demonstration of servomotor and stepper motor.

[Note: Practicals 1 to 9 shall be performed by 2 students and practical 10 in a group of 4 students]

Assignment:

- 1. Industrial visit:** Visit to show various motors, electrical devices, accessories used in mechanical industrial applications like dairy, crushers, dall mill, oil mill or small scale unit. [The group size is as suggested by industry]
- 2.** Detail study of electrical motors manufacture's catalogues to study mounting installation, frame work, coupling, rotor inertia etc. [To be performed individually]

NOTE: All Practicals and assignment are compulsory and should be considered in assessment formats A1, A2 And So On.

Learning Resources:

1. Books:

Sr.No.	Author	Title Of Book	Edition	Publisher
01	B.L. Theraja	Electrical Technology (Vol. I and IV)	Multicolour Edition 2005 And Subsequent Reprint	S.Chand & Co. Rammagar New Delhi
02	E. Hughes	Electrical Technology	Second Edition	ELBS/Pearson
03	R.S. Ananda Murthy	Basic Electrical Engineering	Second Edition	Pearson
04	Theodore Wildi	Electrical Machines, Drives and Power Systems	Sixth Edition	Pearson
05	Sunil T. Gaikwad	Basic Electrical Engineering	First Edition	WILEY India

2. Websites:

- www.wikipedia.com
- www.youtube.com
- www.narosa.com
- www.dreamtechpress.com

List of Equipments

Sr No.	List of Equipments	Qty.
1	Portable MI type A.C. ammeter range (0-5A)	05
2	Portable MI type A.C. voltmeter range (0-150/300V)	05
3	Portable MI type A.C. voltmeter range (0-15/30/75 V)	05
4	Portable electro-dynamometer type wattmeter (10/20 A and 250/500V)	05
5	Portable electro-dynamometer type power factor meter (10/20 A and 250/500V)	05
6	Rheostat (0-250 Ohm,2A)	05
7	Rheostat (0-90 Ohm,5A)	05
8	3 phase load bank of 10A capacity/phase suitable for 415V	02
9	Single phase 230/115V,50Hz,1kVA natural air cooled transformer	02
10	Analog type (0-5000 r.p.m.) tachometer	02
11	A three phase 415 V, 50Hz , 4h.p. squirrel cage induction motor	02
12	A simple model of servometer for demo	01
13	A small model of stepper motor for demo	01
14	A single Phase 230 V, 5A electrical/electronic energy meter	02

Course Name : Mechanical Engineering Group

Course Code : AE/ME/PG/PT/MH/MI/FE

Semester : Third

Subject Title : Computer Aided Drawing

Subject Code : 17016

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	04	--	--	50#	--	25@	75

Rationale:

Now a day a manual drafting is obsolete in industry. Computers being the inevitable part in an engineer's life due to its inbuilt characteristics which helps him to do various task with acceleration. Using computers and CAD software it is easy to create and modify drawings so as to increase productivity & making revisions. It also may be useful to generate assembly and production drawings.

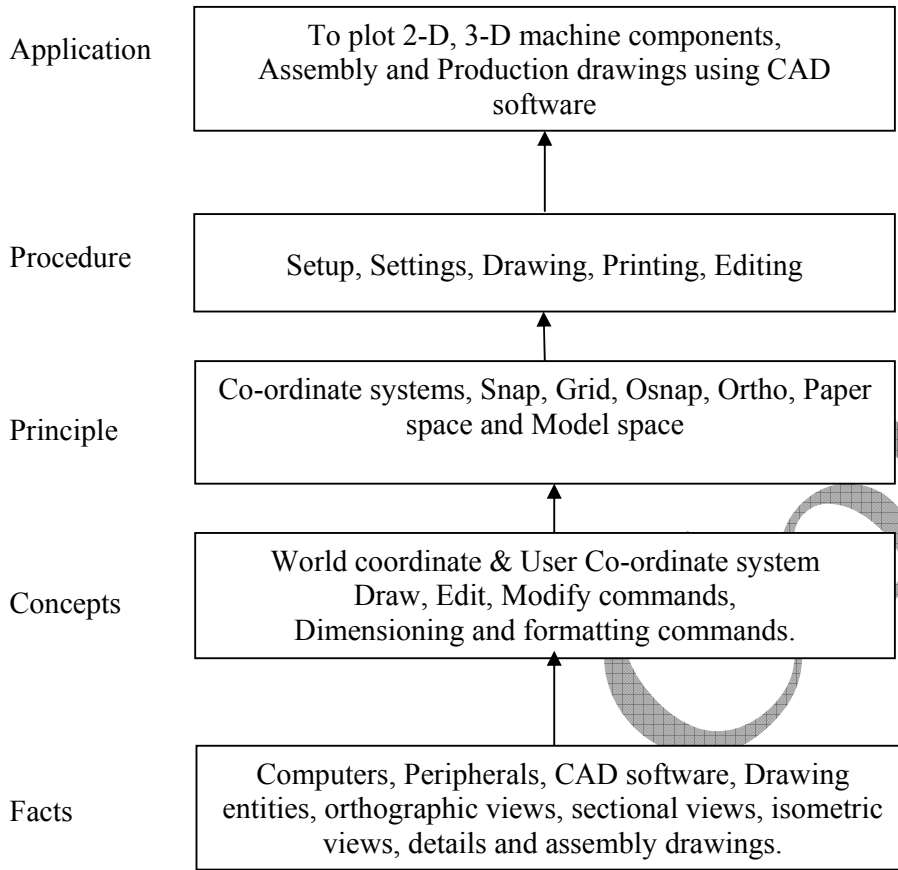
In mechanical industry, operating skills are required for computer aided drafting operations of machine components, handling of printers & plotters & plotting the drawings. This subject is also useful to apply concepts in 3 D modeling.

General Objectives:

Students will be able to

- 1) Draw, edit and modify 2D drawings.
- 2) Give dimensions, tolerances and geometrical tolerances.
- 3) Draw Isometric drawing and 3 D drawing.
- 4) Plot a drawing.

Learning Structure:



Theory:

Topic and Content	Hours
<p>1: Introduction to Computer Aided Drafting 02 Hours</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand and use basics of CAD systems. <p>Content:</p> <p>1.1 Introduction to Computer Aided Drafting (CAD)- Applications, Various commercial Softwares for Computer Aided Drafting</p> <p>1.2 Co-ordinate system- Cartesian & Polar-Absolute, Relative mode.</p> <p>1.3 CAD initial settings commands - Snap, grid, ortho, osnap, limits, units, scale, ltscale.</p> <p>1.4 Object Selection methods – picking, window, crossing, fence, last, previous etc.</p>	02
<p>2: Zoom and formatting Commands 02 Hours</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ View drawing. ➤ Format drawing entities. <p>Content:</p> <p>2.1 Zoom Commands – all, previous, out, in, extent, realtime, dynamic, window, pan.</p> <p>2.2 Formatting commands - Layers, block, linetype, lineweight, color.</p>	02
<p>3: Draw and Enquiry commands 02 Hours</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw 2 D drawings ➤ Measure length and area <p>Content:</p> <p>3.1 Draw Command - Line, arc, circle, rectangle, polygon, ellipse, spline, block, hatch</p> <p>3.2 Enquiry commands – distance, area</p>	02
<p>4: Edit and Modify commands 03 Hours</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Rectify 2 D drawings. ➤ Modify 2 D drawings <p>Content:</p> <p>4.1 Modify Command - Erase, oops, break, trim, copy, move, mirror, offset, fillet, chamfer, array, extend, rotate, scale, lengthen, stretch, measure, divide, explode, align.</p> <p>4.2 Grips editing- Move, Copy, Stretch.</p>	03
<p>5: Dimensioning, Text and Plot Commands 03Hours</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Apply dimensions. ➤ Write text or remarks. ➤ Plot a drawing. <p>Content:</p> <p>5.1 Dimensioning commands - Dimension styles, Dimensional Tolerances and Geometrical Tolerances.</p> <p>5.2 Text commands - dtext, mtext command.</p> <p>5.3 Plotting a drawing - paper space, model space, creating table, plot commands.</p>	03

<p>6: Isometric and 3D Drawings 04 Hours</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw and modify 3 D drawings. ➤ Find materials mass property. ➤ Draw isometric drawings. <p>Content:</p> <p>6.1 3D Edit Commands -Pline, 3Dpoly, pedit, join splinedit commands.</p> <p>6.2 View Commands - View ports, UCS, WCS commands</p> <p>6.3 3D Object and 3D operations – 3 D Object - Cube, Cylinder, Cone, Sphere, Wedge. 3 D operations - extrude, revolve, 3Dmirror, 3Dmove, 3Dpan, 3Drotate, 3Darray, slice, sweep. Boolean operations – union, subtract, intersection. Using Isometric style option of snap command draw isometric drawing</p> <p>6.4 Shade and Enquiry commands – mass property, Shade and render command.</p>	04
Total	16

Note: Multimedia projection facility shall be used during lecture sessions along with computer facility e.g. laptop, computer, LCD projector.

Skills to be developed:

Intellectual skills:

- 1) Select and develop coordinate system.
- 2) Interpret a drawing to draw in CAD software.
- 3) Select & use appropriate CAD commands for given situation.

Motor Skills:

- 1) Use pull down menu and their submenu, toolbars
- 2) Setting the initial drawing setup.
- 3) Draw, edit and modify drawings.
- 4) Use printers and plotters for plotting production drawings.

Practical:

List of Practical's:

1. Setting the initial drawing setup.
2. Use of Draw, Edit & Modify commands by giving some suitable objects.
3. Redraw figures (at least 2) (One sheet)
4. Orthographic projections (One sheet)
5. Sectional views (One sheet)
6. Details of production drawing with dimensions, tolerances, geometrical tolerances, machining, welding and surface finish symbols (One sheet)
7. Assembly drawing with dimensions, geometrical tolerances, fits. (One sheet)
8. Isometric drawing of at least 2 components. (One sheet)
9. Draw 3 D primitives and do 3 D operations on it.
10. Plotting of above drawings on A2/A3 size sheet.

Guideline for Practical: One student per computer terminal.

Note: Use of any one Computer Aided Drafting Software of Latest Version is recommended.

Practical Examination: (2 Hours for each student)

Creation of 2 D / 3D / Isometric drawings for the given part or drawing, followed by oral examination based on above term work.

(One computer terminal per each student)

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publisher / Edition
1	Sham Tickoo	Autocad: A Problem-Solving Approach	Thomson Learning EMEA, Limited
2	George Omura	Mastering Auto CAD	BPB Publication
3	George Omura	ABC's of Auto CAD	BPB Publication
4	Gautam Purohit & Gautam Ghosh	M/c Drawing with AutoCad	Pearson Publication
5	T Jeyapooan	Engineering Graphics Using AutoCAD	Vikas Publishing House Pvt. Ltd. Fifth Edition
6	--	Various software manuals	--

2. CDs, PPTs.:

1. Beginners AutoCAD 2011 Tutorial DVD, Advanced AutoCAD 2011 Tutorial DVD, 2
2. Learning AutoCAD 2012 Tutorial DVD – Publisher – InfiniteSkills Inc. Email : directsales@infiniteskills.com
3. EKHO Institute presents Professional AutoCAD Training Videos
4. Learning AutoCAD 2012 Tutorial DVD - Video Training by Infinite Skills.

3. Websites:

<http://www.we-r-here.com/cad/tutorials/index.htm>
<http://www.cadtutor.net/tutorials/autocad/>
http://www.caddprimer.com/AutoCAD_training_tutorial/AutoCAD_training_lessons.htm
<http://www.autocadmark.com/>
<http://www.autocadtutorials.net/>

Equipment List:

- 1) Latest Configuration Computers which can be able to run latest any Computer Aided Drafting Software. (At least One Computer per student in practical session.)
- 2) Any latest Authorised Computer Aided Drafting Software (20 seats).
- 3) Plotter of size A2/A3
- 4) LCD Projector

Course Name : Mechanical Engineering Group

Course Code : AE/ME/PG/PT/MH/MI

Semester : Third

Subject Title : Professional Practices-I

Subject Code : 17017

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

Rationale:

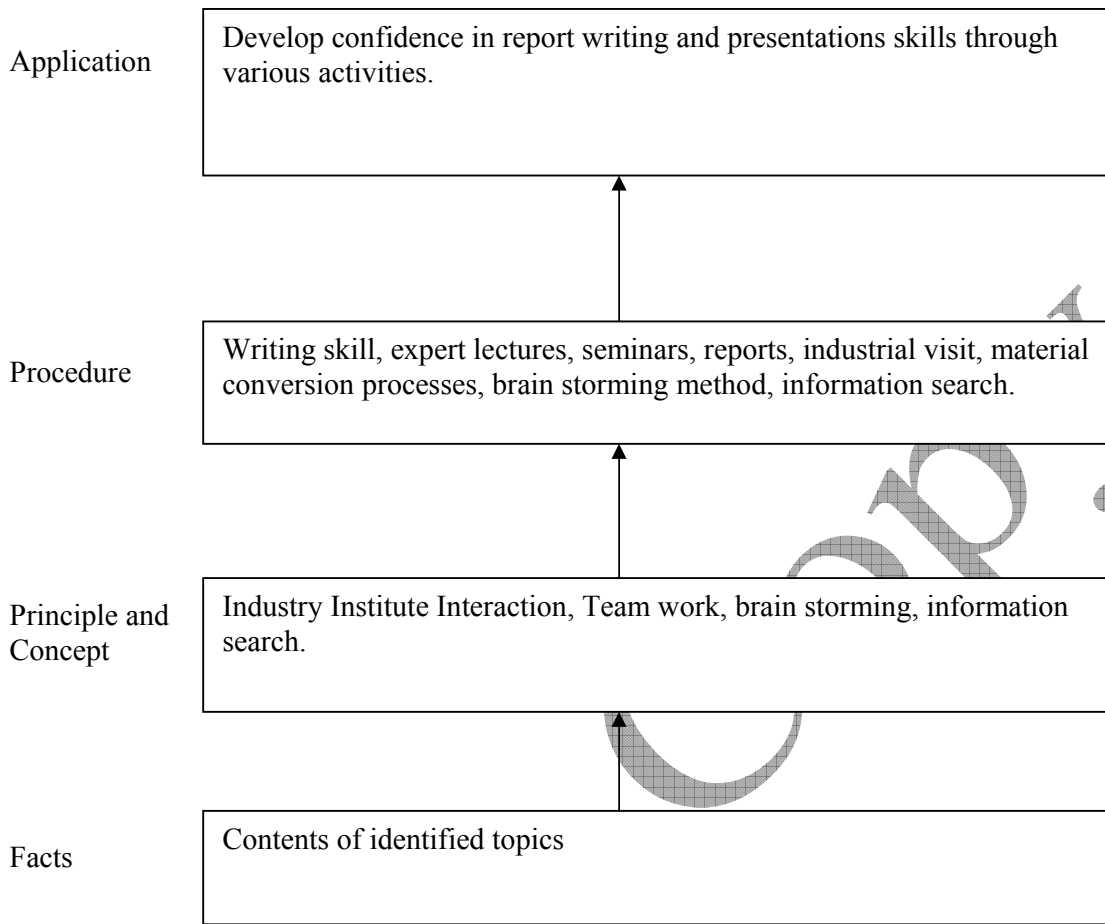
The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. Practical aspects of engineering can be learned through industrial visits, industry expert lectures, seminars, searching alternative solutions and validation of the selected alternatives. Subject like professional practices allow the students to think independently using integrated knowledge of various subjects and give opportunity of working with their own hands. The exercises included in this subject are useful to create social awareness and developing them into good citizens of tomorrow.

General Objectives

Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topics
3. Present seminar using power projection system.
4. Interact with peers to share thoughts.
5. Work in a team and develop team spirit.

Learning Structure:



Intellectual skill:

Student will be able to-

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

Motor Skills:

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.

Content:

Topic & Content	Hours
<p>1. Information search: Information search be made through manufacturers catalogues, suppliers, traders, workshops, journals & websites etc. and submit a report on any two topics in a group of 3 to 4 students. Following topics are suggested. Any other equivalent topic can also be selected. Report size shall be around 7 – 10 pages.</p> <ol style="list-style-type: none"> i) Any one type of valve. Dismantle the valve and prepare part list with quantity material specifications, measure the dimensions of component & prepare the detailed drawings of all components specifying dimensional & geometric tolerances for important surfaces giving machining symbols. <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> i) Draw the assembly in working position showing sectional elevation & plan views with overall dimensions. ii) List the types of A/c motors commonly used for various industrial applications write specifications of any two motors and show their performance characteristics using manufacturers catalogue. iii) List 10 materials (Ferrous & nonferrous metals & alloys and non metals) Give their specifications, state their important properties & its applications. iv) List the components in a transmission system of 2 wheeler & 4 wheeler automobiles and explain their functions in detail identify their materials. v) Non destructive testing – methods & applications (minimum 3 methods) vi) IS codes related to impact test, hardness test, bend test of steels. vii) Collection of information of domestic electric heating appliances like hot water boiler, electric iron, electric cooker, microwave oven, toaster etc. Describe their working principles, controls & safety features. viii) Heat treatment processes for steels – purpose, modified properties & applications. ix) Advances in material technology – smart materials, shape memory alloys, Nano materials. 	06
<p>2. Lectures by professionals / industry experts Two lectures of 2 hour duration are arranged on any two topics suggested below or any other suitable topics so that the students get oriented to the industrial environment & working. Students are required to prepare a brief report of each lecture as a part of their term work.</p> <ol style="list-style-type: none"> i) Organizational structure, various functional departments & their inter relations, types of products manufactured or services provided. ii) Role of diploma engineers (Mech, Auto, Prod,) in an organization, responsibilities to be taken and future scope. iii) Work culture iv) Industrial growth in India and new opportunities & avenues available to 	06

<p>diploma engineers.</p> <ul style="list-style-type: none"> v) Time management vi) Developing product quality & reliability vii) Creative & innovative thinking approach viii) Personality Development ix) Interview technique / group discussion technique x) E – banking – credit card, debit card, ATM operation 	
<p>3. Group Discussion – One exercise</p> <p>Group discussions on any one of the following topics are suggested or any other general / social /educational / technology related topics. Group size - divide practical batch into groups of 7 to 10 students, time for group discussion 15 to 20 minutes.</p> <ul style="list-style-type: none"> i) Current topics from news papers / T.V. news related to social, education & technology ii) Energy crisis in India iii) Lokpal Vidheyak (Act) iv) Corruption prevention v) Reservation policy vi) Policies at institutional level – dress code, campus discipline & cleanliness vii) Ban on plastic carry bags. viii) Pollution control ix) Population control x) Brain drain xi) Diploma (Mechanical Engineering group) opting for Computer and Information Technology jobs. xii) Right to information act xiii) Anti-Ragging act. <p>Students should prepare a report on salient points discussed on the topic & summarize concluding remarks.</p>	04
<p>4. Seminar</p> <p>Seminar on any one topic specified in the list given below or any topic suggested under information search & expert lecture.</p> <p>Time for presentation – 10 minutes per group of 2 to 3 students,</p> <p>Prepare power point presentation and submit seminar notes not more than 10 pages mentioning source of information – books, magazines, journals, websites, surveys, etc.</p> <p>Topics –</p> <ul style="list-style-type: none"> i) Fasteners & its industrial applications ii) Powder metallurgy technique iii) Non-destructive testing iv) Couplings – types & applications v) Bearings - types & applications vi) Accident prevention & safely measures vii) Fuel injection systems viii) Modern features of automobiles ix) Welding technology x) Selection of electric motors xi) Industrial drives- Types, advantages and limitations, Applications xii) ISO system of limit, fits & tolerances xiii) Type of screw threads & their applications. 	08

<p>5. Industrial Visits Structured industrial visits are arranged and report of the same be submitted by the individual student to form a part of the term work. No of visits – at least two Scale of industry – Small scale unit, medium scale unit Group size – practical batch containing not more than 20-25 students, Report 2 to 5 pages. Purpose –</p> <ol style="list-style-type: none"> Get familiar with industry environment Know the organizational structure Working of functional departments & their inter relation Products manufactured, services provided Identification of materials used and material flow from raw materials to finished products Study the production processes & types of machines used Layout of machinery & equipments in general List of material handling equipment <p>Following types of industries may be visited or any industrial units existing in the area or nearby areas.</p> <ol style="list-style-type: none"> Manufacturing units Chemical Process industry/cotton/grain processing industry/dairy etc. Service stations - Auto repairs work shop / garage, farm implements. ST workshop / city transport workshops. Material testing laboratories in industries or reputed organizations. 	08
<p>6. Individual Assignments Any two assignments from the list suggested based on the subjects in the 3rd semester (Any other suitable assignments may be chosen)</p> <ol style="list-style-type: none"> Material selection, specifications & properties desirable of 10 different machine components. Select 5 different plain carbon steels & alloy steels used for manufacturing machine components & specify heat treatment processes to improve material properties, give brief description of one of the heat treatment processes. List the various properties & applications of following materials. a) Thermo plastic plastics b) Thermo setting plastics c) Rubber d) Ceramics Any two problems on bending moment diagram, shear force diagram, deflection of beams & torsion topics of strength of materials. Any two problems from applied mathematics a) Problems on area under the curve & volume of revolution b) Problems on applications of differential equations v) Any two problems on finding principal stresses by using Mohr's circle, finding magnitude & position of maximum shear stresses. Prepare a questionnaire for conducting interview of a successful entrepreneur & conduct the interview. List 5 different engineering applications of transformers stating the types, & specifications, write the working principle of auto transformer. Draw the electric wiring diagram for a) staircase b) water pump-motor set. List the electrical components used in the electric circuit. 	10
<p>7. Socially Relevant activities Conduct any one activity through active participation of students & write the report Group of students – maximum 4 Report – not more than 6 pages List of suggested activities – (Activities may be thought in terms of campus</p>	06

improvement)	
i) Go green movement	
ii) Literacy camps	
iii) Building ethical & moral values	
iv) Conservation of electrical energy	
v) Water conservation	
vi) Clean campus / city	
vii) Awareness to avoid use of plastic carry bags	
viii) Educating students / people about firefighting equipment	
ix) Rain water harvesting	
x) Traffic management within campus / city.	
Total	48

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development Corporation, GOI
02	DK Publishing	How things works encyclopedia	DK Publishing
03	E.H. McGratj, S.J.	Basic Managerial Skills for All Ninth Edition	PHI

2. Web sites

www.engineeringforchange.org
www.wikipedia.com
www.slideshare.com
www.teachertube.com