STATE BOARD OF TECHNICAL EDUCATION , JHARKHAND

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

SEMESTER : THIRD

WITH EFFECT FROM 2011-12 DURATION : 16 WEEKS

FULL TIME / PART TIME : FULL TIME - SEMESTER

SR.		Abbrev	SUB	TE Se	ACHI CHEM	NG E				EXA	MINATI	ON SCH	EME			
NO.	SUBJECT IIILE	iation	CODE	тп	TU	DD	PAPER	TH	(1)	PR	(4)	OR	(8)	TW	(9)	SW
				п	10	UFK	HRS	Max	Min	Max	Min	Max	Min	Max	Min	(16003)
1	Applied Mathematics Ø	AMS	12035	03			03	100	40							
2	Mechanical Engineering	MED	12042	03		04	04	100	40			25#	10	25@	10	
2	2 Drawing Ø		12042	2 05		04	04	100				25#	10	25@	10	
3	Strength of Materials Ø	SOM	12043	03		02	03	100	40					25@	10	
1	Materials and Manufacturing	MMD	12051	04		04	02	100	40			25#	10	25@	10	50
4	Processes		12031	04		04	05	100	40			23#	10	23@	10	50
5	Automobile Transmission		12052	02		02	02	100	40	500	20					
5	Systems	AIS	12032	05		02	03	100	40	30@	20					
6	Professional Practices- III	PPR	12053			04								50@	20	
7	Development of Life Skills-II Ø	DLS	12041	01		02						25#	10	25@	10	
TOTAL						18		500		50		75		150		50

Student Contact Hours Per Week: 35 Hrs.

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks : 825

(a) Internal Assessment, # External Assessment, No Theory Examination, Ø - common to ME / PT / AE / PG

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work

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.

Course Name : Civil and Mechanical Engineering Group Course Code : AE/CE/CS/CV/CR/PG/PT/ME/MH/MI/FE/CH/PS/PT Semester : Third Subject Title : Applied Mathematics Subject Code : 12035

Teaching and examination scheme:

Teaching Scheme					Examination	on 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 SBTE.
- 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:

The study of mathematics is necessary to develop in the student the skills essential for studying new technological development. This subject introduces some applications of engineering, through which the student can understand the link of Mathematics with engineering principles.

Objective: The student will be able to:

- 1. Apply Mathematical term, concept, principles and different methods for studying engineering subjects
- 2. Apply Mathematical methods to solve technical problems,
- 3. Execute management plans with precision.
- 4. Use Mathematical techniques necessary for daily and practical problems.

Learning Structure:

Application	Apply the principles of Mathematics to solve problems in Civil and Mechanical Field						
			Î				
Procedure	Methods of finding integration definite integration and its properties.	Methods of solving differential equation of first order and first degree.	Use of Binomial, Normal and Poission distributions for solving different examples.	Methods for finding approximate roots by using bisection, Regula-falsi, Newton-raphson method, Gauss elimination, Jacobi and Gauss-seidal methods			
Concept	Integration of standard functions. Rules of integration. Integration by parts, partial fractions.	Order, degree of differential equation	Probability of repeated trials of random experiment.	Higher order algebraic equations. Upper and lower triangular matrix, iterative methods.			
		Î					
Facts	First order differentiation. Definition of integration as antiderivative.	Integration. Definition of differential equation	Permutation and combination. Probability of an event.	Relation between degree of equation and roots. Relation between no. of unknowns and equations			

CONTENTS: Theory

Chapter	NAME OF TOPIC	Hours	Marks
01	 Integration: 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by substitution 1.3.2 Integration of rational functions. 1.3.3 Integration by partial fractions. 1.3.4 Integration by trigonometric transformation. 1.3.5 Integration by parts. 	10	18
	1.4 Definite Integration .1.4.1Definition of definite integral.1.4.2Properties of definite integral with simple problems.	04	08
	 1.5 Applications of definite integrals. 1.5.1 Area under the curve. Area bounded by two curves, 1.5.2 Volume of revolution. 1.5.3 Centre of gravity of a rod, plane lamina. 	06	10
02	 Differential Equation 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Non homogeneous, Exact, Linear and Bernoulli equations. 	08	18
	 2.3 Applications of Differential equations. 2.3.1 Rectilinear motion (motion under constant and variable acceleration) 2.3.2 Simple Harmonic Motion 	04	10
03	 3.1 Probability: 3.1.1 Definition of random experiment, sample space, event occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely) 3.1.2 Definition of probability, addition and multiplication theorems of probability. 	04	08
	 3.2 Probability Distribution 3.2.1 Binomial distribution. 3.2.2 Poisson's distribution. 3.2.3 Normal distribution 3.2.4 Simple examples corresponding to production process. 	04	12

04	Num 4.1	erical Methods Solution of algebraic equations Bisection method, Regulafalsi method and Newton – Raphson method.	04	08
	4.2	Solution of simultaneous equations containing 2 and 3 unknowns Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's methods.	04	08
	·	Total	48	100

Learning Resources: Books:

Sr. No.	Title	Authors	Publications	
01	Mathematics for polytechnic	S. P. Dechnande	Pune Vidyarthi Griha	
01	Mathematics for porytechnic	S. F. Destipande	Prakashan, Pune	
02	Calculus: Single variable	Robert T. Smith	Tata McGraw Hill	
03	Advanced Mathematics for	Murray P. Spiegel	Schaum outline series	
03	Engineers and Scientist	Multay K Spieger	McGraw Hill	
04	Higher Engineering	P. S. Growal	Khanna Publication, New	
04	Mathematics	D. S. Olewal	Dehli	
06	Introductory Methods of	S S Sastry	Prentice Hall Of India	
00	Numerical analysis	5. 5. 5astry	New Dehli	
07	Numerical methods for Engg.	Chapra	Tata McGraw Hill	
07	4^{th} ed.	Chapta		
	Numerical methods for			
08	scientific & engineering	M. K. Jain & others	Wiley Eastern Publication.	
	computations			

Course Name : Mechanical Engineering Group Course Code : AE/PG/PT/ME/MH/MI Semester : Third Subject Title : Mechanical Engineering Drawing Subject Code : 12042

Teaching and Examination Scheme:

Teaching Scheme					Examinati	on Scheme		
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03		04	04	100		25#	25@	150

NOTE:

Two tests each of 25 marks to be conducted as per the schedule given by SBTE.

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:

A Mechanical Engineering Diploma holder, irrespective of his field of operation in an industry, is expected to possess a thorough understanding of drawing, which includes clear spatial visualization of objects and the proficiency in reading and interpreting a wide variety of production drawings. Besides, he is also expected to possess certain degree of drafting skills depending upon his job function, to perform his day to day activity i.e. communicating and discussing ideas with his supervisors and passing instructions to his 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 should be able to -

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

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Auxiliary views: - 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)	08	12
02	 Intersection of solids:- Curves of intersection of the surfaces of the solids in the following cases (a) 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 (b) 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 	08	16
03	Projection of straight lines & planes. Line inclined to both the planes. Plane inclined to both the planes limited to triangular, quadrilateral , pentagonal , hexagonal and circular planes.	08	08
04	 Conventional Representation:- 1. Standard convention using SP – 46 (1988) (a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber (b) Long and short break in pipe, rod and shaft. (c) Ball and Roller bearing, pipe joints, cocks, valves, internal / external threads. (d) Various sections- Half, removed, revolved, offset, partial and aligned sections. (e) Knurling, serrated shafts, splined shafts, and chain wheels. (f) Springs with square and flat ends, Gears, sprocket wheel (g) Countersunk & counter bore. (h) Tapers 	04	12
05	 Limits, Fits and Tolerances:- Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods. Introduction to ISO system of tolerencing, dimensional tolerances, elements of interchangeable system, hole & shaft based system, limits, fits & allowances. Selection of fit. Geometrical tolerances, tolerances of form and position and its geometric representation. General welding symbols, sectional representation and symbols used in Engineering practices 	04	12

06	 Details to Assembly Introduction- Couplings – Universal couplings & Oldham's Coupling Bearing – Foot Step Bearing & Pedestal Bearing Lathe tool Post Machine vice & Pipe Vice Screw Jack Steam Stop Valve 	08	20
07	 Assembly to Details Introduction – Pedestal Bearing Lathe Tail Stock Drilling Jig Piston & connecting rod Gland and Stuffing box Assembly Valve – Not more than eight parts Fast & loose pulley 	08	20
	Total	48	100

Practical:

Skills to be developed:

Intellectual Skills:

- 1. Understand interpenetration of soil.
- 2. Interpret limits, fits and tolerances on a given drawing.
- 3. Visualize assembly of components from given details.
- 4. Interpret Conventional symbols as per IS code SP46.
- 5. Identify different materials and their properties.

Motor Skills:

Draw front view and top view of solids penetrating one with other.

- 1. Conventionally represent limit, fits and tolerances on a given drawing as per the manufacturing processes.
- 2. Give surface roughness values and symbols on a part drawing.
- 3. Setting and use of different drawing equipments.
- 4. Record bill of materials in assembly drawing.
- 5. Use computer aided drafting package.

List of Practical:

(Use first angle method of projection)

- 1. Auxiliary Views One sheet containing two problems on Auxiliary views.
- 2. Intersection of Solids
 - i) One Sheet containing atleast two problems.
 - ii) Atleast four problems for home assignment in sketch book
- 3. Projection of lines & planes

i) One sheet containing two problems on lines & planes

- ii) At least two problems as home assignment in sketch book
- 4. Conventional Representation as per SP 46 (1988) one sheet
- 5. Limit, Fit, Tolerances and Machining Symbols one sheet
- 6. Assembly to detailed drawings of components including conventional representation of tolerances and surface finish symbols: One sheet covering any one assembly and its details

At least two problems as home assignment in sketch book

7. Details to Assembly

Draw One sheet covering any one assembly and its details.

Solve at least two problems as home assignment in sketchbook.

Two problems on assembly drawings using any AutoCAD Package.
 (Assembly containing maximum 6 to 7 components-minimum 12 hours)

Learning Resources:

Books:

Sr. No	Author	Title	Publication
01	N.D.Bhatt	Machine Drawing	Charotar Publication, Anand
02	IS Code SP 46 (1988)	Code of practice for general engineering drawing.	Engineering Drawing Practice for School and colleges
03	L.K.Narayanan, P.Kannaich, K.VenkatReddy	Production Drawing	New Age International Publication
04	P.S.Gill	Machine Drawing	S.K.Kataria and Sons
05	M.L.Dabhade	Engineering Graphics (For Topic on Auxiliary Views)	
06	Sidheshwar	Machine Drawing	Tata McGraw Hill

Course Name : Mechanical Engineering GroupCourse Code : ME/PG/PT/AE/MH/FE/MI/PS/PTSemester : ThirdSubject Title : Strength of MaterialsSubject Code : 12043

Teaching and Examination Scheme:

Teac	hing Sch	neme			Examination	on 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 SBTE.
- 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.

Objectives:

The Student should be able to:

- 1. Understand the fundamentals of solid mechanics.
- 2. Acquire elementary knowledge of stresses, strains & material properties.
- 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:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
	Mechanical Properties of Materials, Simple stresses &		
01	 Strains 1.1 Mechanical properties – Elasticity, Plasticity, Rigidity, Ductility, Malleability, Toughness, Hardness, Brittleness, Creep, Fatigue. 1.2 Concept & Definition of Simple stresses & strains Types - tensile, compressive, Shear, single & double shear, Punching shear, Thermal stresses, Hoop stresses & corresponding strains. Hooke's law, Young's modulus, Modulus of Rigidity, Change in length of the bar having uniform & stepped cross section stress-strain curves for ductile & brittle materials. 1.3 Volumetric Strain, Bulk modulus, Poisson's ratio. Biaxial & Tri-axial stresses & strains. Relationship among E, G, & K. 1.4 Stresses & strains in bars of uniformly varying section subjected to axial load at ends only, Composite sections having same length 1.5 Temperature stresses & strains of uniform & composite 	12	24
	Bending Moment & Shear Force		
02	 2.1 Concept & definition of Shear force & bending moment. Relation between rate of loading, shear force & bending moment. 2.2 Shear force & bending moment diagrams for cantilevers, simply supported beam & over hanging beam subjected to point loads & Uniformly distributed load. 2.3 Location of point of contraflexure. 	08	16
	Moment of Inertia		
03	 3.1 Concept & definition of Moment of inertia, radius of gyration. Parallel & perpendicular axes theorem. (No derivation) 3.2 Moment of inertia of square, rectangular, circular, semicircular, Triangular, Hollow square, Rectangular & circular only. 3.3 MI of angle section, Channel section, Tee- section, I section about centroidal axis & any other axis parallel to centroidal axis. 	06	16

	Bending stresses		
04	 4.1 Theory of simple bending, Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis. Stress distribution diagram for Cantilever & simply supported beam. 4.2 Equation of bending(No derivation) 4.3 Simple numeral problem. 4.4 Concept of direct & transverse shear stress. 4.5 Shear stress equation (No derivation) 4.6 Shear stress distribution diagrams Average shear stress & Maximum shear stress for rectangular & circular section. 	06	12
05	 Direct and Bending stresses 5.1 Concept of Axial load, eccentric load, direct stresses, bending stresses, maximum & minimum stresses. 5.2 Stress distribution diagram. 5.3 Condition for no tension in the section. 5.4 Problems on the above concepts for machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame etc. 	08	16
06	 Torsion 6.1 Concept of Pure Torsion, Assumptions in theory of pure Torsion, Torsion equation for solid and hollow circular shafts. 6.2 Power transmitted by a shaft. 6.3 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft) 	08	16
	Total	48	100

Practical:

Skills to be developed:

Intellectual Skill:

- 1. Identification of different parts of machine and their function
- 2. Interpretation failure patterns of different metal under different action
- 3. Extrapolating test result or observation during test
- 4. Testing different metals and comparison of experimental result

Motor Skill:

- 1. Sketch of standard specimen, arrangement for test on respective machines
- 2. Measurement of different parameters
- 3. Handling Instrument
- 4. Observing behavior of different metal during test.

List of Practical:

- 01 Study and demonstration of Universal Testing Machine & its attachments.
- 02 Study & demonstration of Extensometer.
- 03 Tension Test on mild steel, Aluminum & compression test on cast iron on Universal Testing Machine.
- 04 Direct Shear Test of mild steel on Universal Testing Machine.
- 05 Brinell Hardness Test on Mild Steel.
- 06 Rockwell hardness Test on Hardened Steel.
- 07 Izod & Charpy Impact tests of a standard specimen.
- 08 Torsion Test on Mild steel bar.
- 09 a) Assignments: Problems on shear force & bending moment diagrams to be drawn on graph paper.

Learning Resources:

Books:

Sr. No	Author	Title	Publication
01	Andrew Pytel Fedrinand L. Singer	Strength of Material	Addison-Wesley An imprint of Addison Wesley Longman, Inc. Forth edition
02	B.K.Sarkar	Strength of Material	Tata McGraw hill New Delhi
03	Dr. R. K.Bansal	A Text Book strength of Material	Laxmi Publication New Delhi
04	S Ramamrutham	Strength of Material	Dhanpat Rai & Publication New Delhi
05	R.S.Khurmi	Strength of Material	S.Chand Company Ltd. Delhi

w.e.f Academic Year 2011-12

Course Name : Diploma in Automobile Engineering Course Code : AE Semester : Third Subject Title : Materials & Manufacturing Processes Subject Code : 12051

Teaching and Examination Scheme:

Teac	ching Sch	eme	Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04		04	03	100		25 #	25@	150

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by SBTE.
- 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 technical 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. This subject is intended to develop these abilities.

Objectives:

The student will be able to:

- 1. Know various engineering materials, their properties and selection of these materials for different engineering applications.
- 2. Know 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. Know basic machine tools like lathe machine and drilling machine used in manufacturing process.
- 6. Select appropriate speeds, feeds and depth of cut for various machining operations.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
	Engineering Materials :		
01	 1.1 Introduction - 1.1 Introduction - 1.1.1 Classification of engineering materials. 1.1.2 Mechanical properties of metals - Strength, Elasticity, Plasticity, Ductility, Malleability, Toughness, Hardness, Brittleness, Resilience, Creep, Fatigue. 1.2 Ferrous metal and their alloys: 1.2.1 Cast iron: types, composition and applications. 1.2.2 Plain carbon steel: types, composition and applications. 1.2.3 Effects of alloying elements like- Nickel, chromium, silicon, molybdenum & tungsten on the properties of steel. 1.2.4 Alloy steels like stainless steel, Tool steels, their composition and applications. 1.3 Designation of cast iron and steel. Designation as per IS System 1.4 Non-ferrous metals and their alloys: duralumin, 'Y' alloy, their composition and applications. 1.4.2 Copper and its alloys: brass, bronze, gun metal, Babbitt metal their composition and applications. 1.5 Polymeric materials : Thermoplastics , thermosetting Plastics, Fibre, rubber their properties and applications. 1.6 Composite materials	16	24
02	 Heat treatment: 2.1 Introduction: purpose, advantages, Fe-C phase transformation diagram. 2.2 Common heat treatment processes: Annealing, normalizing, hardening, tempering . 2.3 Surface hardening processes: case carburizing, nit riding, Cyaniding. Induction and flame hardening. 2.4 Applications of heat treatment processes for components like Gears, camshaft, Crankshaft. 	12	14
03	 Foundry: 3.1 Types of Foundries, Advantages and disadvantages of foundry process. 3.2 Pattern Making 3.2.1 Pattern materials and their selection. 3.2.2 Types of pattern and their selection. 3.2.3 Pattern Allowances. 3.2.4 Pattern colour coding. 	16	26

	2.2 Moulding:					
	2.2.1 Hand Moulding tools and flasks					
	2.2.2 Moulding cond: Composition Types and properties					
	2.2.2 Clouding sand: Composition, Types and properties.					
	3.3.3 Classification of moulding processes.					
	3.3.4 Core, core print and core boxes.					
	3.4 Casting:					
	3.4.1 Gating and risering of sand castings.					
	3.4.2 Types & working: Die casting and centrifugal casting.					
	3.4.3 Defects in casting : causes and remedies					
	Fundamentals of Machining:					
	4.1 Mechanism of chip formation.					
	4.2 Types of chips.					
04	4.3 Types of cutting tools: single and multi point.	08	16			
	4.4 Cutting tool materials: Selection, Properties and types.					
	4.5 Single point cutting Tool nomenclature and tool signature.					
	4.6 Cutting fluids: Properties, types.					
	Basic Machine tools:					
	A. Lathe:					
	5.1 Classification of lathes.					
	5.2 Lathe specification.					
	5.3 Accessories and attachments used on lathe.					
05	5.4 Operations performed on lathe – Turning, Taper turning by	12	20			
	swiveling compound rest Facing Knurling and Threading					
	B. Drilling:					
	5.5 Classification of drilling machines					
	5.6 Operations performed on drilling machines – drilling, reaming.					
	Total	64	100			

Practical:

Skills to be developed:

Intellectual skills:

1) To develop concept of pattern making.

2) To understand the safety aspects to be followed on the shop floor.

3) To understand the different types of patterns & to compare them.

4) To know the different types of sands used in sand moulding.

Motor Skills:

1) To prepare solid pattern.

2) To use pattern for preparing moulds.

3) To operate & control lathe machine.

4) To operate & control drilling machine.

5) To follow the safety precautions on the shop floor.

List of Practicals:

- 1. Preparing one wooden 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. Preparation of a sand mould for any one of the above patterns.
- 4. Estimation of cost for the casting using the above pattern and mould.
- 5. One job for each student involving different lathe and drilling machine operations.
- 6. Assignment on selection of materials and required properties for automobile components.

Learning Resources: Books:

S. No	Author	Title	Publication
1.	S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Elements of Workshop Technology Vol I & II	Media Promoters & Publishers
2.	H. S. Bawa	Workshop Technoligy Vol I & II.	Tata McGraw-Hill Publishing
3.	R. K. Jain	Production technology	Khanna Publishers. Delhi.
4.	Dr. W. A. J. Chapman	Workshop Technology Part- I, II & III	ELBS & Edward Arnold (Publishers) Ltd., London
5.	B. H. Amstead, Phillip Ostwald, Myronl Begeman.	Manufacturing Processes	John Wiley & Sons
6.	H.M.T.	Production Technology	H.M.T.

Course Name : Diploma in Automobile EngineeringCourse Code : AESemester : ThirdSubject Title : Automobile Transmission SystemsSubject code : 12052

Teaching and Examination Scheme:

Teac	hing Sc	heme	Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03		02	03	100	50@			150

NOTE:

> Two tests each of 25 marks to be conducted as per the schedule given by SBTE.

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 core technology subject for Automobile Engineering Course. This subject is part of automobile system concerning transmission of power. The knowledge of this subject is required in the subjects like Automobile component design, vehicle maintenance and vehicle testing. Basic principles and conceptual knowledge of this subject is useful for improving the performance of vehicles.

Objectives:

The Student will be able to -

- 1. Understand the vehicle layouts, chassis frame & location of various systems.
- 2. Know principle, construction and working of clutch, gearboxes, propeller shafts, universal joints, slip joints & final drive in the transmission system.
- 3. Understand the terminology of wheels & tyres.
- 4. Compare various types of transmission systems.

Learning structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
	Vehicle layout and Chassis frame:		
	1.1 Classification of Chassis - Semi-forward, Fully forward and		
	Conventional.		
	1.2 Vehicle layout & its types—2 Wheel Drive- Front Engine		
	Front Wheel Drive, Rear Engine Rear Wheel Drive, Front		
01	Engine Rear Wheel Drive & 4 Wheel Drive	08	14
	 Major assemblies – their locations and functions 		
	1.3 Various loads acting on chassis frame		
	1.4 Type of frames frames construction and material 2 wheeler		
	and A wheeler		
	allu 4 - wilcelei.		
	Clutches		
	2.1 Principle and necessity of Clutch.		
	2.2 Various types of clutches used in Automobiles – single plate,		
	multiplate clutches - dry & wet clutches, centrifugal clutch,		
02	and diaphragm clutch.	10	22
	 Materials used for clutch lining. 		
	2.3 Hydraulic & mechanical clutch linkage, Cable operated clutch		
	linkage.		
	2.4 Fluid coupling- principle, construction and working.		
	Gear Boxes		
	3.1 Principle and necessity of Gear Box.		
	• Types, construction and working of gear boxes & their		
	layouts such as sliding mesh, constant mesh,		
03	synchromesh type, vario - drive, transfer case.	10	22
	3.2 Gear ratios with the help of power flow diagrams.		
	3.3 Gear shift mechanism.		
	3.4 Concepts of automatic gear box.		
	3.5 Torque Converter- principle, construction and working		
	Propeller shafts universal joints & slin joints		
	4.1 Necessity and function of Propeller Shaft		
04	4.2 Constant velocity Joints- Inhoard & outboard Joints- Tripod Joint	06	14
	Universal joint and slin joint	00	17
	4.3 Hotchkiss drive and torque tube drive		
	4.5 Hotenkiss drive and torque tube drive.		
	Final ULIVE 5.1 Dringinla Nacassity and function of final drive and differential		
	5.1 Finiciple, Necessity and function of finial drive and differential.		
	3.2 Working of differential and differential lock. Backlash in		
05	differential.	08	16
	5.5 Types of rear axies such as semi - floating, three quarter		
	floating and full floating type.		
	5.4 Iransmission in two wheeler- chain drive and belt drive.		
	5.5 Spur Differential Operation.		
	Wheels and Tyres		
0.5	6.1 Types of wheels, rims and tyres.	0.4	10
06	6.2 Lyre materials, construction.	06	12
	0.5 Indecessity and types of treads.		
	0.4 Tyte inflation and its effect. Tyte rotation and nomenciature	10	100
1	I OTAI	40	100

Practical:

Intellectual skill:

- 1. Identify concepts applied.
- 2. Identify parts like clutch, gear box, universal joints, propeller shaft, final drive, wheels & tyres.
- 3. Classify the system according to their application.
- 4. Detect fault by observation.

Motor skill:

- 1. Sketch the different devices.
- 2. Handle tools, equipment, and instrument.
- 3. Observe the behaviors of various system under various parameters.

List of Practical / Assignments:

- 1. Draw various vehicle layouts for- two wheelers, three wheeler and four wheelers and compare them. State chassis specifications of any one vehicle.
- 2. Open a single plate dry clutch assembly and sketch exploded view.
- 3. Open a multi-plate clutch used in two wheelers, observe the operating linkages and sketch the system.
- 4. Open any two types of gear boxes observe gear shifting, gear ratio and sketch the system & compare them.
- 5. Open & observe automatic transmission devices such as torque converter, various drives. Draw neat sketch of the same and describe it.
- 6. Open & observe universal joints such as Hooks universal joint. Draw neat sketch of the same and describe it.
- 7. Open the differential, sketch the unit with bearing locations.
- 8. Assembly & disassembly of any one type of rear axle. Draw neat sketch of the same and describe it.
- 9. Open any two types of tyres, wheels and rims, observe and sketch.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	Anthony Schwaller	Motor automotive technology	Delmar Publisher Inc.
02	Tim Gills	Automotive service	Delmar Publisher Inc.
03	Anil Chikkara	Automobile Engineering Vol. II	Satya Prakashan New Delhi
04	Crouse / Anglin.	Automobile Mechanics	TATA McGraw – HILL
05	Kirpal Singh	Automobile Engineering Vol. I	Standard Publication
06	Harbans Singth Royat	The Automobile	S. Chand Publication
07	R.B. Gupta	Automobile Engineering	Satya Prakashan New Delhi
08	S. Srinivisan	Automotive Mechanics	TATA McGraw – HILL
09	H M SETHI	Automotive Technology	TATA McGraw– HILL

Course Name : Diploma in Automobile Engineering

Course Code : AE

Semester : Third

Subject : Professional Practices - III

Subject Code : 12053

Teac	hing Scl	heme	Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
		04					50@	50

Rationale:

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors, the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunities to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

Student will be able to:

- 1. Acquire information from different sources.
- 2. Prepare notes for given topic.
- 3. Present given topic in a seminar.
- 4. Interact with peers to share thoughts.
- 5. Prepare a report on industrial visit, expert lecture.

Learning Structure:



Important Notes: The topics suggested under various activities (Sr.No.1 to 4) are only suggestive and may serve as guidelines to the teachers. Any other equivalent topics or activities may be considered to improve professional skills of the learner.

Activity	Contents	Hours			
	Industrial Visits				
	Structured industrial visits be arranged and report of the same should be				
	submitted by the individual student, to form a part of the term work.				
	Two industrial visits may be arranged in the following areas / industries :				
	i) Vehicle manufacturing, Manufacturing organizations				
01	ii) A Tyre-tube service / repair shop.	12			
	iii) Auto engine workshop.				
	iv) Foundry or fabrication units.				
	v) Commercial/domestic diesel generating set				
	vi) MSRTC / PMT / PCMT / Local Workshop.				
	vii) Heat treatment shop.				
	Lectures by Professional / Industrial Expert / Student Seminars				
	based on information search to be organized from the following areas				
	(ANY FOUR)				
	i) Use of plastics in automobile.				
02	ii) Surface treatments.				
	iii) Computer aided drafting.				
	iv) Modern Two wheeler / Four wheeler features.				
	v) Clutches – Types, Working.	12			
	vi) Gear box – Types, Working.				
	vii) Industrial hygiene.				
	viii) Composite Materials.				
	ix) Tubeless Tyres, Tyre Inflation & its effect, Tyre retreading.				
	x) Heat treatment processes.				
	x1) Fasteners – types, application.				
	xii) Ceramics				
	Information Search :				
	Search information on any I WO of the following suggested topics and				
	write a report (Group size – 3-5 students, Report – up to 10 pages).				
	Collection of information related to :				
	1) 18 codes related to metal forming processes/ Heat Treatment				
0.2	/ Testing of Ferrous Materials	10			
03	ii) Specifications of different cutting tools and their	10			
	III) Manufacturers. Tyres, Tubes available in market. (Survey-				
	Literature/market).				
	Four wheelers				
	v). List the various properties and applications of following				
	materials.				
02	 vi) MSRTC / PMT / PCMT / Local Workshop. vii) Heat treatment shop. Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from the following areas (ANY FOUR) i) Use of plastics in automobile. ii) Surface treatments. iii) Computer aided drafting. iv) Modern Two wheeler / Four wheeler features. v) Clutches – Types, Working. vi) Gear box – Types, Working. vii) Industrial hygiene. viii) Composite Materials. ix) Tubeless Tyres, Tyre Inflation & its effect, Tyre retreading. x) Heat treatment processes. xi) Fasteners – types, application. xii) Ceramics Information Search : Search information related to : i) Is codes related to metal forming processes/ Heat Treatment / Testing of Ferrous Materials ii) Specifications of different cutting tools and their iii) Specifications of different cutting tools and their iii) Manufacturers. Tyres, Tubes available in market. (Survey-Literature/market). iv) Two wheeler & Four-wheeler frames. Features in Two-wheelers/ Four-wheelers v) List the various properties and applications of following materials:- 	12			

	 a. Ceramics b. Fibre-Reinforced plastics OR Modular courses (Optional) : A course module should be designed in the following areas Batch size – min. 15 students. Course may be organized internally or with the help of external organization. a) Two-wheeler tuning. b) Forging Technology. 	
	 c) Manufacturing of steels d) CAD-related software. e) Welding techniques. One assignment to be completed on the course work as a part of term work 	
04	Seminar: Any one seminar on the suggested list given for expert lecturers/information search (Time for presentation 10 min. per student) and submit seminar report of at least 10 pages. Sources – Magazines, Product catalogues, Technical Journals, Websites & Surveys.	12
05	 Group Discussion: (Group discussion on ANY TWO of the following suggested topics. Group size – practical batch. Time for group discussion 15 minutes) a) Current topics related to auto industries b) Energy crisis. c) Current topic from institutional environment such as – dress code for students, use of library facilities for 24 hours, problems related with discipline etc. d) Modern trends in automobiles. e) Use of alternative fuels. 	06
06	 Individual Assignments: (Any two from the list suggested) a) Process sequence for manufacturing of ANY TWO auto components with material specifications b) Interpretation of industrial / production drawing. c) Collection of samples of different plastic materials or cutting tools with properties, specifications and applications. d) Prepare Models of section of solids. e) Prepare models using development of surfaces. f) Prepare details of production drawings by actual measurement of any one automobile sub-assembly. (min. 4 components) g) Principle & operation of differential. OR Conduct following activities (MINIMUM ONE) through active participation of students. Write a report h) Rally for energy conservation / tree plantation. ii) Conduct aptitude or general knowledge test or IQ test iv) Arrange ANY One training programme in the following areas a) Yoga. b) Use of fire fighting equipment 	12

c) First aid.	
d) Maintenance of Domestic appliances.	
e) Human rights protection.	
f) Consumer rights protection.	
g) Personality development.	
h) Entrepreneurship development.	
Tota	1 64

Course Name : Mechanical Engineering and Technology

Course Code : AE/CE/CS/CV/CR/PG/PT/ME/MH/MI/FE/CH/PS/PT/TC/DC

Semester : Third

Subject Title : Development of Life Skills-II

Subject Code : 12041

Teaching and Examination Scheme:

Teaching Scheme		Examination Scheme						
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01		02				25#	25@	50

Rationale:

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

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

THE SUBJECT IS CLASSIFIED UNDER HUMAN SCIENCE.

Objectives: The students will be able to:

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

Learning Structure:



CONTENTS: Theory

Chapter	Name of the Topic	HOURS				
1	SOCIAL SKILLS					
1	Society, Social Structure, Develop Sympathy And Empathy.					
2	Swot Analysis – Concept, How to make use of SWOT.	01				
	Inter personal Relation					
3	Sources of conflict, Resolution of conflict,					
	Ways to enhance interpersonal relations.					
	Problem Solving					
	1)STEPS IN PROBLEM SOLVING,					
	1) Identify and clarify the problem,					
	2)Information gathering related to problem,					
4	A)Consider alternative solutions and their implications	02				
	5)Choose and implement the best alternative					
	6)Review					
	I) Problem solving technique (any one technique may be considered)					
	1) Trial and error, 2) Brain storming, 3) Lateral thinking					
	Presentation Skills					
	Body language					
	Dress like the audience					
	Posture, Gestures, Eye contact and facial expression.					
5	STAGE FRIGHT,					
	Voice and language – Volume, Pitch, Inflection, Speed, Pause					
	Pronunciation, Articulation, Language,					
	Practice of speech.					
	Use of aids –OHP,LCD projector, white board					
	Group discussion and Interview technique –					
	Introduction to group discussion,					
6	Ways to carry out group discussion,					
U	Parameters— Contact, body language, analytical and logical thinking,					
	decision making					
	INTERVIEW TECHNIQUE					
	Necessity,					
	Tips for handling common questions.					
	Working in Teams					
	Understand and work within the dynamics of a groups.					
	Tips to work effectively in teams,					
_	Establish good rapport, interest with others and work effectively with					
7	them to meet common objectives,					
	Tips to provide and accept feedback in a constructive and considerate					
	Way, Leadershin in teams, Handling frustrations in group					
	Leadership in learns, mandling trustrations in group.					
1		1				

8	Task ManagementIntroduction,Task identification,Task planning ,organizing and execution,Closing the task	02
	TOTAL	16

CONTENTS: PRACTICAL -

List of Assignment: (Any Eight Assignment)

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

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

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

LEARNING RESOURCES: BOOKS:

Sr. No	Title of the book	Author	Publisher
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton (Canada – India Project)	ISTE New Delhi
11	Stress Management Through Yoga and Meditation		Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

INTERNET ASSISTANCE

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