 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : DIPLOMA IN AUTOMOBILE ENGINEERING																	
COURSE CODE : AE																	
DURATION OF COURSE : 6 SEMESTERS												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	--	--	--	--	--	--	--	50
2	Strength of Materials β	SOM	17304	03	--	02	03	100	40	--	--	--	--	25@	10		
3	Mechanical Engineering Drawing β	MED	17305	03	--	04	04	100	40	--	--	25#	10	50@	20		
4	Materials and Manufacturing Processes	MMP	17306	03	--	02	03	100	40	25 #	10	--	--	25@	10		
5	Vehicle Layout and Transmission System	VLT	17307	03	--	02	03	100	40	50#	20	--	--	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				16	--	17	--	500	--	125	--	25	--	200	--	50	
<p>Student Contact Hours Per Week: 33 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, β - Common to ME / PG / PT / MH / MI / 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 will decide the contents of the practical every year. 																	

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 : Third

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. In analog to digital converter and modulation system integration is important. Differential equation is used in finding curve. 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.
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 all branches of Engineering Diploma.

Procedure

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

Solving problems on methods of integration and its properties. Finding area.

Solving examples of differential equations of first order and first degree.

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
Topic-1 Applications of Derivative Specific objectives : <ul style="list-style-type: none"> ➤ Find slope, curvature, maximum and minimum value of functions related to different engineering applications. <ul style="list-style-type: none"> • Examples for finding slope , equations of tangent and normal to the curve • Maxima and minima. • Radius of curvature. 	06	16
Topic-2 Integral Calculus		
2.1 Integration ----- 20 Specific objectives : <ul style="list-style-type: none"> ➤ Integrate function using different method. <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 by partial fractions. Integration by parts and generalized rule by parts. 	14	44
2.2 Definite Integrals ----- 16 Specific objectives : <ul style="list-style-type: none"> ➤ Solve problems on definite integrals using the properties. <ul style="list-style-type: none"> • Definite integral- Definition, examples. • Properties of definite integrals without proof and simple examples. 	08	
2.3 Application of Definite Integrals -----08 Specific objectives : <ul style="list-style-type: none"> ➤ Find area. <ul style="list-style-type: none"> • Area under a curve. • Area between two curves. 	04	
Topic 3 - Differential Equation.		
3.1 Differential equation Specific objectives : <ul style="list-style-type: none"> ➤ Solve the differential equation of first order and first degree ➤ Solve different engineering problems using differential equation <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. Homogeneous differential equation. Exact differential equation. 	10	20

Topic 4 - Probability		
4.1 Probability Specific objectives : ----- 08 ➤ Solve different engineering problems related to probability process. <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. 	02	20
4.2 Probability Distribution ----- 12 <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/PG/PT/MH/MI/FE/PS

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
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)**

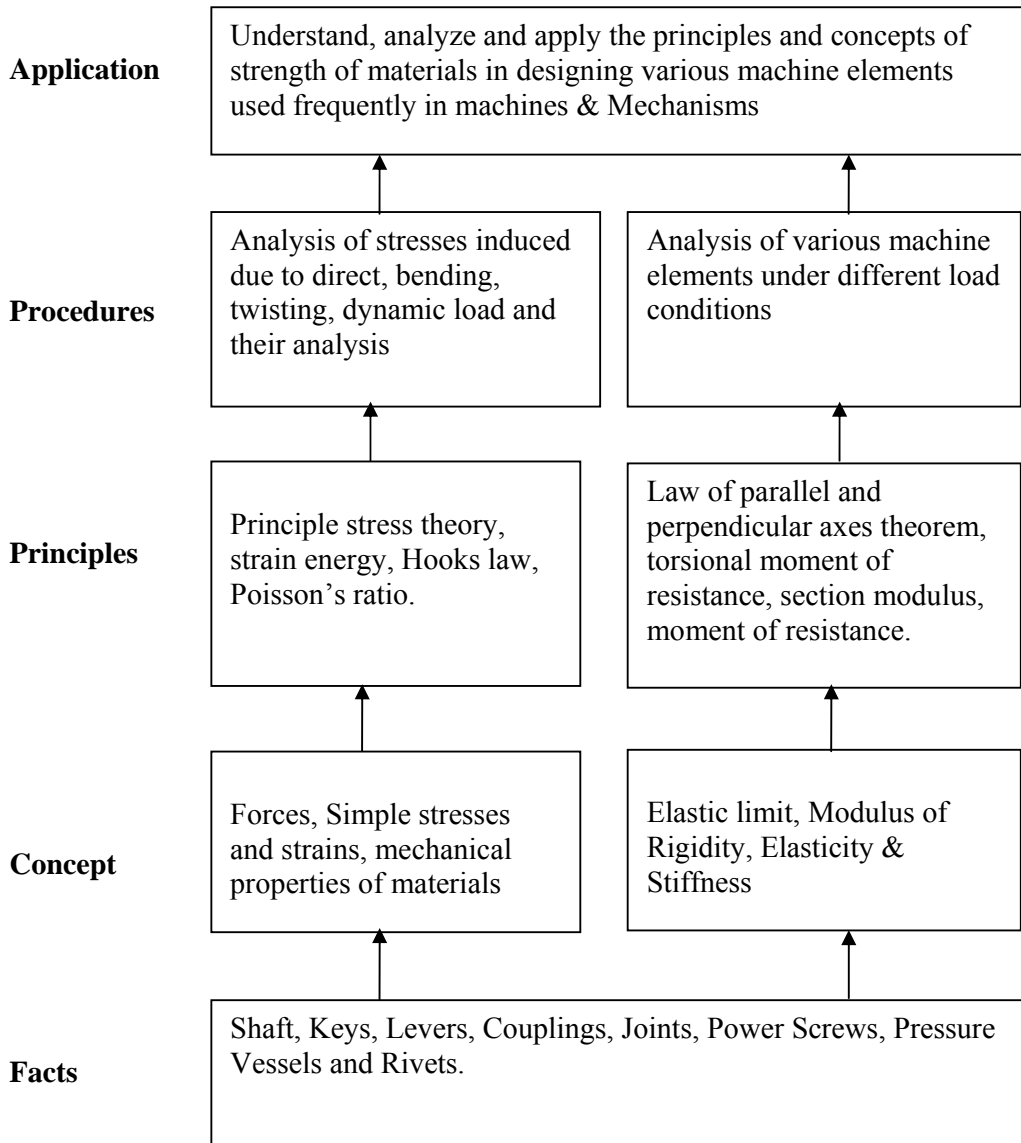
Rationale:

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 - 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) 	14	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</p>	08	16

<p>Specific Objectives.</p> <ul style="list-style-type: none"> ➤ Understand & analyse the basic principles involved in the behaviour of machine parts under load in the context of designing it <p>Contents</p> <p>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 		
<p>4. Moment of Inertia</p> <p>Specific Objectives.</p> <ul style="list-style-type: none"> ➤ Determine Area Moment of Inertia of regular and composite sections. <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</p> <p>Specific Objectives.</p> <ul style="list-style-type: none"> ➤ Acquire and apply knowledge of bending stresses & shear stresses <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. .</p> <p>Transverse Shear stress equation (No derivation).</p> <p>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</p> <p>Specific Objectives.</p> <ul style="list-style-type: none"> ➤ Acquire and apply knowledge of bending stresses and direct stresses. <p>Contents</p> <p>6.1 Concept of Axial load, eccentric load, direct stresses, bending stresses, maximum & minimum stresses.</p> <p>Stress distribution diagram. -- 4 marks</p> <p>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>Condition for no tension in the section, core of section -- 4 marks</p>	07	16
<p>7. Torsion 16 Marks</p> <p>Specific Objectives.</p> <ul style="list-style-type: none"> ➤ Understand and apply the concept of pure torsion and stresses due to Power Transmission <p>Contents</p>	06	16

7.1 Concept of Pure Torsion, <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 		
7.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft) -- 6 marks		
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:

1. Know your laboratory to understand the difference Machines / their components and purpose.
2. Understand different components, their purpose and operations of "Universal Testing Machines" by conducting a trial on sample test specimen.
3. Understand different components, their purpose and operations of Extensometer by conducting a trial on sample test specimen.
4. Tension test on mild steel and aluminum specimen by using Universal Testing Machine (UTM) to calculate yield stress, ultimate stress, breaking stress, percentage elongation and moduli of Elasticity.
5. Compression test on cast iron specimen by using "Universal Testing Machine".
6. Determine the shear strength of mild steel bar in single and double shear by using "Universal Testing Machine"
7. Determine the Brinell hardness number of mild steel specimen and also its equivalent by the other method.
8. Izod or charpy test on M.S., copper, aluminum and brass specimen to calculate energy absorbed.

9. Conduct torsion test on mild steel bar and find breaking torsional shear strength and stiffness.
10. To calculate and draw the S. F. D. and B. M. D. for cantilever, simply supported and overhang beams.
11. To determine principal stresses and to locate principal planes for a given loading by analytical and graphical (Mohr's circle) methods.

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

Semester : Third

Subject Title : Mechanical Engineering Drawing

Subject Code : 17305

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.**

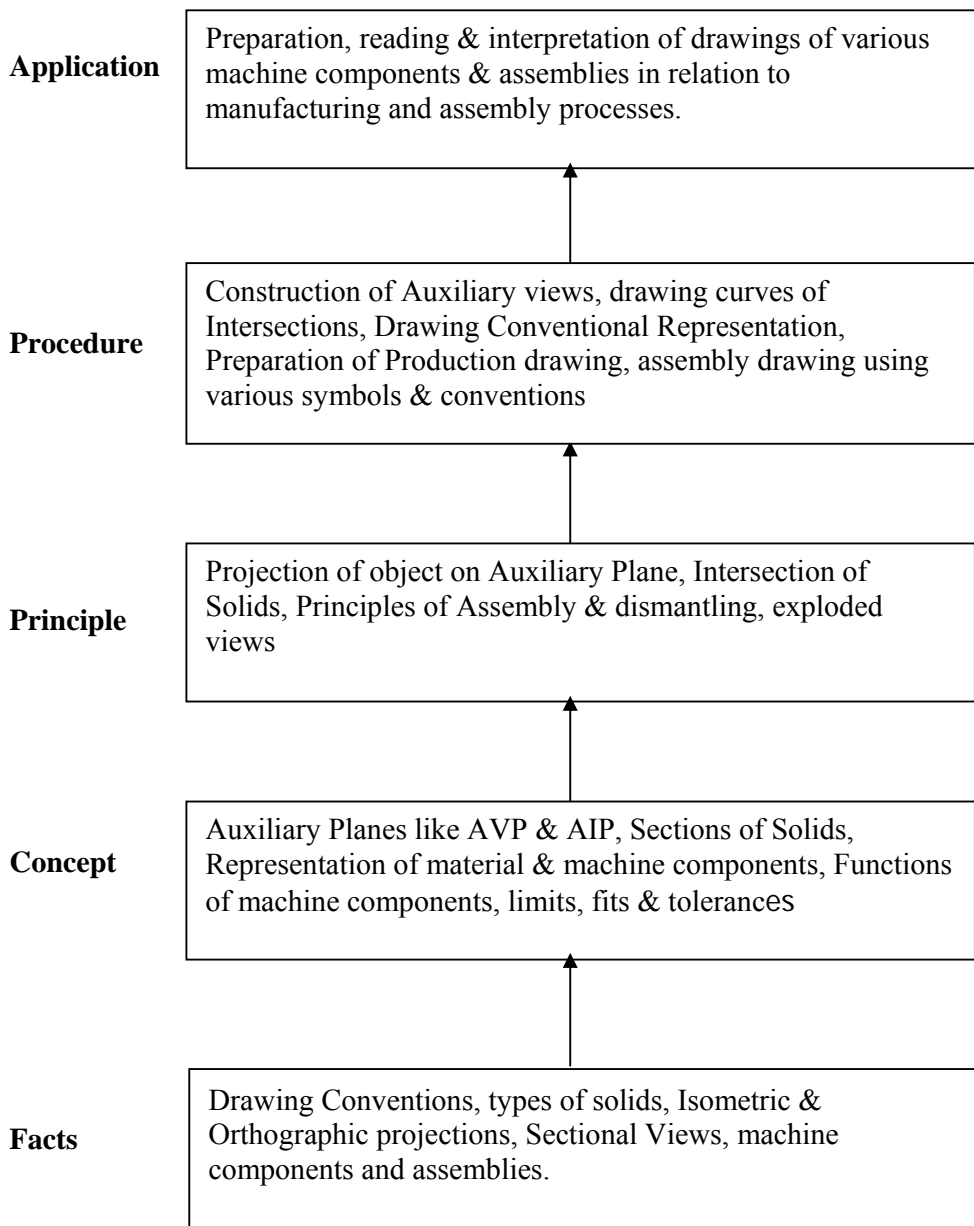
Rationale:

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.

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 Curves of intersection of the surfaces of different solids <p>Curves of intersection of the surfaces of the solids in the following cases</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 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 selection of manufacturing processes accordingly <p>4.1 Limits, fits and tolerances 4 marks</p> <p>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</p> <p>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 ➤ 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. Tool Post – Lathe (Including Square tool post), shaper v. Machine Vice & Pipe Vice vi. Screw Jack vii. Valves- Steam Stop Valve, Non - Return Valve viii. IC engine components assembly	10	24
6.Assembly to Details 0Specific Objectives ➤ 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, clutch, shoe brake vi. Cross head and Stuffing box Assembly vii. Hydraulic, pneumatic Valves (Not containing more than eight parts) viii. Fast & loose pulley	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.	6 hours
5. Assembly to details drawing ➤ Draw the given assembly and prepare component drawings, including conventional representation, tolerances and surface finish symbols. Prepare part list contained, name of components, quantity, material specifications and remarks - One sheet	14 hours
6. Details to Assembly drawing ➤ From a given drawings of components prepare an assembly with two views. Prepare a table containing name of component, quantity, material specifications and remarks, show overall dimensions of the assembly	14 hours
7. Two problems on assembly drawings using any CAD Package and print it. Students will prepare a drawing discuss in 5 & 6 .(Assembly containing maximum 6 to 7 components)	14 hours
8. Dismantle any machine assembly having 6 to 10 part. Prepare the sketches in sketchbook with dimension and then draw assembly.-----6 hours	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

Course Name : Diploma in Automobile Engineering

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

Semester : Third

Subject Title : Materials and Manufacturing Processes

Subject Code : 17306

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	25#	--	25@	150

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:

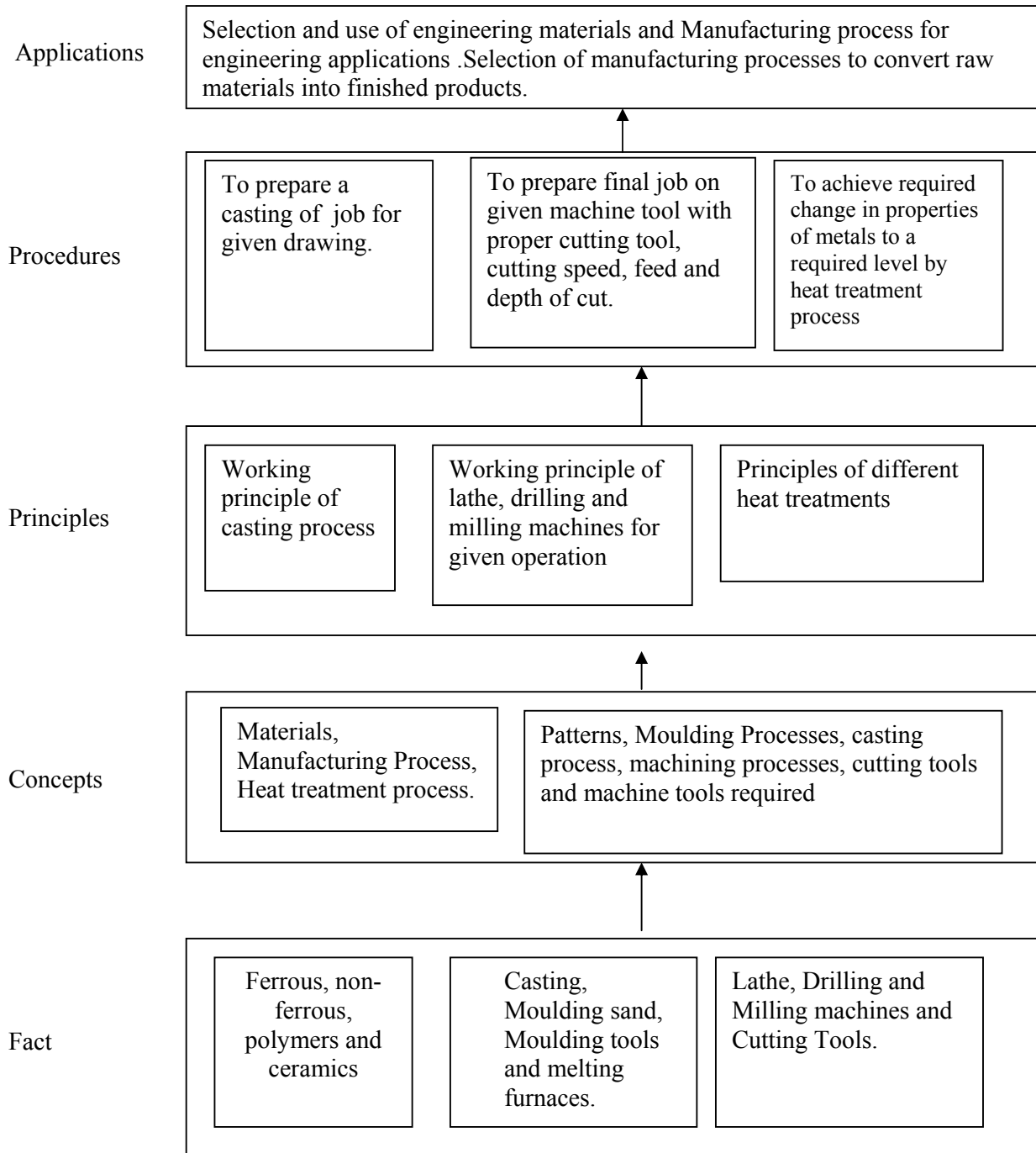
Manufacturing process is a core technological subject in Automobile engineering course. The knowledge of materials, their properties and applications is essential for a diploma students engaged in engineering organizations. He should also be proficient in the selection and use of manufacturing processes. The knowledge of this subject is essential as prerequisite knowledge for other higher level subjects like Automobile component design and Automobile manufacturing process.

General Objectives:

The student will be able to:

1. Know various engineering materials, their properties and selection of these materials for different engineering applications.
2. Understand the different heat treatment processes and their applications.
3. Understand the foundry operations and able to prepare the patterns, moulds and castings.
4. Select and use different cutting tools in machining operation.
5. Understand the working and operational functions of basic machine tools like lathe, drilling and milling machines.

Learning Structure:



Theory Content:

Topic and Contents	Hours	Marks
<p>1: Engineering Materials 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Study the various Engineering materials and its Applications <p>Contents:</p> <p>1.1 Introduction: 08 Marks</p> <ul style="list-style-type: none"> • Classification of engineering materials. • Ferrous metal and their alloys: • Cast iron: types, composition and applications • Plain carbon steel: types, composition and applications • Effects of alloying elements like- Nickel, chromium, silicon, molybdenum and tungsten on the properties of steel • Alloy steels like stainless steel, Tool steels, their composition and applications <p>1.2 Non-ferrous metals and their alloys: 06 Marks</p> <ul style="list-style-type: none"> • Aluminium and its alloys: duralumin, 'Y' alloy, their composition, properties and applications • Copper and its alloys: brass, bronze, gun metal, Babbitt metal their composition, properties and applications <p>1.3 Other materials: 06 Marks</p> <ul style="list-style-type: none"> • Polymeric materials- properties and applications- Thermoplastics- Nylons and Polypropylene. Thermosetting Plastics-Epoxy resins and Polyesters Rubber – Natural and synthetic • Ceramic materials: Properties and application in automotive industry. 	10	20
<p>2: Heat treatment 12 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Study various methods of Heat treatment processes as applied to automobile components ➤ Understand iron-carbon phase equilibrium diagram. <p>Contents:</p> <p>2.1 Introduction: 04Marks</p> <ul style="list-style-type: none"> • Concept of phase and phase transformations • Iron-Iron carbide phase (Fe-Fe₃C) equilibrium diagram. <p>2.2 Common heat treatment processes and their applications 08 Marks</p> <ul style="list-style-type: none"> • Annealing, Normalizing, Hardening, Tempering. • Surface hardening processes: Case carburizing, Nitriding, Cyaniding, Induction and Flame hardening. 	06	12
<p>3: Foundry 28 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Study of various foundry processes <p>Contents:</p> <p>3.1 Introduction 04 Marks</p> <ul style="list-style-type: none"> • Types of Foundries • Advantages and disadvantages of foundry process. <p>3.2 Pattern Making: 08 Marks</p> <ul style="list-style-type: none"> • Pattern materials and their selection. • Types of pattern and their selection • Pattern Allowances. 	13	28

<ul style="list-style-type: none"> • Pattern colour coding. <p>3.3 Moulding: 08 Marks</p> <ul style="list-style-type: none"> • Moulding tools and flasks. • Moulding sand: Composition, Types and properties. • Classification of moulding processes. • Use of Core, core print and core boxes. <p>3.4 Casting: 08 Marks</p> <ul style="list-style-type: none"> • Gating and risers of sand castings • Types and processes and applications of Pressure Die casting, Shell moulding and centrifugal casting. • Defects in casting: causes and remedies. 		
<p>4: Fundamentals of machining: 12 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Study of different types of machining tools and parameters <p>4.1 Chip formation 04 Marks</p> <ul style="list-style-type: none"> • Mechanism of chip formation. • Types of chips • Orthogonal and Oblique cutting <p>4.2 Cutting tools and fluids 08 Marks</p> <ul style="list-style-type: none"> • Types of cutting tools: single and multi-point • Cutting tool materials: Selection, Properties and types • Single point cutting Tool nomenclature and tool signature. • Cutting fluids: Properties, types 	06	12
<p>5: Basic Machine tools 28 Marks</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ To understand basic concept of Conventional Machine tools <p>5.1 Lathe: 10 Marks</p> <ul style="list-style-type: none"> • Classification of lathes. • Major parts of Centre lathe machine with block diagram. • Lathe specifications. • Accessories used on lathe. • Operations performed on lathe – Turning, Taper turning by swiveling compound rest, Facing, Knurling and Threading. <p>5.2 Drilling: 08 Marks</p> <ul style="list-style-type: none"> • Classification of drilling machines. • Major parts of bench drilling machine with block diagram • Operations performed on drilling machines – drilling, reaming. <p>5.3 Milling: 10 Marks</p> <ul style="list-style-type: none"> • Classification of milling machines. • Major parts of column and knee type universal milling machine • Standard milling cutters • Milling operations like face milling, Gang milling, Key-way milling and End milling. 	13	28
Total	48	100

Practical:**Skills to be developed:****Intellectual Skills:**

1. Develop concept of pattern making.

2. Understand the safety aspects to be followed on the shop floor.
3. Understand the different types of patterns and compare them.
4. Know the different types of sands used in sand moulding.

Motor Skills:

1. Prepare solid pattern.
2. Use pattern for preparing moulds.
3. Operate and control lathe machine.
4. Operate and control drilling machine.
5. Use safety precautions and equipment on the shop floor.

List of Practicals:

1. Prepare one wooden solid pattern per student as per given drawing.
2. Develop one pattern for a given job considering all aspects of pattern making for group of 4 to 6 student. Job shall involve spit pattern with core, core print.
3. Prepare a sand mould for any one of the above patterns. Estimate the cost for the casting using the above pattern and mould.
4. Visit to a foundry and observe the moulding and casting processes and prepare a report.
5. One job for each student involving following operations:
Facing, taper turning, step turning, threading, knurling operations on lathe machine; and reaming operation using drilling machine.

Notes:

- 1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent).
- 2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent.
- 3] Workshop diary should be maintained by each student duly signed by respective shop instructors.
- 4] Assignments are to be assessed by the concerned subject teacher / workshop superintendent.

List of Assignments:

1. Prepare the operation sheet for the machining processes carried out under practical number five.
2. Prepare the Process sheet in casting process of a simple component
3. Draw Nomenclature of Single point cutting tool and tool signature.

Learning Resources:**1. Books:**

Sr. No	Author	Title	Publication
1.	S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Elements of Workshop Technology Vol. - I and II	Media Promoters and Publishers
2.	H. S. Bawa	Workshop Technology Vol. - I and II.	Tata McGraw-Hill Publishing
3.	R. K. Jain	Production technology	Khanna Publishers. Delhi.
4.	Ostwald	Manufacturing process and Systems	Wiley India Pvt. Ltd.
5.	H.M.T.	Production Technology	H.M.T.
6.	Serope Kalpakjian Steven R. Schmid	Manufacturing Engineering and Technology	Pearson

2. CDs, PPTs Etc.:

Electronics Trades and Technology Development Corporation (A Govt. of India undertaking), Akbar Hotel Anex, Chankyapuri, New Delhi-110 021.

Learning Materials: Transparencies, CBT packages developed by N.I.T.T.E.R., Bhopal.

3. IS, BIS and International Codes:**4. Websites:**

www.youtube.com

www.npkauto.com

Course Name : Diploma in Automobile Engineering

Course code : AE

Semester : Third

Subject Title : Vehicle Layout and Transmission System

Subject Code : 17307

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50#	---	25@	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)**

Rationale:

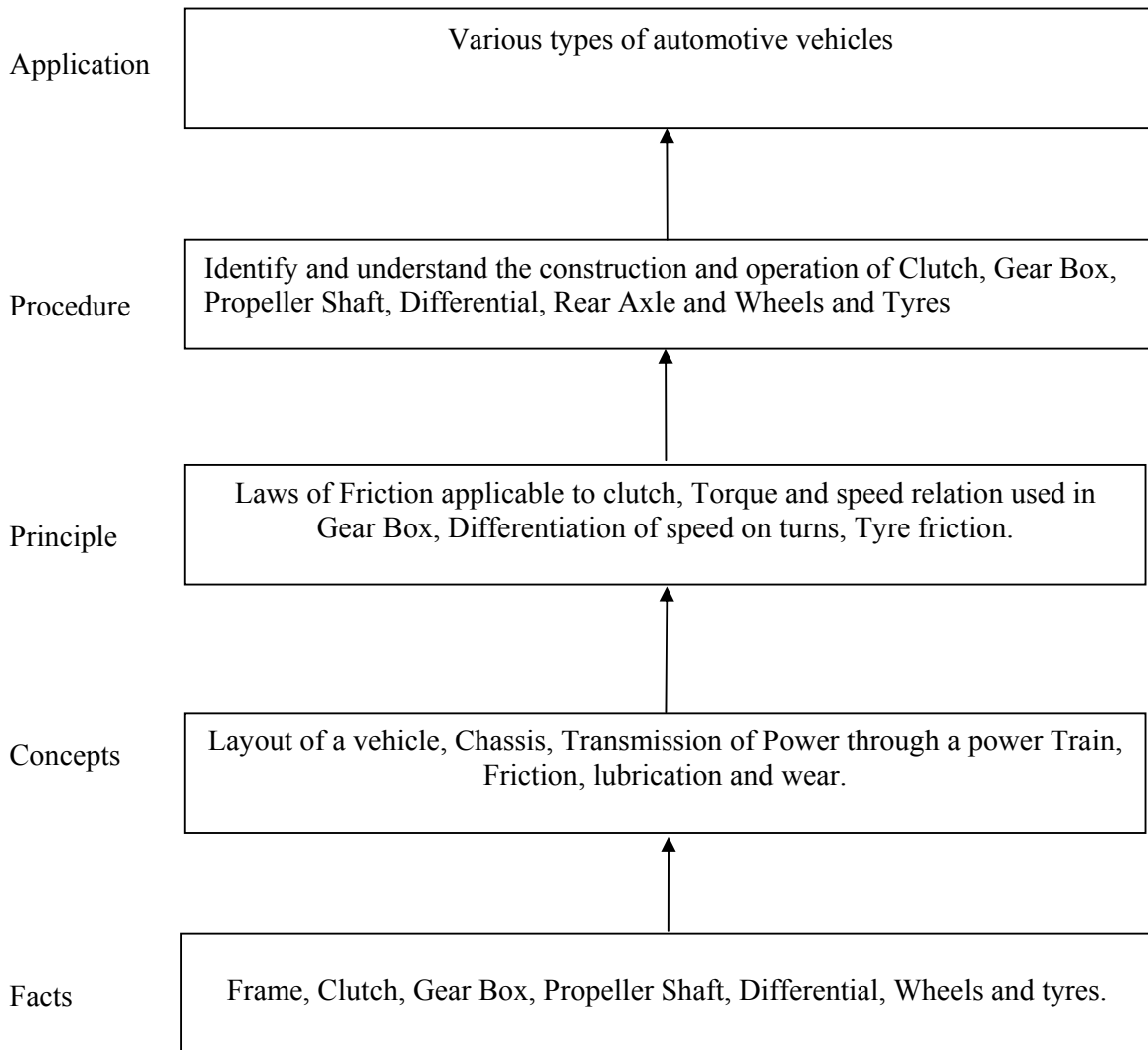
This subject is a core Automobile Engineering subject. The subjects give knowledge about the various components of the transmission train and vehicle layout. This subject forms the basis for the subjects Automobile Systems, Vehicle Maintenance and Vehicle Testing. Basic principles and conceptual knowledge of this subject is useful for understanding the power transmission phenomenon and improving the performance of vehicles.

General Objectives:

The Student will be able to -

1. Understand the vehicle layouts, chassis, frame and location of various systems on chassis.
2. Know the principle, construction and working of elements of transmission system.
3. Understand the terminology and construction of wheels and tyres.

Learning Structure:



Theory:

Topic and Content	Hours	Marks
<p>1. Vehicle layout and Chassis frame 12 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the layout of an Automobile ➤ Identify various components and their Location on the Vehicle. ➤ Understand the frames used for two and four wheeler. ➤ List various loads acting on the frame. <p>Content:</p> <p>1.1 Vehicle layout and its types 4 Marks</p> <ul style="list-style-type: none"> • Definition of -an automobile, layout of a vehicle. • Layout of the front engine rear wheel driven vehicle and explain location and function of major vehicle components and systems in brief. (With Sketch) • Classification of vehicle layout with respect to i) Location of engine, ii) No of live axles, iii) Arrangement of Engine, Passenger and Luggage section, iv) Application <p>1.2 Chassis Frames 8 Marks</p> <ul style="list-style-type: none"> • Introduction – Necessity of frame and its functions. Loads acting on frame. Types of frames- conventional (ladder and x-member type), semi integral and integral types. Frame sections-channel, box and tubular sections. Materials for frames. Sub frames 	08	12
<p>2. Clutches 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify components of various types of clutches. ➤ Understand construction and working of various types of clutches. <p>Content:</p> <p>2.1 Clutch Introduction 4 Marks</p> <ul style="list-style-type: none"> • Necessity of clutch. • Classification - friction and Non friction type clutches <p>2.2 Construction and Operation of Different type of clutches 16 Marks</p> <ul style="list-style-type: none"> • Construction and Operation of a single plate (coil and Diaphragm) dry disc clutch, multi plate, wet clutch, centrifugal clutch, Variator Drive. • Construction details of Clutch plate. Clutch lining materials. • Clutch operating mechanisms-mechanical, hydraulic, vacuum. • Fluid Coupling – Principle, Construction and Working. 	10	20
<p>3. Automotive Gear boxes 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify components of various types of Gear Boxes. ➤ Understand construction and working of various types of Gear Boxes. ➤ Know the principle of operation of Gear Box. <p>Content:</p> <p>3.1 Gear Box 12 Marks</p> <ul style="list-style-type: none"> • Necessity and types of Gear Boxes – Sliding Mesh, Constant Mesh, Synchromesh gear box,– Construction and operation of each type, Power flow diagram. • Torque Converter- Construction and working and application. <p>3.2 Gear shifting Mechanisms and Lubrication 8 Marks</p>	10	20

<ul style="list-style-type: none"> • Gear selector mechanism with gear lever on top of gear box. • Transfer case • Lubrication of gear box. 		
<p>4. Propeller shaft 12 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify components of Propeller Shaft. ➤ Understand the Principle of transmission of drive at varying angle. <p>Content :</p> <p>4.1 Types of Drives. 8 Marks</p> <ul style="list-style-type: none"> • Necessity of Propeller shaft • Torque tube drive and Hotchkiss drive. <p>4.2 Construction and Operation of Propeller Shaft 8 Marks</p> <ul style="list-style-type: none"> • Constructional details of Hollow propeller shaft • Functions of universal joint and slip joint. Constant Velocity Rezappa and Tripod Joint. 	06	12
<p>5. Differential and Rear axles 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ The construction and working of various types of rear Understand working of final drive and differential action. ➤ Understand axles. ➤ Understand various loads acting on the axle shaft. <p>Content:</p> <p>5.1 Differential 8 Marks</p> <ul style="list-style-type: none"> • Necessity of Differential • Construction and working of differential. <p>5.2 Rear Axle 12 Marks</p> <ul style="list-style-type: none"> • Necessity of Rear Axle. • Loads acting on the rear axle • Types of rear axles- semi floating, Three quarter floating and full floating type. • Rear axle casing- split and banjo type, double reduction axles 	08	20
<p>6. Wheels and Tyres 16 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the construction of a pneumatic tubed tyre. <p>Content:</p> <p>6.1 Wheels 4 Marks</p> <ul style="list-style-type: none"> • Wheels- functions, types of wheels-wired spoke wheel, disc and alloy wheels. <p>6.2 Tyre 8 Marks</p> <ul style="list-style-type: none"> • Tyres-Necessity of tyres • Construction, working and comparison of a tubed tyre and Tubeless tyres • Types of Tyres -radial, cross ply, belted bias type • Specification of tyres • Concept of Aspect ratio • Types of tread patterns • Effect of inflation pressure on the life of tyre and tyre rotation. 	06	16
Total	48	100

Practicals:**Skills to be developed:****Intellectual Skills:**

1. Select hand tools and special tools.
2. Identify parts like clutch, gear box, universal joints, propeller shaft, final drive, wheels and tyres.
3. Understand the Construction and working of Clutch, Gear Box, Propeller Shaft, Differential and Wheels and Tyres.

Motor Skills:

1. Sketch the different components of transmission system.
2. Use of hand tools, equipments, instruments.
3. Dismantle and assemble various transmission systems.

List of Practical:

1. Understand the layout, of “Vehicle Layout and Automobile Transmission System laboratory” and make use of various tools and measuring devices, write their specifications, application and care to be taken while using the same.
2. Observe and draw vehicle layout of the following types
 - Two Wheeler
 - Three Wheeler
 - Four Wheeler
3. Dismantle and assemble a single plate dry type clutch assembly, to understand its construction and working. Sketch and label the components.
4. Dismantle and assemble a Multi-plate clutch assembly used in Two Wheelers, to understand its construction and working. Observe the operating linkages and sketch the system.
5. Dismantle and assemble a Synchromesh gear box, to understand its construction and working. Observe gear shifting (synchronizing action), draw power flow diagrams, and calculate gear ratios.
6. Dismantle and assemble Vario-drive. Observe its construction and working. List the components dismantled and draw its sketches.
7. Dismantle and assemble a Propeller shaft, Slip joint and Universal Joint, to understand their construction and working. Sketch the same
8. Dismantle and assemble the Differential and Rear axle, to understand its construction and working. Sketch the unit showing the exact location of the bearings. Find the gear ratio of final drive and state the type of dismantled Rear axle.
9. Dismantle and assemble a Wheel assembly, to understand its construction and working. Observe and sketch tyre and rim. Write specification of Tyre.

- Notes:** 1) Practical should be conducted in a group of four students.
2) A number of practicals may be conducted simultaneously.

Learning Resources:**1. Books:-**

Sr. No.	Author	Title	Publisher
01	Ramlingam K.K.	Automobile Engineering	Scitech Publication
02	Anil Chikkara	Automobile Engineering Vol. II	Satya Prakashan New Delhi
03	Kirpal Singh	Automobile Engineering Vol.I	Standard Publication
04	Harbans Singh Royat	The Automobile	S. Chand Publication
05	R.B. Gupta	Automobile Engineering	Satya Prakashan New Delhi
06	S. Srinivisan	Automotive Mechanics	TATA McGraw – HILL
07	Crouse / Anglin.	Automobile Mechanics	TATA McGraw – HILL

2. Websites:

- www.howstuffworks.co
- www.npkauto.com

Course Name : Mechanical Engineering Group

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

Semester : Third

Subject Title : Computer Aided Drafting

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:

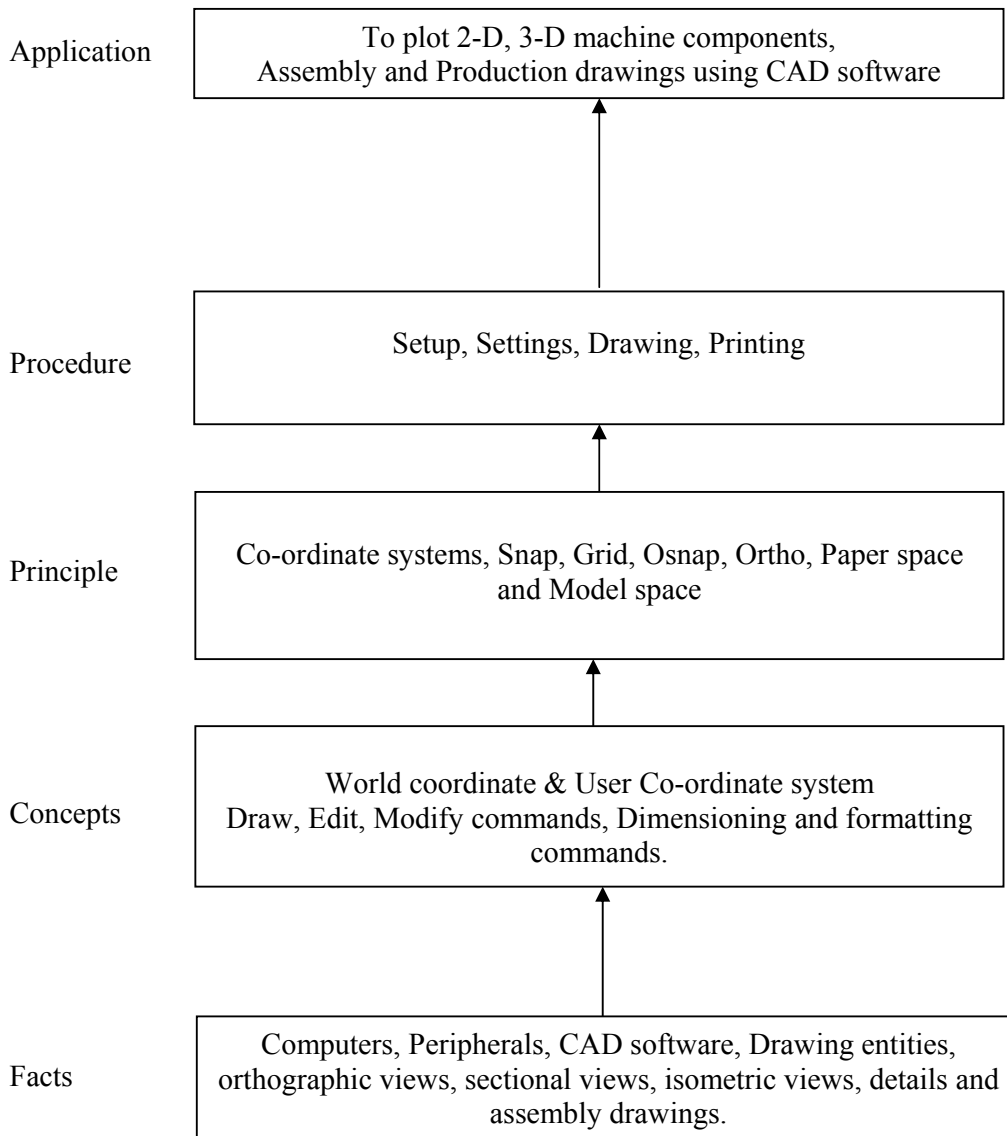
Now a day a manual drafting is obsolete in industry. Computers being the inevitable part in an engineer's life due to its inbuilt characteristics which helps him to do various task with acceleration. Using computers and CAD software it is easy to create and modify drawings ultimately it saves time. It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

In mechanical industry operating skills are required for computer aided drafting operations of machine components, handling of printers & plotters. 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 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, filters, itscale, mbuttonpan</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 03 Hours</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. 	04

<ul style="list-style-type: none"> ➤ 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>	
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. Set the initial view.
2. Use of Draw command.
3. Use of Edit command.
4. Use of Modify command.
5. Apply dimensions.
6. Draw Isometric drawing.
7. Draw 3 D drawings.
8. Plotting of 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:**5. 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 Jeyapoovan	Engineering Graphics Using AutoCAD	Vikas Publishing House Pvt. Ltd. Fifth Edition
6	--	Various software manuals	--

6. 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.

7. 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:

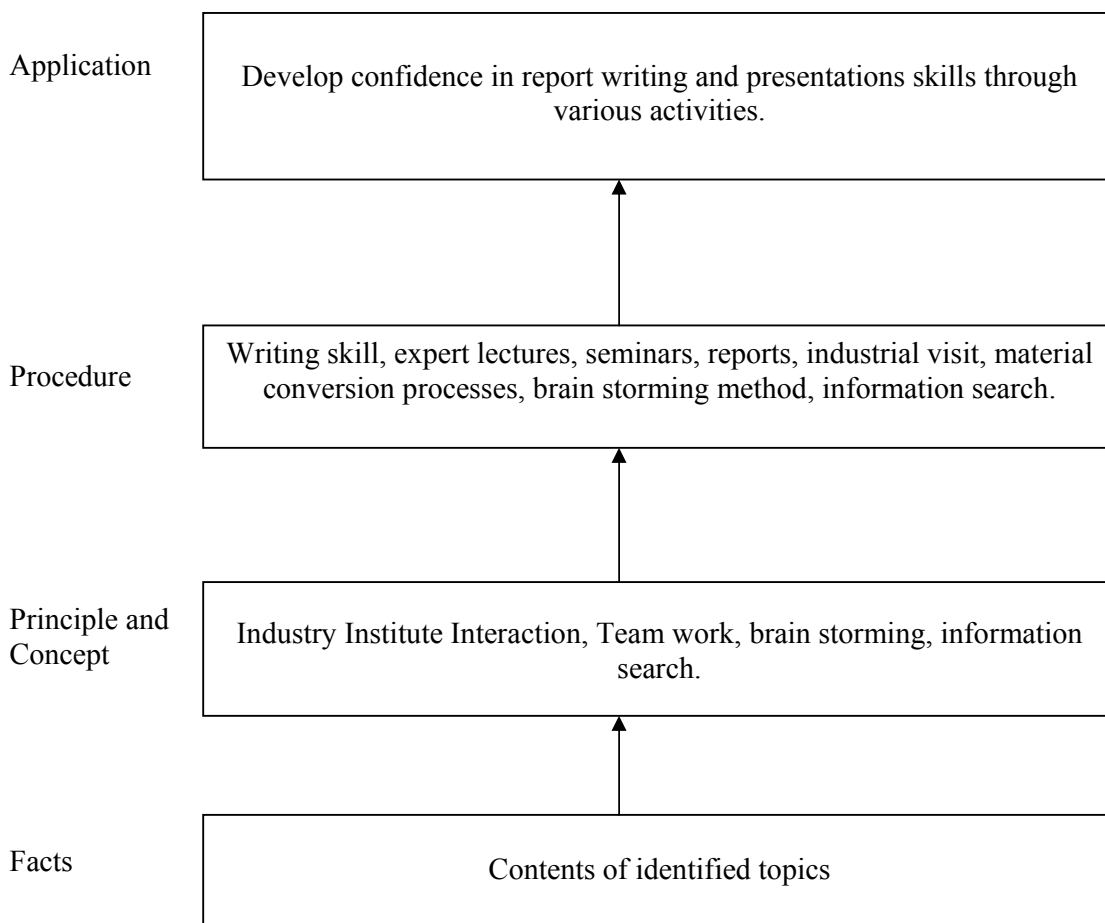
The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. Practical aspects of engineering can be learned through industrial visits, industry expert lectures, seminars, searching alternative solutions and validation 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

diploma engineers. 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, 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"> a. Get familiar with industry environment b. Know the organizational structure c. Working of functional departments & their inter relation d. Products manufactured, services provided e. Identification of materials used and material flow from raw materials to finished products f. Study the production processes & types of machines used g. Layout of machinery & equipments in general h. 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"> i) Manufacturing units ii) Chemical Process industry/cotton/grain processing industry/dairy etc. iii) Service stations - Auto repairs work shop / garage, farm implements. iv) ST workshop / city transport workshops. v) 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"> i) Material selection, specifications & properties desirable of 10 different machine components. ii) 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. iii) List the various properties & applications of following materials. <ol style="list-style-type: none"> a) Thermo plastic plastics b) Thermo setting plastics c) Rubber d) Ceramics iv) Any two problems on bending moment diagram, shear force diagram, deflection of beams & torsion topics of strength of materials. v) Any two problems from applied mathematics <ol style="list-style-type: none"> 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. vi) Prepare a questionnaire for conducting interview of a successful entrepreneur & conduct the interview. vii) List 5 different engineering applications of transformers stating the types, & specifications, write the working principle of auto transformer. viii) 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