

**MODEL CURRICULUM**

**FOR**

**POST SSC PROGRAMME**

**IN**

**DIPLOMA IN AUTOMOBILE ENGINEERING 2011**



**ALL INDIA COUNCIL FOR TECHNICAL EDUCATION**  
**7<sup>TH</sup> FLOOR, CHANDRALOK BUILDING, JANPATH**  
**NEW DELHI – 110 001**

## Foreword

It is with great pleasure and honour that I write a forward for the Model scheme of instruction and syllabi for the Post SSC Engineering Diploma programmes prepared by the All India Board of Technician Education with Prof. Ashok A. Ghatol as its Chairman and other members. All India Council for Technical Education has the onerous responsibility for uniform development and qualitative growth of the Technical Education system and preparation of syllabi to maintain uniform standards throughout the country. In pursuance to clause 10 (2) of the AICTE Act 1987 AICTE has the objective of bringing about uniformity in the curriculum of Engineering. In that direction, the efforts of the All India Board of Technician Education has been quite commendable and praiseworthy. A painstaking effort was made by the Chairman, members of the Board and various working groups composed of experts from leading institutions in framing of the Instruction and Syllabi. The Board was ably assisted by the official of the Academics Bureau in successfully organizing the meetings making available necessary documents and follow up action on the minutes of the meetings.

Chairman  
All India Council for  
Technical Education

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION											
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES											
COURSE NAME: ELECTRONICS/MECHANICAL/CIVIL/COMPUTER/ELECTRICAL/CHEMICAL ENGG. GROUPS											
COURSE CODE : EJ/EN/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/EE/EP/CH/CT/PS/CD/EDEI/CV/MH/FE/IU/MI											
DURATION OF COURSE : 6 SEMESTERS											
SEMESTER: FIRST						SCHEME : C					
BRANCH: Common for all branches						SEMESTER: I					
YEAR: I						SEMESTER: I					
SR.NO.	SUBJECT	PERIODS			EVALUATION SCHEME						Credits
		L	TU	PR	SESSIONSAL EXAM			ESE	PR #	TW @	
					TA	CT	Total				
1	Basic Physics	2	-	2	10	20	30	70	50	-	3
2	Basic Chemistry	2	-	2	10	20	30	70	50	-	3
3	Basic Mathematics	4	1	-	10	20	30	70	-	-	5
4	English	2	-	2	10	20	30	70	-	<u>25</u>	3
5	Engineering Graphics	2	-	4	-	-	-	-	-	<u>50</u>	4
6	Computer Fundamentals	1	-	4	-	-	-	-	50	<u>25</u>	3
7	Basic Workshop Practice (Group wise )	-	-	3	-	-	-	-	50	<u>25</u>	2
<b>Total</b>		<b>13</b>	<b>1</b>	<b>17</b>	<b>40</b>	<b>80</b>	<b>120</b>	<b>280</b>	<b>200</b>	<b>125</b>	<b>23</b>

STUDENT CONTACT HOURS PER WEEK: **31 HRS**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH**  
# - External Assessment      @ - Internal Assessment      ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, PR - Practical  
TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.  
**Total Marks : 725**

Minimum passing under any head is 40%, i.e. 40% passing for Sessional, ESE, Oral, and TW Separately.  
Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : ELECTRONICS/MECHANICAL/CIVIL/COMPUTER/ELECTRICAL/CHEMICAL ENGG. GROUPS	
Course code: EJ/EN/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/ CS/CR/CO/CM/IF/EE/EP/CH/CT/PS/CD/EDEI/ CV/MH/FE/IU/MI	Semester : <b>FIRST</b>
Duration : <b>6 SEMESTERS</b>	Maximum Marks :
Teaching Scheme <b>C</b>	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credit : Nil	
Aim :- Nil	
Objective :-	
Pre-Request :- Nil	
Contents:- Nil	
	Hrs/week
Text Books:- Nil	
Reference books :- Nil	
Suggested List of Laboratory Experiments :- Nil	
Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : All Branches of Diploma in Engineering/ Technology (Basic Physics)				
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/IF/EE/EP/CH/CT/PS/CD/ED/EI/CV/MH/FE/IU		Semester : First		
Duration : <b>6 SEMESTERS</b>		Maximum Marks :		
Teaching Scheme : C		Examination Scheme		
Theory : 13 hrs/week		Mid Semester Exam:	Marks	
Tutorial: 1 hrs/week		Assignment & Quiz:	Marks	
Practical : 17 hrs/week		End Semester Exam:	Marks	
Credit : Nil				
Aim :- Nil				
Objective :-				
S.No	Student will be able to:			
1.	<ul style="list-style-type: none"> <li>Measure given dimensions by using appropriate instruments accurately.</li> <li>Select proper measuring instrument on the basis of range, least count &amp; precision required for measurement.</li> <li>Select proper material for intended purpose by studying properties of materials.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Identify good &amp; bad conductors of heat.</li> <li>Analyze relation among pressure, volume and temperature of gas &amp; to interpret the results</li> <li>Identify the effect of interference between light waves.</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Identify properties of laser light and photo electric effect for engineering applications.</li> <li>Identify, analyze, discriminate and interpret logical sequence of field problems with the study of physics.</li> </ul>			
Pre-Request :- Nil				
Contents (Theory)			Hrs/week	
			Marks	
Unit -1 UNITS AND MEASUREMENTS	1.1	Need of Measurement in engineering and science, unit of a physical quantity, requirements of standard unit, systems of units-CGS,MKS and SI, classification of physical quantities-Fundamental and Derived with their units	03	06
	1.2	Accuracy, Precision of instruments, Errors in measurement, Estimation of errors-Absolute error, Relative error and percentage error, significant figures. (Simple Problems)		
	1.3	Basic Measuring instruments-Vernier Caliper, Micrometer screw gauge, inner & outer caliper thermometer, spherometer, ammeter, voltmeter with their least count, range, accuracy and precision.		
		Standard reference surfaces used in engineering measurements-		

	surface plate, angle plate, V- block, Engineer's square.		
Unit -2 GENERAL PROPERTIES OF MATTER	2.1 Elasticity : Deforming force, Restoring force, Elastic and plastic body, Stress and strain with their types, Hooke's law, Stress strain diagram, Young's modulus, Bulk modulus, Modulus of rigidity and relation between them( no derivation), (simple problems). (Simple problems) Stress strain diagrams of H.T. Steel, Cast iron, Aluminium and Concrete, Ultimate and breaking stress, Factor of safety.	03	06
	<b>2.2 Surface Tension:</b> Forces—cohesive and adhesive, , angle of contact, shape of liquid surface in a capillary tube, capillary action with examples, relation between surface tension , capillary rise and radius of capillary ( no derivation)( simple problem),effect of impurity and temperature on surface tension.	02	04
	2.3 Viscosity : Velocity gradient, Newton's law of viscosity, coefficient of viscosity ,streamline and turbulent flow, critical velocity, Reynold's number,( simple problems), Stokes law and terminal velocity( no derivation) ,buoyant (up thrust) force, effect of temperature & adulteration on viscosity of liquid.	02	04
Unit – 3 HEAT	3.1 Transmission of heat and expansion of solids Three modes of transmission of heat-conduction, convection and radiation, good and bad conductor of heat with examples, law of thermal conductivity, coefficient of thermal conductivity (simple problems), expansion of solids-linear, aerial and cubical and relation between them.	02	06
	3.2 Gas laws and specific heats of gases Boyle's law, Charle's law, Gay Lussac's law, absolute temperature, Kelvin scale of temperature, general gas equation( no derivation)(simple problems),molar or universal gas constant, universal gas equation, standard or normal temperature and pressure (N.T.P.), specific heat of gases, relation between two specific heat (simple problems), thermodynamic variables, first law of thermodynamics (statement & equation only), isothermal, isobaric, isochoric & adiabatic processes (difference among these processes and equations of state) (simple problems).	04	08
Unit – 4 LIGHT	4.1 Properties of light Reflection and, refraction, Snell's law, physical significance of refractive index (simple problems), Total internal reflection, dispersion, diffraction and polarization of light (only	03	06

	introduction) 4.2 Wave theory of light & Interference Newton's corpuscles theory of light, Huygen's wave theory, wave front, Types of wave front-spherical, cylindrical and plane Huygen's principle of propagation of wave front, Principle of superposition of waves, Interference of light, constructive and destructive interference, Young's experiment. Analytical treatment of interference, conditions for stationary interference pattern. 4.3 Laser Light amplification by stimulated emission of radiation, properties of laser, spontaneous and stimulated emission, population inversion, pumping methods, He-Ne laser-construction & working, recording and reconstructing of hologram by using He-Ne laser.	04	08
		04	08
Unit – 5 MODERN PHYSICS	<b>5.1 Photo electricity</b> Plank's hypothesis, properties of photons, photo electric effect, laws and characteristics of photoelectric effect, Einstein's photoelectric equation,(simple problems), construction and working of photoelectric cell, applications of photoelectric cell 5.2 X-rays Production of X-rays, types of X-ray spectra-continuous and characteristics, X-ray wavelength (simple problems), properties of X-rays, applications of X-rays-engineering, medicine and scientific research work.	03	08
		03	06
<b>Total</b>		<b>33</b>	<b>70</b>
<b>Practical :-</b>			
<b>S.No</b>	<b>Skills to be developed</b>		
1.	1) Intellectual skills- <ul style="list-style-type: none"> <li>▪ Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement.</li> <li>▪ Analyze properties of matter &amp; their use for the selection of material.</li> <li>▪ To verify the principles, laws, using given instruments under different conditions.</li> <li>▪ To read and interpret the graph.</li> <li>▪ To interpret the results from observations and calculations.</li> <li>▪ To use these results for parallel problems.</li> </ul>		
2.	2) Motor skills- <ul style="list-style-type: none"> <li>▪ Proper handling of instruments.</li> <li>▪ Measuring physical quantities accurately.</li> </ul>		

	<ul style="list-style-type: none"> <li>▪ To observe the phenomenon and to list the observations in proper tabular form.</li> <li>▪ To adopt proper procedure while performing the experiment.</li> <li>▪ To plot the graphs.</li> </ul>
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Text Books : Nil

Reference books :-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
V. Rajendran	Physics-I		Tata McGraw- Hill raw- Hill publication, New Delhi
Arthur Beiser	Applied physics		Tata McGraw- Hill raw- Hill publication, New Delhi
by R.K.Gaur and S.L.Gupta	Engineering Physics		Dhanpat Rai Publication, New Delhi.
Resnick and Halliday.	Physics		--

Suggested List of Laboratory Experiments :-

S.No	<b><u>Laboratory Experiments(Any ten experiments to be performed)</u></b>
1	1. Use of vernier calipers for the measurement of dimensions of given object.
2	2. Use of micrometer screw gauge for the measurement of dimensions of given object
3	3. Determine the Young's modulus of material of wire using Searle's apparatus.
4	4. To observe rise in water level through capillaries of different bores.
5	5. Determine coefficient of viscosity of given oil using Stoke's Method.
6	6. Verification of Boyle's law.
7	7. Measurement of unknown temperature using thermocouple.
8	8. Determine the coefficient of linear expansion of given material of rod using Pullinger's apparatus.
9	9. To observe the divergence of laser light with respect to distance.
10	10. Plot characteristics of photoelectric cell (Photoelectric current verses intensity of light and voltage applied).

Suggested List of Assignments/Tutorial :- Nil



Name of the Course : All Branches of Diploma in Engineering and Technology (Basic Chemistry).				
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE / ME/PG/PT/AE/ CE/CS/CR/ CO/CM/IF/EE/EP/ CH /CT/PS/CD/ ED/EI/CV/MH/FE/IU		Semester : First		
Duration : <b>6 SEMESTERS</b>		Maximum Marks :		
Teaching Scheme <b>C</b>		Examination Scheme		
Theory :	13 hrs/week	Mid Semester Exam:	Marks	
Tutorial:	1 hrs/week	Assignment & Quiz:	Marks	
Practical :	17 hrs/week	End Semester Exam:	Marks	
Credit : Nil				
Aim :- Nil				
Objective :-				
S.No	Student will be able to:			
1.	<ul style="list-style-type: none"> <li>To draw the atomic structure of different elements.</li> <li>To represent the formation of molecules schematically.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>To describe the mechanism of electrolysis.</li> <li>To identify the properties of metals &amp; alloys related to engineering applications.</li> </ul>			
3.	<ul style="list-style-type: none"> <li>To identify the properties of non metallic materials, related to engineering applications.</li> <li>To compare the effects of pollutants on environments &amp; to suggest preventive measures &amp; safety.</li> </ul>			
Pre-Requisite :- Nil				
Contents			Hrs/w eek	Marks
Unit -1	Atomic Structure Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars, & their distinction with suitable examples, Bohr’s Theory, Definition, Shape & Distinction between Orbits & Orbitals, Hund’s Rule, Filling Up of the Orbitals by Aufbau’s Principles (till Atomic no. 30), Pauli’s exclusion principle Valency – Definition, types (Electrovalency & Covalency), Distinction, Octet Rule, Duplet Rule, Formation of Electrovalent & Covalent Compounds e.g. NaCl, CaCl <sub>2</sub> , MgO, AlCl <sub>3</sub> , CO <sub>2</sub> , H <sub>2</sub> O, Cl <sub>2</sub> , NH <sub>3</sub> , C <sub>2</sub> H <sub>4</sub> , N <sub>2</sub> , C <sub>2</sub> H <sub>2</sub> .		05	12
Unit -2	Electrochemistry Atom, Ion, Definition Ionisation & Electrolytic Dissociation, Arrhenius Theory of Ionisation, Significance of the Terms Involved in Electrolysis. Such as Conductors, Insulators or Dielectrics, Electrolyte, Non Electrolyte, Electrolysis, Electrolytic Cell, Electrodes, Current Density, Temperature, Mechanism of Electrolysis – Primary & Secondary		06	14

	<p>Reactions at Cathode &amp; Anode, Electrochemical Series for Cations &amp; Anions, Electrolysis of <math>\text{CuSO}_4</math> Solution by using Cu Electrode &amp; Platinum Electrode, Electrolysis of NaOH solution &amp; fused NaCl, Faraday's first &amp; second law of Electrolysis &amp; Numericals, Electrochemical Cells &amp; Batteries, Definition, Types (Primary &amp; Secondary Cells), e.g. Construction, Working &amp; Applications of Dry Cell / Laclanche Cell &amp; Lead – Acid Storage Cell, Applications of Electrolysis such as Electroplating &amp; Electro refining, Electrometallurgy &amp; electrotyping Conductivity of Electrolyte – Ohms Law, Definition &amp; Units of Specific Conductivity, Equivalent Conductivity, specific resistance</p>		
Unit -3	<p>Metals &amp; Alloys Metals Occurrence of Metals, Definition Metallurgy, Mineral, Ore, Gangue, Flux &amp; Slag, Mechanical Properties, Processing of Ore, Stages of Extraction of Metals from its Ores in Detail i.e. Concentration, Reduction, refining. Physical Properties &amp; Applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W. Mks:10</p> <p>Alloys Definition of Alloy, Purposes of Making alloy Preparation Methods, Classification of Alloys such as Ferrous &amp; Non Ferrous, examples. Composition, Properties &amp; Applications of Alnico, Duralumin, Dutch Metal, German Silver / Nickel Silver, Gun Metal, Monel metal, Wood's Metal, Babbitt Metal. Mks: 08</p>	08	16
Unit -4	<p>Non Metallic Materials Plastics Definition of Plastic, Formation of Plastic by Addition &amp; Condensation Polymerisation by giving e.g. of Polyethylene &amp; Backelite plastic Respectively, Types of Plastic, Thermosoftening &amp; Thermosetting Plastic, with Definition, Distinction &amp; e.g., Compounding of Plastics – Resins, Fillers, Plasticizers, Acceleraters, Pigments, Engineering Applications of Plastic based on their Properties. Mks: 04</p> <p>Rubber Natural Rubber: Its Processing, Drawbacks of Natural Rubber, Vulcanisation of Rubber with Chemical Reaction. Synthetic Rubber: Definition, &amp; e.g., Distinction Between Natural &amp; Synthetic Rubber.</p>	04	10

	Mks: 04 Thermal Insulating Materials Definition, Characteristics & Applications of Glass Wool, Thermocole, Asbestos, Cork. Mks: 04		
Unit – 5	Environmental Effects (Awareness Level) Introduction, Definition, Causes of Pollution, Types of Pollution, Such as Air & Water Pollution. Mks: 04  Air Pollution Definition, Types of Air Pollutions their Sources & Effects, Such as Gases, Particulates, Deforestation, Radio Active Gases, Control of Air Pollution, Air Pollution Due to Internal Combustion Engine & Its Control Methods, Causes & Effects of Ozone Depletion & Green House Effects.  Mks: 08  Water Pollution Definition, Causes & Methods of Preventing Water Pollution, Types of Waste such as Domestic Waste, Industrial Waste, their Physical & Biological Characteristics, BOD, COD, Biomedical Waste & E – Waste, their Origin, Effects & Control Measures. Preventive Environmental Management (PEM) Activities. Mks: 08	09	18
	Total	32	70
Practical :-			
S.No			
1.	Intellectual Skills: 1. Analyze given solution 2. Interpret the results		
2.	Motor Skills : 1. Observe Chemical Reactions 2. Measure the quantities Accurately 3. Handle the apparatus carefully		
3.	List of Experiments:  01 – 07 Qualitative Analysis of Seven Solutions, Containing One Basic & One Acidic Radical Listed below		

	Basic Radicals:  Pb <sup>+2</sup> , Cu <sup>+2</sup> , Al <sup>+3</sup> , Fe <sup>+2</sup> , Fe <sup>+3</sup> , Cr <sup>+3</sup> , Zn <sup>+2</sup> , Ni <sup>+2</sup> , Ca <sup>+2</sup> , Ba <sup>+2</sup> , Mg <sup>+2</sup> , K <sup>+</sup> , NH <sub>4</sub> <sup>+</sup> .  Acidic Radicals:  Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup> , CO <sub>3</sub> <sup>-2</sup> , SO <sub>4</sub> <sup>-2</sup> , NO <sub>3</sub> <sup>-</sup> .		
06	To Determine E.C.E. of Cu by Using CuSO <sub>4</sub> Solution & Copper Electrode		
07	To Determine the % of Fe in the Given Ferrous Alloy by KMnO <sub>4</sub> Method.		
08	To Prepare a Chart Showing Application of Metals like Fe, Cu, Al, Cr, Ni, Sn, Pb, Co.		
09	To Prepare Phenol Formaldehyde Resin (Bakelite)		
10	To Determine Carbon Monoxide Content in Emission from Petrol Vehicle.		
11	To Determine Dissolved Oxygen in a Water Sample.		
<b>Text Books :- Nil</b>			
<b>Reference books :-</b>			
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>	<b>Name of the Publisher</b>
Jain & Jain	Engineering Chemistry		Dhanpat Rai and Sons
S. S. Dara	Engineering Chemistry		S. Chand Publication
B. K. Sharma	Industrial Chemistry		Goel Publication
S. S. Dara	Environmental Chemistry & Pollution Control		S. Chand Publication
<b>Suggested List of Laboratory Experiments :- Nil</b>			
<b>Suggested List of Assignments/Tutorial :- Nil</b>			

Name of the Course : All Branches of Diploma in Engineering and Technology (Basic Mathematics)			
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/ CE/CS/CR/CO/CM/IF/EE/EP/CH/CT/PS/CD/ED/EI/CV /MH/FE/IU		Semester : First	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	13 hrs/week	Mid Semester Exam:	Marks
Tutorial:	1 hrs/week	Assignment & Quiz:	Marks
Practical :	17 hrs/week	End Semester Exam:	Marks
Credit : Nil			
Aim :- Nil			
Objective :- This subject helps the students to develop logical thinking, which is useful in comprehending the principles of all other subjects. Analytical and systematic approach towards any problem is developed through learning of this subject. Mathematics being a versatile subject can be used at every stage of human life.			
Pre-Requisite :- Nil			
Contents (Name of Topics)			Hrs/week
Unit -1 Chapter No.	<b>ALGEBRA</b>	<b>01</b>	--
	1.1 REVISION 1.1.1 Laws of Indices 1.1.2 Formula of factorization and expansion ( $a^2-b^2$ ), $(a+b)^2$ etc.) 1.1.3 Laws of logarithm with definition of Natural and Common logarithm.		
	1.2 PARTIAL FRACTION 1.2.1 Definition of polynomial fraction proper & improper fractions and definition of partial fractions. 1.2.2 To Resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. 1.2.3 To resolve improper fraction into partial fraction.	<b>04</b>	07
	1.3 DETERMINANT AND MATRICES. Determinant ----- 4 Marks 1.3.1 Definition and expansion of determinants of order 2 and 3. 1.3.2 Cramer's rule to solve simultaneous equations in	<b>12</b>	15

	<p>2 and 3 unknowns.</p> <p>Matrices----- 11Marks</p> <p>1.3.3 Definition of a matrix of order <math>m \times n</math> and types of matrices.</p> <p>1.3.4 Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication.</p> <p>1.3.5 Transpose of a matrix.</p> <p>1.3.6 Minor, cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method.</p> <p>1.3.7 Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.</p>		
	<p>1.4 BINOMIAL THEOREM</p> <p>1.4.1 Definition of factorial notation, definition of permutation and combinations with formula.</p> <p>1.4.2 Binomial theorem for positive index.</p> <p>1.4.3 General term.</p> <p>1.4.4 Binomial theorem for negative index.</p> <p>1.4.5 Approximate value (only formula)</p>	04	03
Unit -2	TRIGONOMETRY.	02	03
	<p>2.1 REVISION</p> <p>2.1.1 Measurement of an angle (degree and radian). Relation between degree and radian.</p> <p>2.1.2 Trig ratios of <math>0^\circ</math>, <math>30^\circ</math>, <math>45^\circ</math> etc.</p> <p>2.1.3 Fundamental identities.</p>		
	<p>2.2 TRIGONOMETRIC RATIOS OF ALLIED, COMPOUND, MULTIPLE &amp; SUBMULTIPLE ANGLES (Questions based on numerical computations, which can also be done by calculators, need not be asked particularly for allied angles ).</p>	08	07
	<p>2.3 FACTORIZATION AND DEFACTORIZATION FORMULAE</p>	04	03
	<p>2.4 INVERSE TRIGONOMETRIC RATIOS</p> <p>2.4.1 Definition of inverse trigonometric, ratios, Principal values of inverse trigonometric ratios.</p> <p>2.4.2 Relation between inverse trigonometric ratios.</p>	02	03
	<p>2.5 PROPERTIES OF TRIANGLE</p> <p>2.5.1 Sine, Cosine, Projection and tangent rules (without proof)</p> <p>2.5.2 Simple problems.</p>	02	03
Unit -3	COORDINATE GEOMETRY	04	03
	3.1 POINT AND DISTANCES		

	3.1.1 Distance formula, Section formula, midpoint, centroid of triangle. 3.1.2 Area of triangle and condition of collinearity.		
	3.2 STRAIGHT LINE 3.2.1 Slope and intercept of straight line. 3.2.2 Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. 3.2.3 Angle between two straight lines condition of parallel and perpendicular lines. 3.2.4 Intersection of two lines. 3.2.5 Length of perpendicular from a point on the line and perpendicular distance between parallel lines.	<b>06</b>	<b>09</b>
	3.3 CIRCLE 3.3.1 Equation of circle in standard form, centre – radius form, diameter form, two – intercept form. 3.3.2 General equation of circle, its centre and radius.	<b>06</b>	<b>06</b>
Unit-4	VECTORS		
	4.1 Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) 4.2 Dot (Scalar) product with properties. 4.3 Vector (Cross) product with properties.	<b>04</b>	04
	4.4 Applications 4.4.1 Workdone and moment of force about a point & line	<b>04</b>	04
TOTAL		64	70

Text Books:- Nil

Reference books :-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. P. Deshpande	Mathematics for polytechnic		Pune Vidyarthi Griha
S. L. Loney	Trigonometry		S. Chand Publication
H. S. Hall & S. R. Knight	Higher Algebra		Metric edition, Book Palace, New Delhi
Frc.G. Valles	College Algebra		Charotar Publication
Ayres	Matrices		Schuum series, McGraw hill
B. S. Grewal	Higher Engineering Mathematics		Khanna publications New Dehli
S. S. Sastry	Engineering Mathematics		Prentice Hall of India

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-	
S.No	Topic on which tutorial is to be conducted
1	Partial fractions
2	Determinants
3	Matrices
4	Solution of simultaneous equation by Matrix inversion method.
5	Binomial theorem
6	Trigonometry- fundamental identities-revision only
7	Trigonometry-allied, compound and multiple angles
8	Trigonometry-factorization and defactorization formulae.
9	Trigonometry-inverse trigonometric ratios.
10	Point and distances
11	Straight line
12	Circle.
13	Vectors
14	Vectors' applications

Note:

Maximum 5 questions are to be given in each tutorial, in which two 2 marks questions (based on basic concept and formulae with one/two step calculations) and three 4 marks questions are expected.



Name of the Course : All Branches of Diploma in Engineering and Technology (English).			
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/ CE/CS/CR/CO/CM/IF/ EE/EP/CH/CT/PS/CD/ED/EI/CV/MH/FE/I		Semester : First	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	13 hrs/week	Mid Semester Exam:	Marks
Tutorial:	1 hrs/week	Assignment & Quiz:	Marks
Practical :	17 hrs/week	End Semester Exam:	Marks
Credit : Nil			
Aim :- Nil			
Objective :-			
<ul style="list-style-type: none"> <li>• Comprehend the given passage</li> <li>• Answer correctly the questions on seen and unseen passages</li> <li>• Increase the vocabulary</li> <li>• Apply rules of grammar for correct writing</li> </ul>			
Pre-Requisite :- Nil			
Contents			Hrs/week
Unit -1	PART I: TEXT <ul style="list-style-type: none"> <li>• Vocabulary - Understanding meaning of new words from text</li> <li>• Comprehension – Responding to the questions from text</li> <li>• Identifying parts of speech</li> </ul>		16 30
Unit -2	PART II -Application of grammar <ul style="list-style-type: none"> <li>• Verbs</li> <li>• Tenses</li> </ul> Do as directed (active /passive, Direct/indirect, affirmative/negative/assertive, question tag, remove too, use of article, preposition ,conjunctions, interjections, punctuation)		10 20
Unit -3	PART III - Paragraph writing <ul style="list-style-type: none"> <li>• Definition – Types of paragraphs</li> <li>• How to write a paragraph</li> </ul>		02 10
Unit -4	PART IV - Vocabulary building <ul style="list-style-type: none"> <li>• Word formation</li> <li>• Technical jargon</li> <li>• Use of synonyms /antonyms/Homonyms/paronyms</li> <li>• One word substitute</li> </ul>		04 10
Total			32 70
Text will consist of 10 articles/Lessons			

The term work will consist of 6 assignments:  
 The assignments should be written in A4 size note books (100 pages ruled)

Practical :-

S.No	Skills to be developed for practical:
1.	Intellectual Skills: 1 Skills of speaking in correct English. 2 Searching information. 3 Reporting skills.
2.	Motor Skills: 1 Use of appropriate body language. 2 Use of mouth organs
3.	List of Assignments:  1 Building of Vocabulary -- (3 Hours) (2 assignments) a) 25 words for each assignment from the glossary given in the text book at the end of each chapter  b) Technical Jargons -- (2 Hours) (1 assignment) Identify 10 technical words from the respective branches. Resource -- (Encyclopedia/Subject Books)  2 Grammar (4 Hours) 2 assignments. a) Insert correct parts of speech in the sentences given by the teachers. (16 sentences--Two each, from the different parts of speech) b) Punctuate the sentences given by the teachers. (10 sentences)  3 Conversational skills: Role plays (8 hours) a) Students are going to perform the role on any 6 situations, by the teacher. b) Dialogue writing for the given situations. (2 assignments)  4 Write Paragraphs on given topics (6 hours) (2 assignments) a) Four types of paragraphs to be written in two assignments covering two types in one assignment.  5 News paper report writing (4hours) ( 2 assignments) a) Write any two events from the news paper as it is. b) Write any two events on the situations given by the teacher.  6 Errors in English (4 hours) ( 2 assignments) a) Find out the errors and rewrite the sentences given by the teacher. (20 sentences)

Text Books :- Nil

Reference books :- Nil			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
David Green	Contemporary English grammar, structures and composition		Macmillan
R. C. Jain	English grammar and composition		Macmillan
Rodgers	Thesaurus		Oriental Longman
Oxford	Dictionary		Oxford University
Longman	Dictionary		Oriental Longman
Z. N. Patil et el	English for practical Purposes		Macmillan
Editor – Mukti Sanyal	English at Workplace		Macmillan
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : All Branches of Diploma in Engineering and Technology (Engineering Graphics)	
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE /ME/PG/PT/AE/ CE/CS/CR/ CO/CM/IF/EE/EP/ CH/CT/PS/CD/ED/EI/CV/MH/FE/IU	Semester : First
Duration : <b>6 SEMESTERS</b>	Maximum Marks :
Teaching Scheme <b>C</b>	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credit : Nil	
Aim :- Nil	
Objective :-	
S.No	The student should be able to: -
1.	<ul style="list-style-type: none"> <li>Draw different engineering curves and know their applications.</li> </ul>
2.	<ul style="list-style-type: none"> <li>Draw orthographic projections of different objects.</li> </ul>
3.	<ul style="list-style-type: none"> <li>Visualize three dimensional objects and draw Isometric Projections.</li> </ul>
4.	<ul style="list-style-type: none"> <li>Use the techniques and able to interpret the drawing in Engineering field.</li> </ul>
5.	<ul style="list-style-type: none"> <li>Use computer aided drafting packages.</li> </ul>
Pre-Requisite :- Nil	
<b>Contents</b>	
Unit -1	Hrs/week
Drawing Instruments and their uses 1.1 Letters and numbers (single stroke vertical) 1.2 Convention of lines and their applications. 1.3 Scale (reduced, enlarged & full size) plain scale and diagonal scale. 1.4 Sheet layout. 1.5 Introduction to CAD (Basic draw and modify Command). 1.6 Geometrical constructions.	05
Unit -2	Hrs/week
Engineering curves & Loci of Points.  1.2 To draw an ellipse by 2.1.1 Directrix and focus method 2.1.2 Arcs of circle method. 2.1.3 Concentric circles method. 2.2 To draw a parabola by: 2.2.1 Directrix and focus method 2.2.2 Rectangle method	09

	<p>2.3 To draw a hyperbola by:</p> <p>2.3.1 Directrix and focus method</p> <p>2.3.2 passing through given points with reference to asymptotes</p> <p>2.3.3 Transverse Axis and focus method.</p> <p>2.4 To draw involutes of circle &amp; polygon (up to hexagon)</p> <p>2.5 To draw a cycloid, epicycloid, hypocycloid</p> <p>2.6 To draw Helix &amp; spiral.</p> <p>2.7 Loci of Points:</p> <p>2.7.1 Loci of points with given conditions and examples related to simple mechanisms.</p>	
Unit – 3	<p>Orthographic projections</p> <p>3.1 Introduction to Orthographic projections.</p> <p>3.2 Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only)</p> <p>3.3 Dimensioning technique as per SP-46</p>	06
Unit – 4	<p>Isometric projection</p> <p>4.1 Isometric scale</p> <p>4.2 Conversion of orthographic views into isometric View/projection(Simple objects)</p> <p>Projection of Straight Lines and Planes. (First Angle Projection Method only)</p>	05
Unit – 5	<p>5.1 Lines inclined to one reference plane only and limited to both ends in one quadrant.</p> <p>5.2 Projection of simple planes of circular, square, rectangular, rhombus, pentagonal, and hexagonal, inclined to one reference plane and perpendicular to the other.</p>	07
	Total	32

Practical :-

List of Practical	Skills to be developed	
	Intellectual skills	Motor Skills
<p>1.Introduction to graphics - (1 Sheet)</p> <p>Draw the following using CAD</p> <p>1.1 Rectangle with given dimensions</p> <p>1.2 Circle with given</p>	<p>1. To develop ability to solve problems on geometrical constructions.</p>	<p>1. To develop ability to draw the geometrical constructions by computer.</p>

<p>dimensions and hatch</p> <p>1.3 Pentagon with line command</p> <p>1.4 Hexagon with given dimensions</p> <p>1.5 Draw one figure containing circle tangent, arc and dimensioning.</p>		
<p>2. Engineering curves &amp; Loci of points - (1 Sheet)</p> <p>i) Three different curves are to be draw using any one method.</p> <p>ii) Draw locus of point on any one mechanism</p>	<p>1) To develop ability to differentiate between conic and curves.</p> <p>2) To develop ability to identify the type of locus from the nature of surface and the position of generating circle.</p> <p>3) Able to interpret the given mechanisms and locus of points.</p>	<p>1. To develop ability to draw different types of curves.</p>
<p>3. Orthographic projections - (Total 2 Sheets)</p> <p>Two objects by first angle projection method - (1 Sheet)</p> <p>Redraw the same sheet using CAD - (1 Sheet)</p>	<p>1) Develop ability to interpret first angle projection method.</p> <p>2) To interpret and able to solve problem on orthographic projection of given object.</p>	<p>1. Develop ability to draw orthographic projections by first angle projection method</p>
<p>4. Isometric projection - (Total 2 sheets)</p> <p>Two objects one by true scale and another by isometric scale. (simple objects) - (1 sheet)</p> <p>Redraw the same sheet using CAD - (1 sheet)</p>	<p>1) Develop ability to differentiate between isometric view and isometric projections.</p> <p>2) To differentiate between Isometric scale and true scale.</p>	<p>1. Develop ability to draw isometric views and isometric projections from given orthographic views of an object using computer.</p>
<p>5. Projections of line and planes. - (1 Sheet)</p> <p>Two problems on Projection of lines and two problems on Projection of Planes.</p>	<p>1) To develop ability to differentiate between true length and apparent length.</p> <p>2) To interpret the position lines and plane with reference plane.</p>	<p>1) Able to draw Orthographic Projections of line and planes.</p>
<p>List of Practice Oriented Projects: -</p> <p>1) To draw layout of visited Industry, College using CAD</p>		

2) To draw orthographic projection of given machine element using CAD.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N. D. Bhatt	Engineering Drawing		Charotar Publishing House
K. Venugopal	Engineering Drawing and Graphics+ AutoCAD		New Age Publication
R. K. Dhawan	Engineering Drawing		S. Chand Co.
P. J. Shah	Engineering Drawing		---
K. R. Mohan	Engineering Graphics		Dhanpat Rai and Publication Co.

A) Video Cassettes / CD's

1. CD's prepared by MSBTE for Engineering Drawing

B) IS Code

SP – 46. Engineering Drawing practice for schools and colleges.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil :- Nil

Name of the Course : All Branches of Diploma in Engineering and Technology (Computer Fundamentals).		
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/ EE/EP/CH/ CT /PS/ CD/ED/EI/CV/MH/FE/IU		Semester : First
Duration : <b>6 SEMESTERS</b>		Maximum Marks :
Teaching Scheme <b>C</b>		Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam:	Marks
Tutorial: 1 hrs/week	Assignment & Quiz:	Marks
Practical : 17 hrs/week	End Semester Exam:	Marks
Credit : Nil		
Aim :- Nil		
Objective :-		
S.No	Students will be able to:	
1.	<ul style="list-style-type: none"> <li>Understand a computer system that has hardware and software components, which controls and makes them useful.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Understand the operating system as the interface to the computer system.</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Use the basic functions of an operating system.</li> </ul>	
4.	<ul style="list-style-type: none"> <li>Set the parameter required for effective use of hardware combined with and application software's</li> </ul>	
5.	<ul style="list-style-type: none"> <li>Compare major OS like Linux and MS-Windows</li> </ul>	
6.	<ul style="list-style-type: none"> <li>Use file mangers, word processors, spreadsheets, presentation software's and Internet</li> </ul>	
7.	<ul style="list-style-type: none"> <li>Have hands on experience on operating system and different application software</li> </ul>	
8.	<ul style="list-style-type: none"> <li>Use the Internet to send mail and surf the World Wide Web.</li> </ul>	
Pre-Requisite :- Nil		
Contents		Hrs/week
Unit -1	<b>Fundamentals Of Computer</b> Introduction Components of PC The system Unit Front part of system Unit Back part of system Unit CPU Memory of computer Monitor Mouse, Keyboard, Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers	3



Unit -2	<b>Introduction To Windows 2000/Xp</b> Working with window Desktop Components of window Menu bar option Starting window Getting familiar with desktop Moving from one window to another Reverting windows to its previous size Opening task bar buttons into a windows Creating shortcut of program Quitting windows	3
Unit – 3	<b>GUI Based Editing, Spreadsheets, Tables &amp; Presentation</b> Application Using MS Office 2000 & Open Office.Org Menus Opening of menus, Toolbars: standard toolbars, formatting toolbars & closing of menus Quitting Document, Editing & designing your document Spreadsheets Working & Manipulating data with Excel Changing the layout Working with simple graphs & Presentation Working With PowerPoint and Presentation	3
Unit – 4	Introduction To Internet What is Internet Equipment Required for Internet connection Sending &receiving Emails Browsing the WWW Creating own Email Account Internet chatting	2
Unit – 5	Usage of Computer System in various Domains Computer application in Offices, books publication, data analysis ,accounting , investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.	2
Unit - 6	<b>Information technology for benefits of community</b> Impact of computer on society Social responsibilities Applications of IT Impact of IT	3

	Ethics and information technology Future with information technology	
	<b>Total Hours</b>	<b>16</b>
<b>Practical's</b>		
<b>Sr. No</b>	<b>List of Practical's</b>	
1.	Working with Windows 2000 desktop ,start icon, taskbar, Recycle Bin, My Computer icon ,The Recycle Bin and deleted files Creating shortcuts on the desktop	
2.	The Windows 2000 accessories WordPad – editing an existing document Use of Paint – drawing tools The Calculator, Clock	
3.	The Windows Explorer window, concept of drives, folders and files? Folder selection techniques, Switching drives, Folder creation Moving or copying files, Renaming, Deleting files ,and folders	
4.	Printing Installing a printer driver Setting up a printer Default and installed printers Controlling print queues Viewing installed fonts	
	The clipboard and 'drag and drop' Basic clipboard concepts Linking vs. embedding	
5.	Moving through a Word document menu bar and drop down menus toolbars	
6.	Entering text into a Word 2000 document, selection techniques Deleting text	
7.	Font formatting keyboard shortcuts	
8.	* Paragraph formatting Bullets and numbering	
9.	* Page formatting What is page formatting? Page margins Page size and orientation Page breaks, Headers and footers	
10.	Introducing tables and columns	
11.	Printing within Word 2000 Print setup Printing options Print preview	
12.	* Development of application using mail merge Mail merging addresses for envelopes Printing an addressed envelope and letter	
13.	Creating and using macros in a document	
14.	* Creating and opening workbooks Entering data	

15.	<p>Navigating in the worksheet</p> <p>Selecting items within Excel 2000</p> <p>Inserting and deleting cells, rows and column</p> <p>Moving between worksheets, saving worksheet, workbook</p>
16.	<p>Formatting and customizing data</p>
17.	<p>Formulas, functions and named ranges</p>
18.	<p>Creating, manipulating &amp; changing the chart type</p>
19.	<p>Printing, Page setup, Margins</p> <p>Sheet printing options, Printing a worksheet</p>
20.	<p>* Preparing presentations with Microsoft Power Point.</p> <p>Slides and presentations, Opening an existing presentation , Saving a presentation</p>
21.	<p>Using the AutoContent wizard ,Starting the AutoContent wizard</p> <p>Selecting a presentation type within the AutoContent wizard</p> <p>Presentation type</p> <p>Presentation titles, footers and slide number</p>
22.	<p>* Creating a simple text slide</p> <p>Selecting a slide layout</p> <p>Manipulating slide information within normal and outline view</p> <p>Formatting and proofing text</p> <p>Pictures and backgrounds</p> <p>drawing toolbar</p> <p>AutoShapes</p> <p>Using clipart</p> <p>Selecting objects</p> <p>Grouping and un-grouping objects</p> <p>The format painter</p>
23.	<p>* Creating and running a slide show</p> <p>Navigating through a slide show</p> <p>Slide show transitions</p> <p>Slide show timings</p> <p>Animation effects</p>
24.	<p>* Microsoft Internet Explorer 5 &amp; the Internet</p> <p>Connecting to the Internet</p> <p>The Internet Explorer program window</p> <p>The on-line web tutorial Using hyper links</p> <p>Responding to an email link on a web page</p>
25.	<p>Searching the Internet</p> <p>Searching the web via Microsoft Internet Explorer</p> <p>Searching the Internet using Web Crawler</p> <p>Searching the Internet using Yahoo</p> <p>Commonly used search engines</p>

26.	Favorites, security & customizing Explorer Organizing Favorite web sites Customizing options – general, security, contents, connection, programs, advanced
27.	* Using the Address Book Adding a new contact Creating a mailing group Addressing a message Finding an e-mail address
28.	Using electronic mail Starting Outlook Express Using the Outlook Express window Changing the window layout Reading file attachment Taking action on message-deleting, forwarding, replying
29.	* Email & newsgroups Creating and sending emails Attached files Receiving emails Locating and subscribing to newsgroups Posting a message to a newsgroup
30.	Chatting on internet Understating Microsoft chat environment Chat toolbar

**Note : Term work will include printout of Exercises of practicals marked with asterisks ( \* )**

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Vikas Gupta	Comdex Computer Course Kit	First	Dreamtech
Henry Lucas	Information Technology for management	7 <sup>th</sup>	Tata McGraw Hills
B.Ram	Computer Fundamentals Architecture and Organization	Revised 3 <sup>rd</sup>	New Age International Publisher

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Civil Engineering Group (Basic Workshop Practice (Civil))		
Course code: CE/CT/CR	Semester : First	
Duration : <b>6 SEMESTERS</b>	Maximum Marks :	
Teaching Scheme <b>C</b>	Examination Scheme	
Theory : 13 hrs/week	Mid Semester Exam:	Marks
Tutorial: 1 hrs/week	Assignment & Quiz:	Marks
Practical : 17 hrs/week	End Semester Exam:	Marks
Credit : Nil		
Aim :- Nil		
Objective :-		
S.No	At the end of this course, the student will able to	
1.	<ul style="list-style-type: none"> <li>• Know basic workshop processes.</li> <li>• Read and interpret job drawings.</li> <li>• Identify, select and use various marking, measuring, and holding, striking and cutting tools &amp; equipments wood working and sheet metal shops.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>• Operate, control different machines and equipments.</li> <li>• Select proper welding rods and fluxes.</li> <li>• Inspect the job for specified dimensions</li> </ul>	
3.	<ul style="list-style-type: none"> <li>• Produce jobs as per specified dimensions.</li> <li>• Adopt safety practices while working on various machines.</li> </ul>	
Pre-Requisite :- Nil		
	Contents	Hrs/week
	Details of Theory Contents	
Unit -1	<b>CARPENTRY SHOP</b> <ol style="list-style-type: none"> <li>1. Introduction.</li> <li>2. Various types of woods.</li> <li>3. Different types of tools, machines and accessories.</li> </ol>	03
Unit -2	<b>WELDING SHOP</b> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. types of welding, ARC welding, Gas welding, Gas Cutting.</li> <li>3. welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece.</li> <li>4. different types of flame.</li> <li>5. Elementary symbolic representation,</li> <li>6. Safety precautions in welding safety equipments and its use in welding processes.</li> </ol>	04
Unit - 3	<b>FITTING SHOP</b> <ol style="list-style-type: none"> <li>1. Introduction</li> </ol>	04

	<ol style="list-style-type: none"> <li>2. Various marking, measuring, cutting, holding and striking tools.</li> <li>3. Different fitting operation like chipping, filing, right angle, marking, drilling, tapping etc.</li> <li>4. Working Principle of Drilling machine, Tapping dies its use.</li> <li>5. Safety precautions and safety equipments.</li> </ol>	
Unit – 4	<b>PLUMBING SHOP</b> <ol style="list-style-type: none"> <li>1. Introduction.</li> <li>2. Various marking, measuring, cutting, holding and striking tools.</li> <li>3. Different G.I. pipes, PVC pipes, flexible pipes used in practice.</li> <li>4. G. I. pipes and PVC pipes fittings and accessories, Adhesive solvents-chemical action, Piping layout.</li> </ol>	03
Unit - 5	<b>SHEET METAL SHOP</b> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Various types of tools, equipments and accessories.</li> <li>3. Different types of operations in sheet metal shop.</li> <li>4. Soldering and riveting.</li> <li>5. Safety precautions.</li> </ol>	02
	<b>Total</b>	<b>16</b>
<b>Skill to be developed:</b>		
<b>S.No.</b>		
	<b>Intellectual Skills:</b> <ol style="list-style-type: none"> <li>1. Ability to read job drawing</li> <li>2. Ability to identify and select proper material, tools, equipments and machine.</li> <li>3. Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.</li> </ol>	
	<b>Motor Skills:</b> <ol style="list-style-type: none"> <li>1. Ability to set tools, work piece, and machines for desired operations.</li> <li>2. Ability to complete job as per job drawing in allotted time.</li> <li>3. Ability to use safety equipment and follow safety procedures during operations.</li> <li>4. Ability to inspect the job for confirming desired dimensions and shape.</li> <li>5. Ability to acquire hands-on experience</li> </ol>	
<p>Notes: 1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.</p> <p>2] The workshop diary shall be maintained by each student duly signed by instructor of respective shop</p>		
<b>Text Books:</b>		
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>
		<b>Name of the Publisher</b>

S.K. Hajara Chaudhary	Workshop Technology		Media Promoters and Publishers, New Delhi
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and sons, New Delhi
R K Jain	Production Technology		Khanna Publishers, New Delhi
H.S.Bawa	Workshop Technology		Tata McGraw Hill Publishers, New Delhi
Kent's	Mechanical Engineering Hand book		John Wiley and Sons, New York
Electronics Trade & technology			Development Corporation.(A Govt. of India undertaking) Akbar Hotel Annex, Chanakyapuri, New Delhi- 110 021

• **Video Cassettes/ CDS**

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

Reference books :- Nil

**Suggested List of Laboratory Experiments :-**

S.No	Details Of Practical Contents
1	<p>WOOD WORKING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different wood working tools / machines.</li> <li>• Demonstration of different wood working processes, like planing, marking, chiseling, grooving, turning of wood etc.</li> <li>• One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.</li> </ul>
2	<p>WELDING SHOP :</p> <ul style="list-style-type: none"> <li>• Demonstration of different welding tools / machines.</li> <li>• Demonstration on Arc Welding, Gas Welding, gas cutting and rebuilding of broken parts with welding.</li> <li>• One simple job involving butt and lap joint.</li> </ul>
3	<p>FITTING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different fitting tools and drilling machines and power tools</li> <li>• Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc.</li> <li>• One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.</li> </ul>
4	<p>PLUMBING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different plumbing tools</li> <li>• Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings.</li> </ul>

	<ul style="list-style-type: none"> <li>• One job on simple pipe joint with nipple coupling for standard pipe. Pipe threading using standard die sets.</li> </ul>
5	<p>SHEET METAL SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different sheet metal tools / machines.</li> <li>• Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing , soldering and riveting.</li> <li>• One simple job involving sheet metal operations and soldering and riveting.</li> </ul>
Suggested List of Assignments/Tutorial :- Nil	



Name of the Course : Electrical Engineering/ Electrical Power System (Basic Workshop Practice (Electrical))		
Course code: EE/EP		Semester : First
Duration : <b>6 SEMESTERS</b>		Maximum Marks :
Teaching Scheme <b>C</b>		Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam:	Marks
Tutorial: 1 hrs/week	Assignment & Quiz:	Marks
Practical : 17 hrs/week	End Semester Exam:	Marks
Credit : Nil		
Aim :- Nil		
Objective :-		
S.No	The student will be able to	
1.	<ul style="list-style-type: none"> <li>Use the knowledge of sheet metal working and welding for preparing panels, switch boxes etc.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Use various drills for electrical wiring and installation</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Make joints for various types of wirings such as casing capping, Batten wiring and mounting of accessories</li> </ul>	
Pre-Requisite :- Nil		
Contents		Hrs/week
Unit -1	<b>WELDING SHOP :</b> 1. Introduction 2. types of welding, ARC welding, Gas welding, Gas Cutting. 3. welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece. 4. Different types of flame. 5. Elementary symbolic representation, 6. Safety precautions in welding safety equipments and its use in welding processes.	
Unit -2	<b>SHEET METAL SHOP.</b> 1. Introduction 2. Various types of tools, equipments and accessories. 3. Different types of operations in sheet metal shop. 4. Soldering and riveting. 5. Safety precautions.	
Unit - 3	<b>TURNING SHOP</b> 1. Introduction 2. Various marking, measuring, cutting, holding and striking tools. 3. Working Principle of Drilling machine, Tapping dies its use.	

	4. Drilling and Tapping 5. Turning: Plain, taper 6. Threading and Knurling 7. Safety precautions and safety equipments.	
Unit – 4	<b>PLUMBING SHOP</b> 1. Introduction. 2. Various marking, measuring, cutting, holding and striking tools. 3. Different types of PVC pipes, flexible pipes used in practice. 4. PVC pipes fittings and accessories, Adhesive solvents- chemical action, 5. Piping layout.	
		Total
Practical:	Skills to be developed	
	1. Intellectual Skills: a) Ability to read job drawings. b) Ability to identify and select proper material, tools and equipments and machines. c) Ability to select proper parameters ( like cutting speed, feed, depth cut use of lubricants ) in machine.	
	2. Motor Skills : a) Ability to set tools, work piece, and machines for desired operations. b) Ability to complete job as per job drawing in allotted time. c) Ability to use safety equipment and follow safety procedures during operations. d) Ability to inspect the job for confirming desired dimensions and shape. e) Ability to acquire hands-on experience.	
Sr. No	<b>DETAILS OF PRACTICAL CONTENTS</b>	
01	<b>WELDING SHOP</b> <ul style="list-style-type: none"> <li>• Any one composite job from involving butt joint lap joint welding process, from the following like Grill, door, window frame, Corner flower stand chair , table frame (square pipe 25 mm) cooler frame (folding type), Kitchan Trolley, Centering Plate, supporting frames</li> </ul> Note:1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work . 3] Job allotted should comprise of 6-8 hours of actual working operations. 4] Student shall calculate the cost of material and labor required for their job from the drawing.	

02	<p><b>PLUMBING SHOP</b></p> <ul style="list-style-type: none"> <li>• Demonstration of PVC pipe joint with various fittings.</li> <li>• Exercise for students on preparing actual pipeline layout for PVC pipe. Preparing actual drawing and bill of material.</li> </ul>
03	<p><b>SHEET METAL SHOP</b></p> <ul style="list-style-type: none"> <li>• One composite job of Water-draining Channel, display boards, Panel Board, Switch Box, Glass Paneling items etc.</li> </ul> <p>Note:1]One job of standard size(Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 4-6 hours of actual working ions. 4] Student shall calculate the cost of material and labor cost required for their job from the drawing.</p>
04	<p><b>TURNING SHOP</b></p> <p>Note:1] One job related to Plane and Taper turning, threading and knurling 2] One job related to Drilling and tapping 3] Batch size should be selected depending on volume of work. 4] Job allotted should comprise of 6-8 hours of actual working 5] Student shall calculate the cost of material and labor cost for their job from the drawing.</p>
05	<p>Demonstration of power tools and practice of utility items.</p> <ul style="list-style-type: none"> <li>• Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories.</li> <li>• Tools for Cutting and drilling,</li> </ul>

Text Books:- Nil

Reference books :-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.K. Hajara Chaudhary	Workshop Technology		Media Promotors and Publishers,New Delhi
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and Sons, New Delhi
R K Jain	Production Technology		Khanna Publishers, New Delhi
H.S.Bawa	Workshop Technology		Tata McGraw Hill Publishers,New Delhi
-	Kent's Mechanical Engineering Hand book		John Wiley and Sons, New York

Video Cassettes / CDS

- Learning Materials Transparencies, CBT Packages developed by NITTER Bhopal.

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering (Basic Workshop Practice (Mechanical & Chemical Group))	
Course code: ME/AE/PG/PT/CH/PS	Semester : First
Duration : <b>6 SEMESTERS</b>	Maximum Marks :
Teaching Scheme <b>C</b>	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credit : Nil	
Rationale: Mechanical and Chemical diploma technician is expected to know basic workshop practice like Wood working, Sheet metal. The students are required to identify, operate and control various machines. The students are required to select and use various tools and equipments related to Wood working and sheet metal processes.	
Aim :- Nil	
Objective :-	
S.No	The student will able to
1.	<ul style="list-style-type: none"> <li>• Know basic workshop processes.</li> <li>• Read and interpret job drawing.</li> <li>• Identify, select and use various marking, measuring, holding, striking and cutting tools &amp; equipments.</li> </ul>
2.	<ul style="list-style-type: none"> <li>• Operate, control different machines and equipments.</li> <li>• Inspect the job for specified dimensions</li> </ul>
3.	<ul style="list-style-type: none"> <li>• Produce jobs as per specified dimensions.</li> <li>• Adopt safety practices while working on various machines</li> </ul>
Pre-Requisite :- Nil	
Contents (Details Of Theory Contents)	
Unit -1	<b>CARPENTRY SHOP</b> 1. Introduction. 2. Various types of woods. 3. Different types of tools, machines and accessories.
Unit -2	<b>WELDING SHOP :</b> 1. Introduction 2. types of welding, ARC welding, Gas welding, Gas Cutting. 3. welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece. 4. different types of flame. 5. Elementary symbolic representation,
	Hrs/week

	6. Safety precautions in welding safety equipments and its use in welding processes.	
Unit – 3	FITTING SHOP: 1. Introduction 2. Various marking, measuring, cutting, holding and striking tools. 3. Different fitting operation like chipping, filing, right angle, marking, drilling, tapping etc. 4. Working Principle of Drilling machine, Tapping dies its use. 5. Safety precautions and safety equipments.	
Unit – 4	PLUMBING SHOP: 1. Introduction. 2. Various marking, measuring, cutting, holding and striking tools. 3. Different G.I. pipes, PVC pipes, flexible pipes used in practice. 4. G. I. pipes and PVC pipes fittings and accessories, Adhesive solvents-chemical action, Piping layout.	
Unit – 5	SHEET METAL SHOP. 1. Introduction 2. Various types of tools, equipments and accessories. 3. Different types of operations in sheet metal shop. 4. Soldering and riveting. 5. Safety precautions.	
	Total	
Skill to be developed:		
	Intellectual Skills:  1. Ability to read job drawing  2. Ability to identify and select proper material, tools, equipments and machine.  3. Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.	
	Motor Skills:  1. Ability to set tools, work piece, and machines for desired operations.  2. Ability to complete job as per job drawing in allotted time.  3. Ability to use safety equipment and follow safety procedures during operations.  4. Ability to inspect the job for confirming desired dimensions and shape.	

5. Ability to acquire hands-on experience.

Notes: 1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.  
2] The workshop diary shall be maintained by each student duly signed by instructor of respective shop

Sr.No.	Details Of Practical Contents
01	<p>WOOD WORKING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different wood working tools / machines.</li> <li>• Demonstration of different wood working processes, like planing, marking, chiseling, grooving, turning of wood etc.</li> <li>• One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.</li> </ul>
02	<p>WELDING SHOP :</p> <ul style="list-style-type: none"> <li>• Demonstration of different welding tools / machines.</li> <li>• Demonstration on Arc Welding, Gas Welding, gas cutting and rebuilding of broken parts with welding.</li> <li>• One simple job involving butt and lap joint.</li> </ul>
03	<p>FITTING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different fitting tools and drilling machines and power tools.</li> <li>• Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc.</li> <li>• One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.</li> </ul>
04	<p>PLUMBING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different plumbing tools</li> <li>• Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings.</li> <li>• One job on simple pipe joint with nipple coupling for standard pipe. Pipe threading using standard die sets.</li> </ul>
05	<p>SHEET METAL SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different sheet metal tools / machines.</li> <li>• Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering and riveting.</li> <li>• One simple job involving sheet metal operations and soldering and riveting.</li> </ul>

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.K. Hajara Chaudhary-	Workshop Technology		-Media Promoters and Publishers, New Delhi
B.S. Raghuwanshi-	Workshop Technology-		Dhanpat Rai and sons, New Delhi

R K Jain-	Production Technology-		Khanna Publishers, New Delhi
H.S.Bawa- -	Workshop Technology		Tata McGraw Hill Publishers, New Delhi
Kent's	Mechanical Engineering Hand book-		John Wiley and Sons, New York
<b>Video Cassettes/ CDS</b>			
<ul style="list-style-type: none"> <li>• Electronics Trade &amp; technology Development Corporation.(A Govt. of India undertaking) Akbar Hotel Annex, Chanakyapuri, New Delhi- 110 021</li> <li>• Learning Materials Transparencies, CBT Packages developed by N.I.T.T.E.R. Bhopal.</li> </ul>			
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			



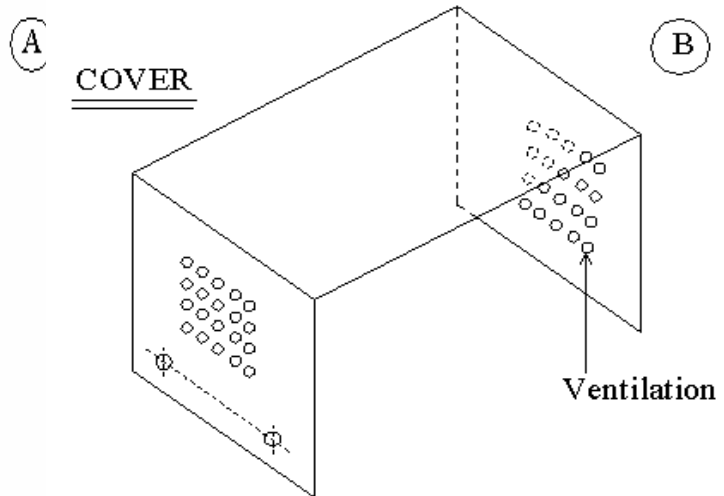
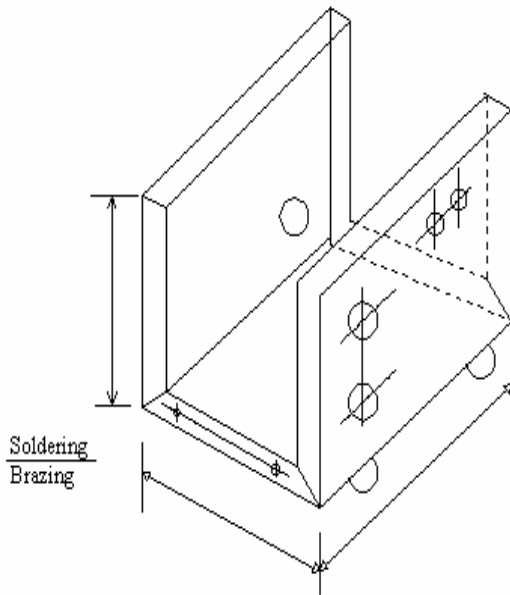
Name of the Course : Electronics Engineering Group (Basic Workshop Practice (Electronics Group))	
Course code: ET/EJ/EN/EX/IE/IS/IC/DE/MU/EV	Semester : First
Duration : <b>6 SEMESTERS</b>	Maximum Marks :
Teaching Scheme <b>C</b>	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credit : Nil	
Aim :- Nil	
Rational:-	
S.No	Electronics diploma technician is expected to know basic workshop practice like Wood working, Sheet metal and Fitting. The students are required to identify, operate and control various machines. The students are required to select and use various tools and equipments related to Wood working and sheet metal processes
Objective :-	
S.No	Student will be able to:
1.	<ul style="list-style-type: none"> <li>Read and interpret the drawing.</li> </ul>
2.	<ul style="list-style-type: none"> <li>Draw sketch for given job.</li> </ul>
3.	<ul style="list-style-type: none"> <li>Use manufacturers Catalog to prepare estimation of material required.</li> </ul>
4.	<ul style="list-style-type: none"> <li>Use specification tables.</li> </ul>
5.	<ul style="list-style-type: none"> <li>Decide Sequence of procedure.</li> </ul>
Pre-Requisite :- Nil	
Contents (Topic)	
Unit -1	<b>CARPENTRY SHOP</b> <ol style="list-style-type: none"> <li>Introduction.</li> <li>Various types of woods.</li> <li>Different types of tools, machines and accessories.</li> </ol>
Unit -2	<b>FITTING SHOP:</b> <ol style="list-style-type: none"> <li>Introduction</li> <li>Various marking, measuring, cutting, holding and striking tools.</li> <li>Different fitting operation like chipping, filing, right angle, marking, drilling, tapping etc.</li> <li>Working Principle of Drilling machine, Tapping dies its use.</li> <li>Safety precautions and safety equipments.</li> </ol>
Unit – 3	<b>SHEET METAL SHOP.</b> <ol style="list-style-type: none"> <li>Introduction</li> </ol>
Unit -3	<b>SHEET METAL SHOP.</b> <ol style="list-style-type: none"> <li>Introduction</li> </ol>

	<ol style="list-style-type: none"> <li>2. Various types of tools, equipments and accessories.</li> <li>3. Different types of operations in sheet metal shop.</li> <li>4. Soldering and riveting.</li> <li>5. Safety precautions.</li> </ol>	
		Total
Skills to be developed:		
Intellectual Skills:		
<ol style="list-style-type: none"> <li>1. Ability to read job drawing.</li> <li>2. Ability to identify and select proper material, tools, equipments and machine.</li> </ol>		
Ability to select proper parameters ( like cutting speed, feed, depth cut use of lubricants ) in machine.		
Motor Skills:		
<ol style="list-style-type: none"> <li>1. Ability to set tools, work piece, and machines for desired operations.</li> <li>2. Ability to complete job as per job drawing in allotted time.</li> <li>3. Ability to use safety equipment and follow safety procedures during operations.</li> <li>4. Ability to inspect the job for confirming desired dimensions and shape.</li> <li>5. Ability to acquire hands-on experience.</li> </ol>		
Note: Details of on example job for each shop is given below:		
Sr.No.	Details Of Practical Contents	
01	<p>WOOD WORKING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different wood working tools / machines.</li> <li>• Demonstration of different wood working processes, like planning, marking, chiseling, grooving, turning of wood etc.</li> <li>• One simple job of preparing switch board or any other similar job</li> </ul>	
02	<p>FITTING SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different fitting tools and drilling machines and power tools</li> <li>• Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc.</li> <li>• One simple fitting job involving practice of filing, drilling, tapping, cutting etc. Such as Transistor Heat Sink or any other similar job</li> </ul>	
03	<p>SHEET METAL SHOP:</p> <ul style="list-style-type: none"> <li>• Demonstration of different sheet metal tools / machines.</li> <li>• Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing , soldering and riveting.</li> </ul>	

- One simple job involving sheet metal operations and soldering and brazing. Such as Battery Eliminator Box or any other similar job

### 3. SHEET METAL WORK : BATTERY ELIMINATOR BOX

#### CHASSIS



MATERIAL : C R C A sheet 22/24 SWG

#### \* TOOLS & EQUIPMENT:

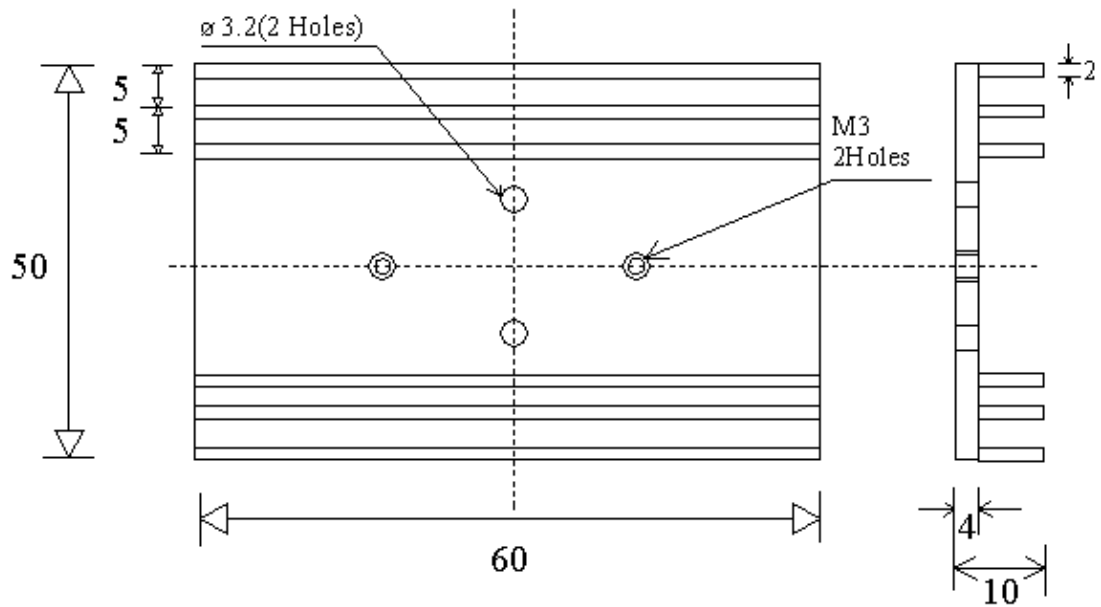
- 1) Steel Rule
- 2) Try square
- 3) Scriber
- 4) Spring Divider / Center Punch
- 5) Files
- 6) Shearing Machine / ship
- 7) Drilling Machine
- 8) Mallet
- 9) Hammer
- 10) Chisels
- 11) Hollow or solid punch

#### SEQUENCE OF OPERATIONS :

- 1) Development
- 2) Marking
- 3) Checking
- 4) Cutting
- 5) Debuting
- 6) Corner cutting
- 7) Drilling
- 8) Punching
- 9) Bending
- 10) Topping
- 11) Numbering

- 12) Hand Drill M/c
- 13) Drills in various sizes
- 14) Taps M3 & tap wrench
- 15) Bending M/c
- 16) Bench vice
- 17) Use various stakes
- 18) Number Punch
- 19) Blow lamp
- 20) Soldering iron

- 12) Finishing
- 13) Soldering / Brazing



4. Fitting Work: Transistor Heat Sink

MAT : ALUMINIUM FLAT    SIZE : 50 X 65 X 10 mm

NOTE : ALL DIMENSIONS ARE IN MM

TOLERANCE :  $\pm 0.3$  mm

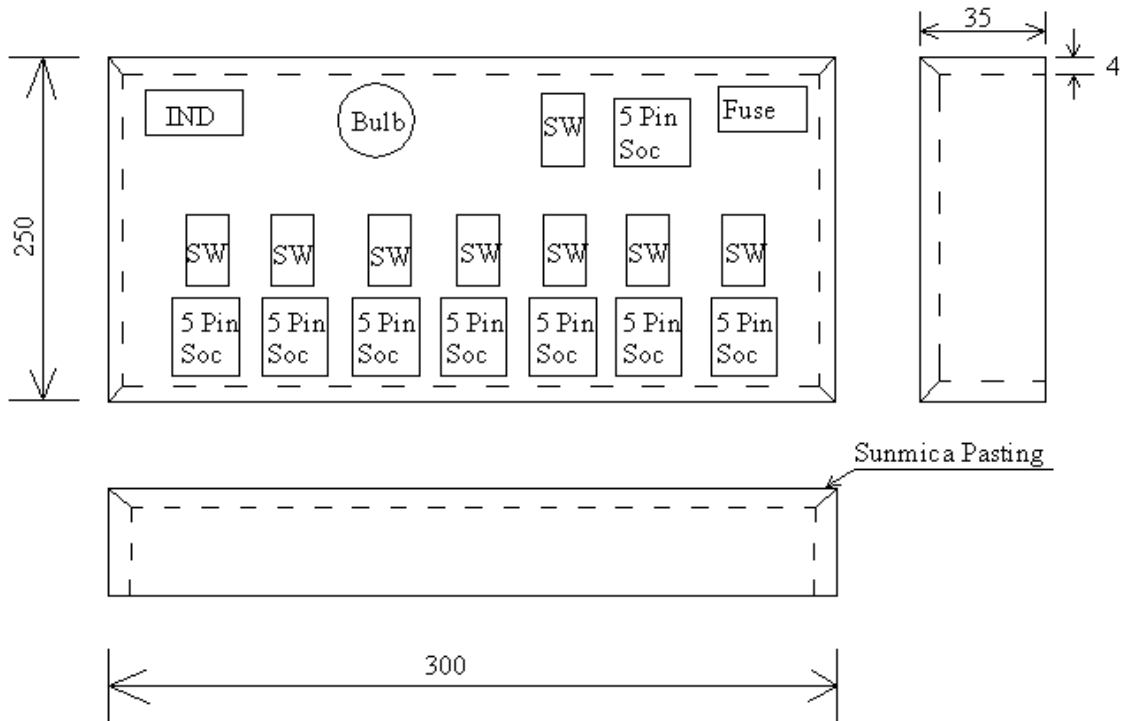
### **TOOLS & EQUIPMENT**

- 1) Steel Rule / Vernier caliper
- 2) Try square
- 3) Scriber
- 4) Bench Vice
- 5) Surface plate / with magnet block
- 6) Files, flat, square, Niddles
- 7) Marking Gauge
- 8) Marking Block / Height Gauge
- 9) Hacksaw frame
- 10) Center Punch
- 11) Hammer
- 12) Chisels Hat
- 13) Table Drill Machine (Bench)
- 14) Drills
- 15) Tap & Tap wrenches
- 16) Number Punch

### **SEQUENCE OF OPERATIONS**

- 1) Marking
- 2) Checking
- 3) Cutting
- 4) Square ness fitting (90')
- 5) Saw cutting
- 6) Chiseling / chipping
- 7) Slot filing
- 8) Drill Marking
- 9) Drilling
- 10) Tapping
- 11) Finishing
- 12) Numbering

## 5. Carpentry Work: Switch Box



**MATERIAL : TEAK WOOD AND SUNMICA, COMMERCIAL PLYWOOD**

- SIZE :** 1) 40 X 260 X 10 mm 02 Nos.  
 2) 40 X 310 X 10 mm 02 Nos.  
 3) Sun-mica – 250 X 300 mm X 0.5 mm 01 Nos.  
 4) Plywood – 250 X 300 mm X 5 mm 01 Nos.  
 5) Fevicol  
 6) French Polish

### TOOLS & EQUIPMENT

- 1) Steel Rule
- 2) Try square
- 3) Marking Gauge
- 4) Jack Plane
- 5) Hand Saw
- 6) Carpentry Vice

### SEQUENCE OF OPERATIONS

- 1) Measuring
- 2) Planning
- 3) Marking
- 4) Cutting
- 5) Chiseling
- 6) Corner joint with nail

7) Wooden Mallet / Hammer	7) Sun mica Pasting (Fevicolor similar adhesive)		
8) Firmer Chisel	8) Marking for slot cutting		
9) Jig Saw Machine	9) Jig Saw cutting		
10) Marfa file	10) Numbering		
11) Numbering	11) Polishing		
<b>Text Books:</b>			
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>	<b>Name of the Publisher</b>
S.K. Hajara Chaudhary	Workshop Technology		Media Promotors and Publishers, New Delhi
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and Sons, New Delhi
R K Jain	Production Technology		Khanna Publishers, New Delhi
H.S.Bawa	Workshop Technology		Tata McGraw Hill Publishers, New Delhi
--	Kent's Mechanical Engineering Hand book		John Wiley and Sons, New York
<b>Video Cassettes/ CDS</b>			
Learning Materials Transparencies, CBT Packages developed by NITTER Bhopal			
<b>Reference books :- Nil</b>			
<b>Suggested List of Laboratory Experiments :- Nil</b>			
<b>Suggested List of Assignments/Tutorial :- Nil</b>			

Name of the Course : Computer Engineering Group (Basic Workshop Practice (Computer))		
Course code: CO/CM/CD/IF	Semester : First	
Duration : <b>6 SEMESTERS</b>	Maximum Marks :	
Teaching Scheme <b>C</b>	Examination Scheme	
Theory : 13 hrs/week	Mid Semester Exam:	Marks
Tutorial: 1 hrs/week	Assignment & Quiz:	Marks
Practical : 17 hrs/week	End Semester Exam:	Marks
Credit : Nil		
Aim :- Nil		
Objective :-		
S.No	After studying this subject, the student will be able to -	
1.	<ul style="list-style-type: none"> <li>• Understand basic components of computers.</li> <li>• Connect peripheral devices.</li> <li>• Clean various devices like Keyboard, mouse, printers, motherboard.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>• Park and eject the papers over the printer.</li> <li>• Write Data on the CD.</li> <li>• Scan documents and images.</li> </ul>	
3.	<ul style="list-style-type: none"> <li>• Understand front panel and back panel connections.</li> <li>• Connection of Pen drives and DVD's</li> </ul>	
Pre-Requisite :- Nil		
Contents: Theory (Topic/Subtopic)		Hrs/week
Unit -1	Introduction to Various External Peripheral Devices 1.1 Different types of keyboards 1.2 Different types of Mouse 1.3 Different types of Scanners 1.4 Different types of Modems 1.5 Different types of printers 1.6 CD writers, speakers, CD read /write drive 1.7 Microphones, LCD projectors, Pen drives, DVD drive 1.8 Different types of Monitors	
Unit -2	Introduction to Various Internal Devices 2.1 Different makes of hard disks 2.2 Different types of network Interface cards 2.3 Different types of cables such as data cables, printer cables ,network cables ,power cables etc. 2.4 Different types of floppy disk 2.5 Motherboard connection 2.6 Graphics Card connection	



	2.7 Network Interface card connection	
Unit – 3	Physical Connections of different peripheral Devices 3.1 Connection of Mouse to different ports 3.2 Connection of keyboards to different ports 3.3 Connection of Monitors 3.4 Connection of Printers 3.5 Different switch settings of printers 3.6 Printer’s self test 3.7 Jumper settings of hard disks 3.8 Attaching FDD,HDD and CD drives 3.9 Attaching Pen Drives and DVDs 3.10 Attaching Scanners	
		Total

**ASSIGNMENTS:**

1. Observe all the peripheral devices available in the lab. Describe them in detail.
2. Demonstration of system configuration using CMOS setup.
3. Study of different ports such as serial, parallel, PS/2,NIC ports.
4. Assignment on how to write data on CDs
5. Observe different printer settings on different types of printers available in your lab. Write down the function of each switch.
6. Demonstration of printer’s self test.
7. Assignment on connection of speakers and microphones.
8. Assignment on different types of cables in your lab.
9. Assignment on cleaning procedures of Mouse, Keyboard and motherboard.
10. Assignment on how to connect scanner and scan document and pictures on the scanner available in your lab.
11. Assignment on making jumper settings on hard disk.
12. Assignment on different types of cards such as graphics card, LAN card, multimedia cards etc.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mr. David Stone & Alfred Poor	Troubleshooting Your PC		Prentice Hall India
David Groth	A+ Complete		BPB Publication
Balasubramaniam	Computer Installation and servicing		Tata McGraw Hill
Manuals	Reference Manuals of PC troubleshooting and maintenance		--

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION												
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES												
COURSE NAME: MECHANICAL ENGINEERING												
COURSE CODE : ME/PG/AE/PS/MH/FE/MI												
DURATION OF COURSE : 6 SEMESTERS												
SEMESTER: SECOND										SCHEME : C		
Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
		L	TU	P	SESSIONSAL EXAM			ESE	PR @	Oral #	TW @	
					TA	CT	Total					
1	Communication Skills	1	1	2	10	20	30	70	-	25	25	3
2	Engineering Mathematics	3	1	-	10	20	30	70	-	-	-	3
3	Applied Science ( Mechanical & Plastic )	3	-	4	10	20	30	70	50	-	-	5
4	Engineering Mechanics	3	-	2	10	20	30	70	-	-	<u>25</u>	4
5	Workshop Drawing	1	-	4	10	20	30	70	-	-	<u>50</u>	3
6	Workshop Practice	-	-	4	-	-	-	-	-	-	<u>50</u>	2
7	Development of Life – I	1	-	2	-	-	-	-	-	25	<u>25</u>	3
8	Professional Practices-II	-	-	2	-	-	-	-	-	-	50	1
<b>Total</b>		<b>12</b>	<b>2</b>	<b>20</b>	<b>50</b>	<b>100</b>	<b>150</b>	<b>350</b>	<b>50</b>	<b>50</b>	<b>225</b>	<b>24</b>

STUDENT CONTACT HOURS PER WEEK: **34 HRS**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH**  
# , External Assessment                      @ , Internal Assessment                      ESE – End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA – Teachers Assessment, L – Lecture, TU – Tutorial, P – Practical  
TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.  
**Total Marks : 675**

Minimum passing for sessional marks is 40%, and for theory subject 40%.  
Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : All Branches of Diploma in Engineering & Technology (Communication Skills)			
Course code: CE/CR/CS/ME/EE/EP/EJ/EN/ET/EX/DE/IE/IS/IC/EV/MU/CO/CM/IF/CV/MH/FE/IU/CD/ED/EI		Semester : Second	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	12 hrs/week	Mid Semester Exam:	Marks
Tutorial:	2 hrs/week	Assignment & Quiz:	Marks
Practical :	20 hrs/week	End Semester Exam:	Marks
Credit : Nil			
Aim :- Nil			
Objective :-			
S.No	The Students will be able to:		
1.	<ul style="list-style-type: none"> <li>Understand and use the basic concepts of communication and principles of effective communication in an organized set up and social context.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Give a positive feedback in various situations, to use appropriate body language &amp; to avoid barriers for effective communication.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Write the various types of letters, reports and office drafting with the appropriate format.</li> </ul>		
Pre-Requisite :- Nil			
Contents (Theory)			Hrs/week
Name of the Topic			Marks
Unit -1	Introduction to communication: 1.1 Definition , communication cycle/ process, 1.2 The elements of communication : sender- message – channel- Receiver –Feedback & Context. 1.3 Definition of communication process. 1.4 Stages in the process : defining the context, knowing the audience, designing the message, encoding , selecting proper channels, transmitting, receiving, decoding and giving feedback.	02	08
Unit -2	Types of communication Formal- Informal, Verbal- Nonverbal, Vertical- horizontal- diagonal	02	08
Unit – 3	Principals of effective communication : 3.1 Definition of effective communication	02	08

	3.2 Communication barriers & how to overcome them. 3.3 Developing effective messages: Thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers & facilitating feedback.		
Unit – 4	Non verbal- graphic communication: 4.1 Non- verbal codes: A- Kinesics , B- Proxemics , C – Haptics D-Vocalics , E- Physical appearance. F –Chronemics , G –Artifacts Marks: 08 4.2 Aspects of body language Marks: 06 4.3 Interpreting visuals & illustrating with visuals like tables, charts & graphs. Marks: 08	04	18
Unit – 5	Formal written skills : 5.1 Office Drafting: Circular, Notice , and Memo. Marks: 06 5.2 Job Application with resume. Marks: 08 5.3 Business correspondence: Enquiry, Order letter, Complaint letter, and Adjustment letter. Marks: 06 5.4 Report writing: Accident report, fall in production, Progress / Investigative. Marks: 08 5.5 Defining & describing objects & giving Instructions. Marks: 04	06	28
	Total	16	70

**Assignments:**

1. Communication Cycle (With The Help Of Diagram)
2. Communication Situations (List Of 5 Communication situations stating the type of communication)
3. Barriers That Hinder A Particular Communication Situation. (State the type of barrier, and how to overcome them).
4. Developing A Story Or A Paragraph For The Given Topic Sentence.(in a group of 5 – 6 students)
5. Describing Various Equipments.
6. Identifying The Various Sentences With Their Type Of Writing. (e.g. Scientific, legal, colloquial etc.)
7. Business Letters
8. Letters Of Suggestion
9. Comparative Time Table Of 2 Students
10. Description Of Two Different Persons.(seeing the picture)
11. Letter To The Librarian, Principal
12. Report Writing.

**NOTE:** The above assignments are suggested to be completed in the prescribed work-book.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Krushna Mohan, Meera	Developing Communication Skills		Macmillan

Banerji			
Joyeeta Bhattacharya	Communication Skills		Reliable Series
Jayakaran	Every ones guide to effective writing		Apple publishing
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : All Branches of Diploma in Engineering and Technology (Engineering Mathematics)			
Course code: CE/ME/IE/EJ/DE/ET/EX/EE/EP/MU/EV/IS/CO/ CM/IF /PG/PT/AE/CV/MH/FE/CD/ED/EI		Semester : Second	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	12 hrs/week	Mid Semester Exam:	Marks
Tutorial:	2 hrs/week	Assignment & Quiz:	Marks
Practical :	20 hrs/week	End Semester Exam:	Marks
Credit : Nil			
Aim :- Nil			
Objective :-			
S.No	The student will be able to		
1.	Acquire knowledge of Mathematical terms, concepts, principles and different methods. Develop the ability to apply mathematical methods to solve technical problems, to execute management, plans with precision. Acquire sufficient mathematical techniques necessary for daily and practical problems.		
Pre-Requisite :- Nil			
Contents (Theory)			Marks
			Hrs/ week
Note:			
<ol style="list-style-type: none"> <li>Chapters 1 to 3 are common for all branches.</li> <li>Chapter 4-For Civil, Electrical, Mechanical and Electronics groups</li> <li>Chapter 5-For Computer Engineering Group.</li> </ol>			
Unit -1	Function and Limit 1.1 Function 1.1.1 Definitions of variable, constant, intervals such as open, closed, semi-open etc. 1.1.2 Definition of Function, value of a function and types of functions, Simple Examples. 1.2 Limits 1.2.1 Definition of neighborhood, concept and definition limit. 1.2.2 Limits of algebraic, trigonometric, exponential and logarithmic functions with simple examples.	04       08	06       12
Unit -2	Derivatives 2.1 Definition of Derivatives, notations. 2.2 Derivatives of Standard Functions 2.3 Rules of Differentiation. (Without proof). Such as Derivatives of Sum or difference, scalar multiplication, Product and quotient. 2.4 Derivatives of composite function (Chain rule) 2.5 Derivatives of inverse and inverse trigonometric functions. 2.6 Derivatives of Implicit Function	12	18

	2.7 Logarithmic differentiation 2.8 Derivatives of parametric Functions. 2.9 Derivatives of one function w.r.t another function 2.10 Second order Differentiation.		
Unit -3	Statistics And Probability 3.1 Statistics 3.1.1 Measures of Central tendency (mean, median, mode) for ungrouped and grouped frequency distribution. 3.1.2 Graphical representation (Histogram and Ogive Curves) to find mode and median 3.1.3 Measures of Dispersion such as range, mean deviation, Standard Deviation, Variance and coefficient of variation. Comparison of two sets of observations. 3.2 Probability 3.2.1 Definition of random experiment, sample space, event, Occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely). 3.2.2 Definition of Probability, addition and multiplication theorems of Probability	10        04	12        06
NOTE: Chapter 4 is for Civil, Electrical, Electronics and Mechanical Groups			
Unit -4	4.1 Applications Of Derivative 4.1.1 Geometrical meaning of Derivative, Equation of tangent and Normal 4.1.2 Rates and Motion 4.1.3 Maxima and minima 4.1.4 Radius of Curvature 4.2 Complex number 4.2.1 Definition of Complex number. Cartesian, polar, Exponential forms of Complex number. 4.2.2 Algebra of Complex number(Equality, addition, Subtraction, Multiplication and Division) 4.2.3 De-Moivre's theorem (without proof) and simple problems. Euler's form of Circular functions, hyperbolic functions and relations between circular & hyperbolic functions	06        04	08        08
Note: Chapter 5 is for Computer Engineering Group Only			
Unit -5	5.1 Numerical Solution of Algebraic Equations 5.1.1 Bisection method, Regula-Falsi method and Newton-Raphson method 5.2 Numerical Solution of Simultaneous Equations 5.2.1 Gauss elimination method 5.2.2 Iterative methods-Gauss Seidal and Jacobi's method	06    04	08    08
Total		48	70
<b>Text Books:</b>			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.P. Deshpande	Mathematics for Polytechnic		Pune Vidyarthi Griha Prakashan, Pune.



Robert T Smith	Calculus :Single Variable		Tata McGraw Hill
Dass H. K.	Advanced Engineering Mathematics		S. Chand Publication, New Delhi
S.C Gupta and Kapoor	Fundamentals of Mathematical Statistics		S. Chand Publications New Delhi.
B.S Grewal	Higher Engineering Mathematics		Khanna Publication, New Delhi
P. N. Wartikar	Applied mathematics		Pune Vidyarthi Griha Prakashan, Pune.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

Tutorial

Note:

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

Tutorial No.	Topic on which tutorial is to be conducted
1	Function
2	Limits
3	Derivative
4	Derivative
5	Derivative
6	Statistics
7	Statistics
8	Statistics
9	Probability
10	Probability
11	Application of derivative/numerical Solution of algebraic equations
12	Application of derivative/numerical Solution of algebraic equations
13	Complex Numbers/Numerical Solution of Simultaneous Equations
14	Complex Numbers/Numerical Solution of Simultaneous Equations

Name of the Course : Civil, Mechanical and Electrical Group (Engineering Mechanics)			
Course code: CE/CS/CR/ME/PT/PG/AE/EE/EP/MH/FE/CV		Semester : Second	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	12 hrs/week	Mid Semester Exam:	Marks
Tutorial:	2 hrs/week	Assignment & Quiz:	Marks
Practical :	20 hrs/week	End Semester Exam:	Marks
Credit : Nil			
Aim :- Nil			
Objective :-			
S.No	The students will able to:		
1.	<ul style="list-style-type: none"> <li>Resolve the forces.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Find the resultant of given force system.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Find the reactions of beam.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Find the center of gravity of composite solids.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Find M.A., V.R., Efficiency and establish law of machine</li> </ul>		
Pre-Requisite :- Nil			
Contents (Theory)			Hrs/week
Unit -1	<p><b>Force</b></p> <p>a. Fundamentals: - Definitions of mechanics, statics, dynamics. Engineering Mechanics, body, rigid body, mass, weight, length, time, scalar and vector, fundamental units, derived units, S.I. units.</p> <p>b. Force: - Definition of a force, unit force, Newton, S.I. unit of a force, representation of a force by vector and by Bow's notation method. Characteristics of a force, effects of a force, principle of transmissibility.</p> <p>c. Resolution of a force: Definition, Method of resolution, Types of component forces, Perpendicular components and Non-perpendicular components.</p> <p>d. Moment of a force: - Definition, measurement of moment of a force, S. I. unit, geometrical meaning of moment of a force,</p>	12	15

	<p>classification of moments according to direction of rotation, sign convention, law of moments Varignon's theorem of moment and its use, couple – definition, S.I. unit, measurement of a couple, properties of couple.</p> <p>e. <b>Force system:</b> - Definition, classification of force system according to plane and line of action</p> <p>f. Composition of Forces: - Definition, Resultant force, methods of composition of forces,</p> <p>I – Analytical method – (i) Trigonometric method (law of parallelogram of forces) (ii) Algebraic method (method of resolution),</p> <p>II – Graphical method: - Introduction, space diagram, vector diagram, polar diagram, and funicular polygon. Resultant of concurrent, non-concurrent and parallel force system by analytical and graphical method.</p>		
Unit -2	<p><b>Equilibrium:</b></p> <p>2.1 Definition, conditions of equilibrium, analytical and graphical conditions of equilibrium for concurrent, non-concurrent and parallel force system, free body and free body diagram.</p> <p>2.2 Lami's Theorem – statement and explanation, Application of Lami's theorem for solving various engineering problems.</p> <p>2.3 Equilibrant – Definition, relation between resultant and equilibrant, equilibrant of concurrent and non-concurrent force system.</p> <p>2.4 Beams – Definition, Types of beams (cantilever, simply supported, overhanging, fixed, continuous), Types of end supports ( simple support, hinged , roller), classification of loads, point load, uniformly distributed load. Reactions of a simply supported and over hanging beam by analytical and graphical method.</p>	10	15
Unit – 3	<p><b>Friction:</b></p> <p>3.1 Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction angle of repose and coeff. Of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages of friction.</p>	08	15

	<p>3.2 Equilibrium of bodies on level plane –external force applied horizontal and inclined up and down.</p> <p>3.3 Equilibrium of bodies on inclined plane – external forces is applied parallel to the plane, horizontal and incline to inclined plane.</p> <p>3.4 Ladder friction, Wedge and block.</p>		
Unit – 4	<p><b>Centroid and Centre Of Gravity:</b></p> <p>4.1 <b>Centroid:</b> Definition of centroid. Moment of an area about an axis. Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite figure.</p> <p>4.2 <b>Center of gravity:</b> Definition, center of gravity. Of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids.</p>	<b>08</b>	<b>10</b>
Unit – 5	<p><b>Simple Machines:</b></p> <p>6. Definitions of simple machine, compound machine , load , effort , mechanical advantage , velocity ratio , input on a machine ,output of a machine ,efficiency of a machine , expression for mechanical advantage , velocity ratio and efficiency of a machine. Ideal machine, ideal effort and ideal load, friction in machines, effort lost in friction and frictional load.</p> <p>5.2 Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self locking machine.</p> <p>5.3 Study of simple machines : Simple axle and wheel, differential axle and wheel, Weston’s differential pulley block, single purchase crab, double purchase crab, worm and worm wheel, geared pulley block, screw jack, pulleys : First, second and third system of pulleys, gear train, hoist mechanism.</p>	<b>10</b>	<b>15</b>
Total		<b>48</b>	<b>70</b>
<b>Contents (Practical)</b>			
<b>Skills to be developed:</b>			
1 Intellectual Skill:	A. Calculate the forces on given structure B. Interpret the results		
2 Motor Skills:	A. Handle the equipment carefully B. Draw graph		
The term work consist of any five experiments from Group A,B and graphical solution in Group C			

Group A:

- 1) Verify law of polygon of forces
- 2) Verify law of moments
- 3) Verification of Lami's theorem
- 4) Forces in members of a jib crane.
- 5) Comparison of coefficient of friction of various pair of surfaces and
- 6) determination of angle of repose
- 7) Equilibrium of parallel forces – simply supported beam reactions.
- 8) Experimental location of center of gravity of plane plate of uniform thickness.

Group B: To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency.

Also check the reversibility of a machine ( Any five):

- 1) Differential axle and wheel
- 2) Weston's differential pulley block
- 3) Geared pulley block
- 4) Single purchase crab
- 5) Double purchase crab
- 6) Worm and worm wheel
- 7) Two sheave and three sheave pulley block
- 8) Screw jack.

Group C: A 2 Size drawing sheets containing graphical solutions for –

- 1) Concurrent force system : Two problems
- 2) Parallel force system : Two problems
- 3) Reactions of a beam : Two problems

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Beer – Johnson	Engineering Mechanics		Tata McGraw Hill, Delhi
Basu	Engineering Mechanics		Tata McGraw Hill, Delhi
Joseph F. Shelley	Vector Mechanics for Engineers Vol. I & II		Tata McGraw Hill, Delhi

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Engineering Drawing)			
Course code: ME/PG/PT/AE/MH/FE		Semester : Second	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	12 hrs/week	Mid Semester Exam:	Marks
Tutorial:	2 hrs/week	Assignment & Quiz:	Marks
Practical :	20 hrs/week	End Semester Exam:	Marks
Credit :- Nil			
Aim :- Nil			
Objective :-			
S.No	The students shall be able to:		
1.	Understand the basic concepts of engineering drawing.		
2.	Visualize the objects.		
3.	Draw different views in different positions of objects.		
4.	Draw the different views of machine elements.		
Pre-Requisite :- Nil			
Contents (Theory)			Hrs/week
Note: The teachers should use some of the practical hours for teaching basic Theory during practical's as required.			
Unit -1	Sectional Views. 1.1 Types of sections 1.2 Conversion of pictorial view into sectional orthographic views (First Angle Projection Method only)	03	10
Unit -2	Missing Views. 2.1 Draw missing view from the given Orthographic views - simple components (First Angle Projection Method only)	01	05
Unit - 3	Isometric Projection 3.1 Conversion of Orthographic Views into Isometric view/projection (Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)	03	15
Unit - 4	Projections of Solids. 4.1 Projections of Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube with their axes inclined to one reference plane and parallel to other.	02	10
Unit - 5	Sections of Solids.	03	10

	5.1 Solids: -Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube. 5.2 Cone, Pyramid and Tetrahedron resting on their base on Horizontal Plane. 5.3 Prism, Cylinder: -a)Axis parallel to both the reference plane b) Resting on their base on HP. 5.4 Section plane inclined to one reference plane and perpendicular to other.		
Unit – 6	Developments of Surfaces. 6.1 Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.	02	10
Unit – 7	Free Hand Sketches 7.1 Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts, keys and couplings.	02	10
	Total	16	70
Practical			
List of Practical	Skills to be Developed		
	Intellectual skill	Motor Skill	
1. Sectional View - (Total 2 Sheets) Two objects by First Angle Projection Method – (1 Sheet)  Redraw the same sheet using CAD - (1 Sheet)	1) To interpret sectional views of given object.	Develop ability to draw sectional views Using computer.	
2. Isometric projection - (Total 2 sheets) Two objects one by true scale and another by isometric scale - (1 sheet) Draw one sheet having two problems in each sheet using CAD – (Plot any one)	1) Develop ability to differentiate between isometric view and isometric projections. 2) To differentiate between Isometric scale and true scale.	Develop ability to draw isometric views and isometric projections from given orthographic views of an object using computer.	
7. Missing Views Two problems by first angle projection method - (1 Sheet)	1) To interpret the missing view from given orthographic views.	1) To develop ability to draw missing view from given orthographic views.	
8. Projection of solids Two problems on two different solids, one by axis of solid inclined to HP and parallel to VP and another problem by	1) To interpret the different positions of solids with reference planes. 2) To develop ability to	1) To draw projections of different solids when axis is inclined or perpendicular to one of the reference plane.	

axis of solid inclined to VP and parallel to HP. – (1 Sheet)	differentiate between true length of axis and apparent length of axis. 3) To develop ability to differentiate between true shape and apparent shape of solids.	
9. Section of solids Two problems on different solids. One problem, section plane inclined to HP and perpendicular to VP and in another problem, section plane inclined to VP and Perpendicular to HP. - (1 Sheet)	1) To differentiate between true shape and apparent shape of section. 2) To interpret the positions of section plane with reference planes.	1) To develop ability to draw sectional orthographic views of given solids, when it is cut by section plane in different position with reference planes. 2) Ability to draw true shape of section.
10. Development of surfaces Any two problems on development of surfaces of different objects. - (1 Sheet)	1) Able to interpret the development of surfaces of different solids.	1) Ability to draw the development of surfaces of different objects in different shapes.
11. Free Hand Sketches Any six figures on different topics. - (1 Sheet)	12. To differentiate between scale drawing and free hand drawing. 2) To differentiate between various parts of machine like nuts, bolts, screws, different threads, couplings etc.	1) Develop ability to draw orthographic views of different machine elements.

List of Practice Oriented Projects:

To find out the total sheet metal required for a given object.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N. D. Bhatt	Engineering Drawing		Charotkar Publishing House
R. K. Dhawan	Engineering Drawing		S. Chand Co.
P. J. Shah	Engineering Drawing		--
N. D. Bhatt	Machine Drawing		Charotkar Publishing



			House
K. Venugopal	Engineering Drawing and Graphics + AutoCAD		New Age Publication
K. R. Mohan	Engineering Graphics		Dhanpat Rai and Publication Co.
R. K. Dhawan	Machine Drawing		S. Chand Co.
Video Cassettes / CD's			
IS Codes:			
SP – 46. Engineering Drawing practice for schools and colleges.			
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Mechanical Engineering Group (Professional Practices-II)		
Course code: ME/PG/PT/AE/ MH/FE	Semester : Second	
Duration : <b>6 SEMESTERS</b>	Maximum Marks :	
Teaching Scheme <b>C</b>	Examination Scheme	
Theory : 12 hrs/week	Mid Semester Exam:	Marks
Tutorial: 2 hrs/week	Assignment & Quiz:	Marks
Practical : 20 hrs/week	End Semester Exam:	Marks
Credit : Nil		
Aim :- Nil		
Objective :-		
S.No	The Student will be able to:	
1.	<ul style="list-style-type: none"> <li>• Acquire information from different sources.</li> <li>• Prepare notes for given topic.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>• Present given topic in a seminar.</li> <li>• Interact with peers to share thoughts.</li> </ul>	
3.	<ul style="list-style-type: none"> <li>• Prepare a report on industrial visit, expert lecture.</li> </ul>	
Pre-Requisite :- Nil		
Contents:- Nil	Hrs/week	
Text Books:- Nil		
Reference books :- Nil		
Suggested List of Laboratory Experiments :- Nil		
Suggested List of Assignments/Tutorial :- Nil		
Sr. No.	Activities	Hours

01	<p><b>Industrial Visits:</b>  Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work.  Visits to any two of the following :</p> <ul style="list-style-type: none"> <li>i) Nearby Petrol Pump.(fuel, oil, product specifications)</li> <li>ii) Automobile Service Station (Observation of Components / aggregates)</li> <li>iii) Engineering Workshop(Layout, Machines)</li> <li>iv) Dairy Plant / Water Treatment Plant</li> </ul>	10
02	<p>Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any THREE of the following areas :</p> <ul style="list-style-type: none"> <li>i) Pollution control.</li> <li>ii) Non destructive testing.</li> <li>iii) Acoustics.</li> <li>iv) Illumination / Lighting system.</li> <li>v) Fire Fighting / Safety Precautions and First aids.</li> <li>vi) Computer Networking and Security.</li> <li>vii) Topics related to Social Awareness such as – Traffic Control System, Career opportunities, Communication in Industry, Yoga Meditation, Aids awareness and health awareness.</li> </ul>	06
03	<p><b><u>Group Discussion :</u></b>  The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are –</p> <ul style="list-style-type: none"> <li>i) Sports</li> <li>ii) Current news items</li> <li>iii) Discipline and House Keeping</li> <li>iv) Current topics related to mechanical engineering field.</li> </ul>	08
04	<p><b><u>Student Activities:</u></b>  The students in a group of 3 to 4 will perform <b>any one</b> of the following activities ( others similar activities may be considered  Activity :</p> <ul style="list-style-type: none"> <li>i) Collect and study IS code for Engineering Drawing..</li> <li>ii) Collecting information from Market: Nomenclatures and specifications of engineering materials.</li> <li>iii) Specifications of Lubricants.</li> <li>iv) Draw orthographic projections of a given simple machine element using and CAD software</li> </ul>	08
Total		32

Name of the Course : All Branches of Diploma in Engineering and Technology (Development of Life Skills- I)		
Course code: CE/ME/IE/EJ/DE/ET/EX/EE/EP/CO/IF/IS/ CO/CM/IF/CV/MH/FE/IU/CD/ED/EI	Semester : SECOND	
Duration : <b>6 SEMESTERS</b>	Maximum Marks :	
Teaching Scheme <b>C</b>	Examination Scheme	
Theory : 12 hrs/week	Mid Semester Exam:	Marks
Tutorial: 2 hrs/week	Assignment & Quiz:	Marks
Practical : 20 hrs/week	End Semester Exam:	Marks
Credit:- Nil		
Aim :- Nil		
Objective :-		
S.No	The students will be able to:	
1.	<ul style="list-style-type: none"> <li>Develop reading skills</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Use techniques of acquisition of information from various sources</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Draw the notes from the text for better learning.</li> </ul>	
4.	<ul style="list-style-type: none"> <li>Apply the techniques of enhancing the memory power.</li> </ul>	
5.	<ul style="list-style-type: none"> <li>Develop assertive skills.</li> </ul>	
6	<ul style="list-style-type: none"> <li>Prepare report on industrial visit.</li> </ul>	
7.	<ul style="list-style-type: none"> <li>Apply techniques of effective time management.</li> </ul>	
8	<ul style="list-style-type: none"> <li>Set the goal for personal development.</li> </ul>	
9.	<ul style="list-style-type: none"> <li>Enhance creativity skills.</li> </ul>	
10	<ul style="list-style-type: none"> <li>Develop good habits to overcome stress.</li> </ul>	
11.	<ul style="list-style-type: none"> <li>Face problems with confidence</li> </ul>	
Pre-Requisite :- Nil		
Contents (Theory)		Hrs/week
Unit -1	<u>Importance of DLS,</u> Introduction to subject, importance in present context ,application	<b>01</b>
Unit -2	Information Search Information source –Primary, secondary, tertiary Print and non - print, documentary, Electronic Information center, Library , exhibition, Government Departments. Internet Information search – Process of searching, collection of data -questionnaire , taking Interview , observation method.	02
Unit - 3	<b>Written communication</b> METHOD OF NOTE TAKING	01

	Report writing –Concept, types and format.	
Unit – 4	Self Analysis Understanding self— Attitude, aptitude, assertiveness, self esteem, Confidence buildings. Concept of motivation.	02
Unit – 5	Self Development Stress Management –Concept, causes, effects , remedies to Avoid / minimize stress. Health Management – Importance, dietary guidelines and exercises. Time management- Importance, Process of time planning, Urgent Vs importance, Factors leading to time loss and ways to handle it ,Tips for effective time management. EMOTION-CONCEPT, TYPES, CONTROLLING, EMOTIONAL INTELLIGENCE. CREATIVITY-CONCEPT, FACTORS ENHANCING CREATIVITY. GOAL SETTING – CONCEPT, SETTING SMART GOAL.	07
Unit - 6	<b>Study habits</b> Ways to enhance memory and concentration. Developing reading skill. Organisation of knowledge, Model and methods of learning.	<b>03</b>
	Total	<b>16</b>

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Marshall Cooks	Adams Time management		Viva Books
E.H. Mc Grath , S.J.	Basic Managerial Skills for All		Pretice Hall of India, Pvt Ltd
Allen Pease	Body Language		Sudha Publications Pvt. Ltd.
Lowe and Phil	Creativity and problem solving		Kogan Page (I) P Ltd
Adair, J	Decision making & Problem Solving		Orient Longman
Bishop , Sue	Develop Your Assertiveness		Kogan Page India
Marion E Haynes	Make Every Minute Count		Kogan page India
Pearson Education Asia	Organizational Behavior		Tata McGraw Hill
Michael Hatton ( Canada – India Project)	Presentation Skills		ISTE New Delhi

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

**Internet Assistance:**

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

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

S.No	The Term Work Will Consist Of Following Assignments.
1	Library search:- Visit your Institute's Library and enlist the books available on the topic given by your teacher. Prepare a bibliography consisting name of the author, title of the book, publication and place of publication.
2	Enlist the magazines, periodicals and journals being available in your library. Select any one of them and write down its content. Choose a topic for presentation.
3	Attend a seminar or a guest lecture, listen it carefully and note down the important points and prepare a report of the same.
4	Visit to any one place like historical/office/farms/development sites etc. and gather information through observation, print resources and interviewing the people.
5	Prepare your individual time table for a week – (b) List down your daily activities.

	(c) Decide priorities to be given according to the urgency and importance of the activities. (d) Find out your time wasters and mention the corrective measures.
6	Keep a diary for your individual indicating- planning of time, daily transactions, collection of good thoughts, important data, etc
7	Find out the causes of your stress that leads tension or frustration .Provide the ways to Avoid them or to reduce them.
8	Undergo the demonstration on yoga and meditation and practice it. Write your own views, feeling and experiences on it.
<b>NOTE:- THESE ARE THE SUGGESTED ASSIGNMENT FOR GUIDE LINES TO THE SUBJECT TEACHER. HOWEVER THE SUBJECT TEACHERS CAN SELECT, DESIGN ANY ASSIGNMENT RELEVANT TO THE TOPIC, KEEPING IN MIND THE OBJECTIVES OF THIS SUBJECT.</b>	

Name of the Course : Mechanical Engineering Group (Workshop Practice)									
Course code: ME/PT/AE/MH/FE					Semester : Second				
Duration : <b>6 SEMESTERS</b>					Maximum Marks :				
Teaching Scheme <b>C</b>					Examination Scheme				
Theory : 12 hrs/week					Mid Semester Exam:			Marks	
Tutorial: 2 hrs/week					Assignment & Quiz:			Marks	
Practical : 20 hrs/week					End Semester Exam:			Marks	
Credit : Nil									
Teaching and Examination Scheme:									
Teaching Scheme			<b>Examination Scheme</b>						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	--	50@	50
<p>Rationale:</p> <p>Mechanical diploma technician is expected to know basic workshop practice like, Gas Welding gas cutting. Fitting, Drilling, Tapping, plumbing and hot working processes. The students are required to identify operate and control various machines. The students are required to select and use various tools and equipments for welding, fitting, tapping drilling, plumbing and forging operations.</p>									
Aim :- Nil									
Objective :-									
S.No	The student will able to:								
1.	<ul style="list-style-type: none"> <li>• Know basic workshop processes.</li> <li>• Read and interpret job drawings.</li> <li>• Identify, select and use various marking, measuring, and holding, striking and cutting tools &amp; equipments wood working and sheet metal shops.</li> </ul>								
2.	<ul style="list-style-type: none"> <li>• Operate, control different machines and equipments.</li> <li>• Select proper welding rods and fluxes.</li> <li>• Inspect the job for specified dimensions</li> <li>• Produce jobs as per specified dimensions.</li> </ul>								
3.	<ul style="list-style-type: none"> <li>• Adopt safety practices while working on various machines.</li> <li>• Measurement skills.</li> <li>• Fitting skills.</li> </ul>								
<p>Notes: 1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.</p> <p>2] The workshop diary shall be maintained by each student duly signed by</p>									



instructor of respective shop		
CONTENTS: Subject practical content as shown in the table below:		
Skill to be developed:		
Intellectual Skills: <ol style="list-style-type: none"> <li>1. Ability to read job drawings.</li> <li>2. Ability to identify and select proper material, tools and equipments and machines.</li> <li>3. Ability to select proper parameters ( like cutting speed, feed, depth cut use of lubricants ) in machine.</li> </ol>		
Motor Skills: <ol style="list-style-type: none"> <li>1. Ability to set tools, work piece, and machines for desired operations.</li> <li>2. Ability to complete job as per job drawing in allotted time.</li> <li>3. Ability to use safety equipment and follow safety procedures during operations.</li> <li>4. Ability to inspect the job for confirming desired dimensions and shape.</li> <li>5. Ability to acquire hands-on experience</li> </ol>		
Pre-Requisite :- Nil		
Details of Practical Contents		Hrs/week
Unit -1	<p><b>CARPENTERY SHOP:</b></p> <ul style="list-style-type: none"> <li>• Any one composite job from the following involving different joint, turning and planning, surface finishing by emery paper, varnishing etc. like square stool, tea table, center table, chaurang, table lamp bed sofa-set, book rack. Cabinet, notice board, shows cases, tables chairs etc.</li> </ul> <p>Note:1] One job of standard size (Saleable article shall be preferred)  2] Batch size should be selected depending on volume of work.  3] Job allotted should comprise of 6-8 hours of actual working  4] Student shall calculate the cost of material and labor cost for their job from the drawing.</p>	
Unit -2	<p><b>WELDING SHOP</b></p> <ul style="list-style-type: none"> <li>• Any one composite job from involving butt joint lap joint welding process, from the following like Grill, door, window frame, waste paper basket, Chappel stand, Corner flower stand chair , table frame (square pipe 25 mm) cooler frame (folding type)</li> </ul> <p>Note: 1] One job of standard size (Saleable/marketable article shall be preferred)  2] Batch size should be selected depending on volume of work .  3] Job allotted should comprise of 6-8 hours of actual working operations.  4] Student shall calculate the cost of material and labor required for their job from the drawing.</p>	

Unit - 3	<p>SMITHY SHOP</p> <ul style="list-style-type: none"> <li>• Demonstration of different forging tools and Power Hammer.</li> <li>• Demonstration of different forging processes, likes shaping, caulking fullering, setting down operations etc.</li> <li>• One job like hook peg, flat chisel or any hardware item.</li> <li>• Note: 1]One job of standard size ( Saleable/marketable article shall be preferred)</li> </ul> <p>2] Job allotted should comprise of 4-6 hours of actual working operations. 3] Student shall calculate the cost of material and labor required for their job from the drawing.</p>	
Unit - 4	<p><b><i>PLUMBING SHOP</i></b></p> <ul style="list-style-type: none"> <li>• Demonstration of PVC pipe joint with various fittings.</li> <li>• Exercise for students on preparing actual pipeline layout for G.I. Pipe or PVC pipe. Preparing actual drawing and bill of material.</li> </ul> <p>Note:1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 6-8 hours of actual working 4] Student shall calculate the cost of material and labor cost for their job from the drawing.</p>	
Unit – 5	<p><b><i>SHEET METAL SHOP</i></b></p> <ul style="list-style-type: none"> <li>• One composite job from the following: Letter box, Trunk, Grain Container, Water-heater Container, Bucket, Waste Paper Basket, Cooler Tray, Water-draining Channel, etc. (including soldering and riveting)</li> </ul> <p>Note: 1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 4-6 hours of actual working ions. 4] Student shall calculate the cost of material and labor cost required for their job from the drawing.</p>	
Unit – 6	<p>Demonstration of power tools and practice of utility items.</p> <ul style="list-style-type: none"> <li>• Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories.</li> <li>• Making of electrical switchboard with 2 sockets and piano buttons and with electrical wiring.</li> <li>• Any other item as per the requirement of college/Deptt./</li> </ul>	

	<u>(Note: Utility item are not to be assessed)</u>			
	Total			64
<b>Text Books:</b>				
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>	<b>Name of the Publisher</b>	
S.K. Hajara Chaudhary	Workshop Technology		Media Promotors and Publishers,New Delhi	
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and Sons, New Delhi	
R K Jain	Production Technology		Khanna Publishers, New Delhi	
H.S.Bawa	Workshop Technology		Tata McGraw Hill Publishers,New Delhi	
--	Kent's Mechanical Engineering Hand book		John Wiley and Sons, New York	
<b>Video Cassettes / CDS</b>				
<ul style="list-style-type: none"> <li>• Learning Materials Transparencies, CBT Packages developed by NITTER Bhopal.</li> </ul>				
Reference books :- Nil				
Suggested List of Laboratory Experiments :- Nil				
Suggested List of Assignments/Tutorial :- Nil				

Name of the Course : Mechanical Engineering Group (Applied Science (Mechanical))			
Course code: ME/PG/PT/AE/MH/FE		Semester : Second	
Duration : <b>6 SEMESTERS</b>		Maximum Marks :	
Teaching Scheme <b>C</b>		Examination Scheme	
Theory :	12 hrs/week	Mid Semester Exam:	Marks
Tutorial:	2 hrs/week	Assignment & Quiz:	Marks
Practical :	20 hrs/week	End Semester Exam:	Marks
Credit : Nil			
Aim :- Nil			
Objective :-			
S.No	The Student will be able to:		
1.	<ul style="list-style-type: none"> <li>Differentiate kinetic and kinematics and Solve the problems on kinematics and kinetics.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Graphically represent rectilinear motion, S.H.M. and use for solving engineering problems.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Use N.D.T. in quality assurance and saving of man power, machining, materials,</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Use principles of illumination for enhancing work efficiency</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Analyze variation of sound intensity with respect to distance.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Identify different factors affecting acoustical planning of buildings</li> </ul>		
7.	<ul style="list-style-type: none"> <li>Identify different factors affecting indoor lighting.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of The Topic)			Hrs/week
Unit -1	<b>1. Kinematics</b> 1.1 Rectilinear Motion Equations of Motions- $v=u+at$ , $s=ut+\frac{1}{2}at^2$ , $v^2=u^2+2as$ (only equation), Distance traveled by particle in $n^{\text{th}}$ second, Velocity Time Diagrams-uniform velocity, uniform acceleration and uniform retardation, equations of motion for motion under gravity. 1.2 Angular Motion Definition of angular displacement, angular velocity, angular acceleration, Relation between angular velocity and linear velocity, Three equations of circular motion (no derivation) angular distance traveled by particle in $n^{\text{th}}$ second (only equation), Definition of S.H.M. and S.H.M. as projection of uniform circular motion on any one diameter, Equation of S.H.M. and Graphical representation of displacement, velocity, acceleration of particle in S.H.M. for S.H.M. starting from mean position and from extreme position. <b>2. Kinetics</b> <b>2.1</b> Definitions of momentum, impulse, impulsive force, Statements of		14
			15

Unit -2	<p>Newton's laws of motion and with equations, Applications of laws of motion—Recoil of gun, Motion of two connected bodies by light inextensible string passing over smooth pulley, Motion of lift.</p> <p>2.2 Work ,power ,Energy Definition of work, power and energy, equations for P.E. K.E., Work energy principle, Representation of work by using graph, Work done by a torque(no derivation)</p>		
Unit -3	<p>3. Non –destructive testing of Materials.</p> <p>3.1 Testing methods of materials -Destructive and Nondestructive, Advantages and Limitations of N.D.T., Names of N.D.T. Methods used in industries, Factors on Which selection of N.D.T. dependents, Study of Principle, Set up, Procedure,</p> <p>3.2 Working, Advantages, limitations, Applications and Application code of following N.D.T. methods -Penetrant method, Magnetic particle method, Radiography, Ultrasonic, Thermography.</p>	<b>05</b>	<b>10</b>
Unit -4	<p>Acoustics and Indoor Lighting of Buildings</p> <p>4.1 Acoustics Weber and Fletcher's law, limit of intensity and loudness, echo, Reverberation and reverberation time (Sabine's formula) ,Timbre (quality of sound), Pitch or Frequency of sound. Factors affecting Acoustical planning of auditorium-- echo, reverberation, creep, focusing, standing wave, coefficient of absorption, sound insulation, noise pollution and the different ways of controlling these factors.</p> <p>4.2 Indoor lighting Definition of luminous intensity, intensity of illumination with their SI units, Inverse square law and Photometric equation, Bunsen's photometer— ray diagram, working and applications, Need of indoor lighting ,Indoor lighting schemes and Factors Affecting Indoor Lighting.</p>	<b>05</b>	<b>10</b>
	<b>Total</b>	<b>24</b>	<b>35</b>
<b>Practical</b>			
<b>Skills to be developed:</b>			
Intellectual skills:	<ul style="list-style-type: none"> <li>▪ Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement.</li> <li>▪ To verify the principles, laws, using given instruments under different conditions.</li> <li>▪ To read and interpret the graph.</li> <li>▪ To interpret the results from observations and calculations.</li> <li>▪ To use these results for parallel problems.</li> </ul>		
Motor skills:	<ul style="list-style-type: none"> <li>▪ Proper handling of instruments.</li> <li>▪ Measuring physical quantities accurately.</li> </ul>		

- To observe the phenomenon and to list the observations in proper tabular form.
- To adopt proper procedure while performing the experiment. List of Practical:

1. To represent simple harmonic motion with the help of vertical oscillation of spring and to determine spring constant (K) (Stiffness Constant)
2. To determine time period of oscillation of compound bar pendulum and calculate acceleration due to gravity.
3. To determine the velocity of sound by using resonance tube
4. To compare luminous intensities of two luminous bodies by using Bunsen's photometer.
5. To calculate coefficient of absorption for acoustical materials
6. To determine Joule's constant (J) by electric method
7. To determine wavelength of Sodium light by using Newton's rings
8. To Verify Ampere's rule using Oersted's Experiment and find variation of intensity of magnetic field with Current and Distance
9. To determine frequency of sound by using sonometer .
10. To calculate refractive index of material of prism using spectrometer device .
11. To determine the divergence of He-Ne laser beam.

Laboratory based Mini Projects:

1. To detect surface cracks in the working piece by using liquid penetration method (LPT).
2. To determine coefficient of thermal conductivity of good conductor by using Searle's method
3. To determine the moments of inertia ( $I_{\alpha}$  and  $I_{\beta}$ ) of the given irregular body and to determine the rigidity modulus of the material of the given suspension wire by setting up a torsional pendulum.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
V. Rajendran	Physics-I		Tata McGraw- Hill
Arthur Beiser	Applied physics		Tata McGraw- Hill

R.K.Gaur and S.L.Gupta	Engineering Physics		Dhanpatrai
Rensic and Halliday	Physics		--
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			
Part B: Applied Chemistry			
Rationale: This syllabus of chemistry for Mechanical / Production / Automobile Students is classified Under the Category of Applied Science. It is intended to teach students the appropriate use of engineering materials, their protection & lubrication processes in different working conditions of machines.			
Objective :-			
S.No	The Student will be able to:		
1.	Suggest the appropriate use of metals, alloys & non metallic materials in engineering.		
2.	Applying the Knowledge to Protect Metallic & Non Metallic Surfaces		
3.	Select Lubricants for Smooth Running of Machines.		

Contents : Theory (Name of the Topic)		Hrs/ week	Marks
01	<p>Electrochemistry Definition of Electrolyte &amp; Conductor, Difference between Metallic &amp; Electrolytic Conduction, Ionisation, Degree of Ionisation &amp; Factors Affecting Degree of Ionisation, Conductivity of Electrolytes.</p> <p>Definition of Electrochemical Cell, Battery, Charge, Discharge, Closed Circuit Voltage, Open Circuit Voltage, EMF, Internal Resistance, Separator, Classification of Batteries such as Primary, Secondary &amp; Reserve with Examples.</p> <p>Industrial Application of Electrolysis – Metallic or Protective Factors for Selection of Method of Coating, Process of Electroplating, Electrowinning, Electrometallurgy (Applications of Electroplating), Impregnated Coating or Cementation on Base Metal Steel - Coating Metal Zn (Sheradizing), Cr (Chomozing), Al (Colorizing), Applications, Advantages &amp; Disadvantages.</p>	05	07
02	<p>Non Metallic Engineering Materials (Plastic, Rubber, Insulators, Refractories, Composite Material, Ceramics)</p> <p>1. Engineering Plastic: Special Characteristics &amp; Engineering Applications of Polyamides or Nylons, Polycarbonates (Like Lexan, Merlan), Polyurethanes (Like Perlon – U), Silicons, Polyacetals, Teflon, Laminated Plastic, Thermocole,</p>	05	05

	<p>Reinforced Plastic.</p> <p>2. Ceramics: Definition, Properties &amp; Engineering Applications, Types – Structural Ceramics, Facing Material, Refractories, Fine Ceramics, Special Ceramics.</p> <p>3. Refractories: Definition, Properties, Applications &amp; Uses of Fire Clay, Bricks, Silica Bricks.</p> <p>4. Composite Materials: Definition, Properties, Advantages, Applications &amp; Examples.</p>		
03	<p>Metals &amp; Alloys Metals – Metallurgy of Iron, Terms Involved in Metallurgy, Indian Resources of Fe, Imp Ores, Extraction, Smelting in Blast Furnace, Chemical Reactions in Blast Furnace, Products of Blast Furnace, their Composition, Application, Commercial Forms of Iron, (Pig Iron / Cast Iron, Wrought or Malleable Steel), their Composition, Properties &amp; Applications, Types of Casting (Chilled Casting, Centrifugal Casting &amp; Malleable Casting), Heat Treatment, Heat Treatment of Cast Iron &amp; Steel.</p> <p>Alloys – Definition, Types, Ferrous Alloys – Steel, Composition, Properties &amp; Applications of Plain Carbon Steel (Low Carbon, Medium Carbon, High Carbon &amp; Very Hard Steel) &amp; Alloy Steels, (Heat Resisting, Shock Resisting, Magnetic, Stainless, Tool Steel &amp; HSS), Effect of Various Alloying Elements (Cr, W, V, Ni, Mn, Mo, Si) etc. on Steel.</p> <p>Non-Ferrous Alloys – Copper Alloy – Brass, Bronze, Nickel Silver or German Silver, their Composition, Properties &amp; Applications, Aluminium Alloy – Duralumin, Bearing Alloy – Babbitt Metal, Solders – Soft Solder, Brazing Alloy, Tinamann’s Solder, Nickel Alloy – Monel Metal, Low Melting Alloys – Woods Metal.</p>	08	10
04	<p>Corrosion Definition, Types, Atmospheric or Chemical Corrosion, Mechanism, Factors Affecting Atmospheric, Corrosion &amp; Immersed Corrosion or Electrochemical Corrosion, Mechanism, Protection of Metals by Purification of Metals, Alloy Formation, Cathode Protection, Controlling the External Conditions &amp; Application of Protective Coatings i.e. Galvanising, Tinning, Metal Spraying, Sherardizing, Electroplating, Metal Clodding, Cementation or Diffusion Method, their Definition, Procedure, Uses, Advantages &amp; Disadvantages, Examples of Non Corrosive Materials, Protection of Corrosion by the Use of Organic Coating Like Paint, Lacquer, Enamels, Emulsion Paints, Special Paints, their Properties &amp; Uses.</p> <p>Special Paints – Heat Resistant, Cellulose Paint, Coaltar Paint, Antifouling Paint their constituents &amp; applications.</p>	06	08



05	Lubricant Lubricant, Types, Lubrication Mechanism by Fluid Film, Boundary, Extreme Pressure, Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oilness, Volatility, Flash & Fire Point, Cloud & Pour Point, Chemical Characteristics such as Acid Value or Neutralization Number, Emulsification, Saponification Value, Selection of Lubricants for Various Types of Machineries.	03	05
	Total	27	35
Practical:	Skills to be developed:		
Intellectual Skills:	<ul style="list-style-type: none"> <li>• Select proper equipment and instruments</li> <li>• Interpret results</li> </ul>		
Motor Skills:	<ul style="list-style-type: none"> <li>• Accuracy in measurement</li> <li>• Careful use of equipment</li> </ul>		
List of Practical:			
01	To determine neutralization point of weak acid and weak base by conductivity meter.		
02	To determine end point of titration between dil. H <sub>2</sub> SO <sub>4</sub> and BaCl <sub>2</sub> using conductivity meter.		
03	To verify Faraday's second law of electrolysis.		
04	To determine pH of given solution by using pH paper, universal indicator and pH meter.		
05	To determine the strength of given hydrochloric acid solution by titrating it against sodium hydroxide solution using pH meter.		
06	To determine percentage of copper from brass iodometrically.		
07	To find the rate of corrosion of Al strip in acidic and basic medium graphically.		
08	To determine thinner content in paint.		
09	To determine acid value of given lubricant.		
10	To determine viscosity of given oil by using Ostwald's viscometer.		
11	To determine saponification value of given lubricant.		
Laboratory based mini projects			
13	To compare the quality of lubricating oil available in the market by testing their physical / chemical characteristics in the laboratory and decide their scope of application.		
14	To find the rate of corrosion of different metals like Al, Fe, Cu, steel etc. and decide their scope of utilization in industry for mechanical purposes.		
<b>Text Books:</b>			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Jain & Jain	Engineering Chemistry		Dhanpat Rai and Sons
S. S. Dara	Engineering Chemistry		S. Chand Publication
B. K. Sharma	Industrial Chemistry		Goel Publication
S. S. Dara	Environmental Chemistry & Pollution Control		S. Chand Publication

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION													
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES													
COURSE NAME: AUTOMOBILE ENGINEERING													
COURSE CODE : AE													
DURATION OF COURSE : 6 SEMESTERS													
SEMESTER: THIRD										SCHEME : C			
Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME								Credits
		L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @		
					TA	CT	Total						
1	Applied Mathematics	03	-1-	--	10	20	30	70	--	--	--	3	
2	Mechanical Engineering Drawing	02	--	04	10	20	30	70	--	25	25	4	
3	Strength of Materials	03	--	02	10	20	30	70	--	--	25	4	
4	Materials and Manufacturing Processes	03	--	04	10	20	30	70	--	25	25	5	
5	Automobile Transmission Systems	02	--	02	10	20	30	70	50	--	--	3	
6	Development of Life Skills – II	01	--	02	--	--	--	--	--	25	25	2	
7	Professional Practices- III	--	--	02	--	--	--	--	--	--	50	1	
<b>Total</b>		14	1--	16	50	<b>100</b>	<b>150</b>	<b>350</b>	50	75	150	22	

STUDENT CONTACT HOURS PER WEEK: **31 HRS**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH**  
# , External Assessment @ , Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, P - Practical  
TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.  
**Total Marks : 775**

Minimum passing for sessional marks is 40%, and for theory subject 40%.  
Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : <b>Mechanical and Production Engineering / Production Technology (Professional Practices-III)</b>	
Course code: <b>ME/PT/PG/MH/MI</b>	Semester : Third
Duration :	Maximum Marks :
Teaching Scheme	Examination Scheme
Theory : 0 hrs/week	Mid Semester Exam: - Marks
Tutorial: 0 hrs/week	Assignment & Quiz: - Marks
Practical : 2 hrs/week	End Semester Exam: - Marks
Credit : Nil	
Aim :-	
S.No	
1.	<ul style="list-style-type: none"> <li>To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.</li> </ul>
Objective :-	
S.No	Student will be able to:
1.	<ul style="list-style-type: none"> <li>Acquire information from different sources.</li> <li>Prepare notes for given topic.</li> <li>Present given topic in a seminar.</li> </ul>
2.	<ul style="list-style-type: none"> <li>Interact with peers to share thoughts.</li> <li>Prepare a report on industrial visit, expert lecture</li> </ul>

Serial No.	Activities	Hours
1	<p><b>Industrial Visits</b>            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.  <b>TWO</b> industrial visits may be arranged in the following areas / industries :</p> <ul style="list-style-type: none"> <li>i) Manufacturing organizations for observing various manufacturing processes including heat treatment</li> <li>ii) Material testing laboratories in industries or reputed organizations</li> <li>iii) Auto workshop / Garage</li> <li>iv) Plastic material processing unit</li> <li>v) ST workshop / City transport workshop</li> </ul>	08
2	<p>Lectures by Professional / Industrial Expert be organized from <b>ANY THREE</b> of the following areas :</p> <ul style="list-style-type: none"> <li>i) Use of a plastics in automobiles.</li> <li>ii) Nonferrous Metals and alloys for engineering applications</li> <li>iii) Surface Treatment Processes like electroplating, powder coating etc.</li> <li>iv) Selection of electric motors.</li> <li>v) Computer aided drafting.</li> <li>vi) Industrial hygiene.</li> <li>vii) Composite Materials.</li> <li>viii) Heat treatment processes.</li> <li>ix) Ceramics</li> <li>x) Safety Engineering and Waste elimination</li> </ul>	08
3	<p><b><u>Individual Assignments :</u></b>  <b>Any two</b> from the list suggested</p> <ul style="list-style-type: none"> <li>a) Process sequence of any two machine components.</li> <li>b) Write material specifications for any two composite jobs.</li> <li>c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications.</li> <li>d) Preparing models using development of surfaces.</li> <li>e) Assignments on bending moment , sheer forces , deflection of beams and torsion chapters of strength of material.</li> <li>f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable.</li> <li>g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes.</li> <li>h) List the various properties and applications of following materials – a. Ceramics            b. fiber reinforcement plastics            c. thermo plastic plastics d. thermo setting plastics            e. rubbers.</li> </ul> <p>OR</p> <p>Conduct <b>ANY ONE</b> of the following activities through active participation of students and write report</p> <ul style="list-style-type: none"> <li>i) Rally for energy conservation / tree plantation.</li> <li>ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.</li> <li>iii) Conduct aptitude , general knowledge test , IQ test</li> </ul>	08

	iv) Arrange <b>any one</b> training in the following areas : a) Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances.	
4	<b><u>Modular courses ( Optional ) :</u></b> A course module should be designed in the following areas for max. 12 hrs. Batch size – min. 15 students. Course may be organized internally or with the help of external organizations. a) Forging Technology. b) CAD-CAM related software. c) Welding techniques. d) Personality development. e) Entrepreneurship development.	08
5	<b><u>3-D Design using software</u></b> Computer screen, coordinate system and planes, definition of HP,VP, reference planes How to create them in 2 <sup>nd</sup> /3 <sup>rd</sup> environment. Selection of drawing site & scale. Commands of creation of Line, coordinate points, Axis, Poly lines, square, rectangle, polygon, sp line, circles, ellipse, text, move, copy, offset, Mirror, Rotate, Trison, Extend, Break, Chamfer, Fillet, Curves, Constraints fit tangency, perpendicularity, dimensioning Line convention, material conventions and lettering.  The Student should draw – different orthographic Views (including sections), Auxiliary views according to first/ Third angle method of projection. (Minimum two sheets, each containing two problems) after learning the contents as above.	16
<b>Total</b>		<b>48</b>
Pre-Requisite :- Nil		
Contents:- Nil		Hrs/week
Text Books:- Nil		
Reference books :- Nil		
Suggested List of Laboratory Experiments :- Nil		
Suggested List of Assignments/Tutorial :- Nil		

Name of the Course : Civil and Mechanical Engineering Group (Applied Mathematics)			
Course code: CE/AE/ME/PG/PT/MH/MI		Semester : Third	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	1 hrs/week	Assignment & Quiz:	10 Marks
Practical :	0 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To develop the essential skills for new technological development and introduces some applications of engineering, to understand the link of Mathematics with engineering principles.</li> </ul>		
Objective :-			
S.No	The student will be able to:		
1.	<ul style="list-style-type: none"> <li>Apply Mathematical term, concept, principles and different methods for studying engineering subjects</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Apply Mathematical methods to solve technical problems.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Execute management plans with precision.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Use Mathematical techniques necessary for daily and practical problems.</li> </ul>		
Pre-Requisite :- Nil			
Contents (Theory) Name of Topic		Hrs/week	Marks
Unit -1	<b>Integration:</b> 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. 1.4 Definite Integration. 1.4.1 Definition of definite integral. 1.4.2 Properties of definite integral with simple problems.	10	18

	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. 1.5.4 Moment of Inertia of uniform rod, rectangular lamina 1.5.5 Theorems of parallel and perpendicular axes.	08	10
Unit -2	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, Nonhomogeneous, Exact, Linear and Bernoulli equations.  2.3 Applications of Differential equations. <b>2.3.1 Rectilinear motion (motion under constant and variable acceleration)</b> 2.3.2 Simple Harmonic Motion.	10	10             08
Unit - 3	Probability Distribution  3.1 Binomial distribution. 3.2 Poisson's distribution. 3.3 Normal distribution 3.4 Simple examples corresponding to production process.	08	12
Unit - 4	Numerical Methods  4.1 Solution of algebraic equations Bisection method, Regula-falsi method and Newton – Raphson method.  4.2 Solution of simultaneous equations containing 2 and 3 unknowns Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's methods.	06             06	06             06
	Total	48	70
<b>Text Books:</b>			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mathematics for polytechnic	S. P. Deshpande		Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith		Tata McGraw Hill
Advanced	Murray R Spiegel		Schaum outline series

Mathematics for Engineers and Scientist			McGraw Hill
Higher Engineering Mathematics	B. S. Grewal		Khanna Publication, New Dehli
Introductory Methods of Numerical analysis	S. S. Sastry		Prentice Hall Of India New Dehli
Numerical methods for Engg. 4 <sup>th</sup> ed.	Chapra		Tata McGraw Hill
Numerical methods for scientific & engineering computations	M. K. Jain & others		Wiley Eastern Publication.
<b>Reference books :-</b>			
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>	<b>Name of the Publisher</b>
R. Jasse Phagan	Applied Mathematics		
Mark. H. Holmes	Introduction to foundations of applied mathematics.		
<b>Suggested List of Laboratory Experiments :- Nil</b>			
<b>Suggested List of Assignments/Tutorial :- Nil</b>			



Name of the Course : Mechanical Engineering and Technology (Development of Life Skills-II)		
Course code: ME / PG / PT / AE / FE / MI		Semester : THIRD
Duration :		Maximum Marks :
Teaching Scheme		Examination Scheme
Theory :	1 hrs/week	Mid Semester Exam: - Marks
Tutorial:	0 hrs/week	Assignment & Quiz: 10 Marks
Practical :	2 hrs/week	End Semester Exam: - Marks
Credit :- Nil		
Aim :-		
S.No		
1.	<ul style="list-style-type: none"> <li>To 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. To enhance capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.</li> </ul>	
Objective :-		
S.No	Objectives: the students will be able to:	
1.	<ul style="list-style-type: none"> <li>Developing working in teams</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Apply problem solving skills for a given situation</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Use effective presentation techniques</li> </ul>	
4.	<ul style="list-style-type: none"> <li>Apply techniques of effective time management</li> </ul>	
5.	<ul style="list-style-type: none"> <li>Apply task management techniques for given projects</li> </ul>	
6.	<ul style="list-style-type: none"> <li>Enhance leadership traits</li> </ul>	
7.	<ul style="list-style-type: none"> <li>Resolve conflict by appropriate method</li> </ul>	
8.	<ul style="list-style-type: none"> <li>Survive self in today's competitive world</li> </ul>	
9.	<ul style="list-style-type: none"> <li>Face interview without fear</li> </ul>	
10.	<ul style="list-style-type: none"> <li>Follow moral and ethics</li> </ul>	
11.	<ul style="list-style-type: none"> <li>Convince people to avoid frustration</li> </ul>	
Pre-Requisite :- Nil		
Contents (Theory)		Hrs/week
Unit -1	<b>SOCIAL SKILLS</b> SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	<b>01</b>
Unit -2	Swot Analysis – Concept , How to make use of SWOT.	<b>01</b>
Unit - 3	<b>Inter personal Relation</b> Sources of conflict, Resolution of conflict ,	<b>02</b>

	Ways to enhance interpersonal relations.	
Unit – 4	<p><b>Problem Solving</b></p> <p><b>I)STEPS IN PROBLEM SOLVING,</b></p> <p>1)IDENTIFY AND CLARIFY THE PROBLEM,  2)INFORMATION GATHERING RELATED TO PROBLEM,  3)EVALUATE THE EVIDENCE,  4)CONSIDER ALTERNATIVE SOLUTIONS AND THEIR IMPLICATIONS,  5)CHOOSE AND IMPLEMENT THE BEST ALTERNATIVE,  6)REVIEW</p> <p>II)Problem solving technique.(any one technique may be considered)</p> <p>1) Trial and error, 2) Brain storming, 3) Lateral thinking</p>	<b>02</b>
Unit – 5	<p><b>Presentation Skills</b></p> <p>Body language --  Dress like the audience  Posture, Gestures, Eye contact and facial expression.</p> <p>PRESENTATION SKILL –  STAGE FRIGHT,  Voice and language – Volume, Pitch, Inflection, Speed, Pause  Pronunciation, Articulation, Language,  Practice of speech.  Use of aids –OHP,LCD projector, white board</p>	<b>03</b>
Unit – 6	<p><b>Group discussion and Interview technique –</b></p> <p>Introduction to group discussion,  Ways to carry out group discussion,  Parameters— Contact, body language, analytical and logical thinking, decision making</p> <p><b>INTERVIEW TECHNIQUE</b></p> <p>NECESSITY,  TIPS FOR HANDLING COMMON QUESTIONS.</p>	<b>03</b>
Unit – 7	<p><b>Working in Teams</b></p> <p>UNDERSTAND AND WORK WITHIN THE DYNAMICS OF A GROUPS.  TIPS TO WORK EFFECTIVELY IN TEAMS,  ESTABLISH GOOD RAPPOR, INTEREST WITH OTHERS AND WORK EFFECTIVELY WITH THEM TO MEET COMMON OBJECTIVES,  TIPS TO PROVIDE AND ACCEPT FEEDBACK IN A CONSTRUCTIVE AND CONSIDERATE WAY ,  LEADERSHIP IN TEAMS, HANDLING FRUSTRATIONS IN GROUP.</p>	<b>02</b>

Unit – 8	<b>Task Management</b> INTRODUCTION, TASK IDENTIFICATION, TASK PLANNING ,ORGANIZING AND EXECUTION, CLOSING THE TASK	<b>02</b>
	TOTAL	<b>16</b>
Contents (PRACTICAL) List of Assignment: (Any Eight Assignment)		Hrs/week
Unit -1	<ul style="list-style-type: none"> <li>• SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT. <ul style="list-style-type: none"> <li>a) Your past experiences,</li> <li>b) Achievements,</li> <li>c) Failures,</li> <li>d) Feedback from others etc.</li> </ul> </li> <li>• Undergo a test on reading skill/memory skill administered by your teacher.</li> <li>• Solve the puzzles.</li> </ul>	
Unit -2	<ul style="list-style-type: none"> <li>• 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)</li> <li>• Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.</li> <li>• 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. #####</li> </ul>	
Unit - 3	<ul style="list-style-type: none"> <li>• Conduct an interview of a personality and write a report on it.</li> <li>• Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed</li> <li>• Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.</li> </ul>	
<p>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.</p>		

- **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.**

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Adams Time management	Marshall Cooks		Viva Books
Basic Managerial Skills for All	E.H. Mc Grath , S.J.		Pretice Hall of India, Pvt Ltd
Body Language	Allen Pease		Sudha Publications Pvt. Ltd.
Creativity and problem solving	Lowe and Phil		Kogan Page (I) P Ltd
Decision making & Problem Solving	by Adair, J		Orient Longman
Develop Your Assertiveness	Bishop , Sue		Kogan Page India
Make Every Minute Count	Marion E Haynes		Kogan page India
Organizational Behavior	Steven L McShane and Mary Ann Glinow		Tata McGraw Hill
Organizational Behavior	Stephen P. Robbins		Pretice Hall of India, Pvt Ltd
Presentation Skills	Michael Hatton ( Canada – India Project)		ISTE New Delhi
Stress Management Through Yoga and Meditation	--		Sterling Publisher Pvt Ltd
Target setting and Goal Achievement	Richard Hale ,Peter Whilom		Kogan page India
Time management	Chakravarty, Ajanta		Rupa and Company
Working in Teams	Harding ham .A		Orient Longman

**INTERNET ASSISTANCE**

1. <http://www.mindtools.com>
2. <http://www.stress.org>

3. <http://www.ethics.com>
4. <http://www.coopcomm.org/workbook.htm>
5. <http://www.mapfornonprofits.org/>
6. <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
7. <http://eqi.org/>
8. <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
9. <http://www.mapnp.org/library/ethics/ethxgde.htm>
10. [http://www.mapnp.org/library/grp\\_cnfl/grp\\_cnfl.htm](http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm)
11. <http://members.aol.com/nonverbal2/diction1.htm>
12. [http://www.thomasarmstron.com/multiple\\_intelligences.htm](http://www.thomasarmstron.com/multiple_intelligences.htm)
13. <http://snow.utoronto.ca/Learn2/modules.html>
14. <http://www.quickmba.com/strategy/swot/>

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : <b>Mechanical Engineering Group</b> (Strength of Materials)			
Course code: <b>ME/PG/PT/AE/MH/MI</b>		Semester : Third	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit : Nil			
Aim :-			
S.No			
1.	To understand & analyze various types of loads, stresses & strains along with main causes of failure of machine parts. Understanding principles of machine design. mechanical properties of materials for selecting the suitable materials for various engineering applications.		
Objective :-			
S.No	The Student should be able to:		
1.	<ul style="list-style-type: none"> <li>Understand the fundamentals of solid mechanics.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Acquire elementary knowledge of stresses, strains &amp; material properties.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Understand &amp; analyze the basic principles involved in the behavior of machine parts under load in the context of designing it.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Understand &amp; analyze the mechanical properties of the various materials.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)		Hrs/week	Marks
01	<p>Mechanical Properties of Materials, Simple stresses &amp; Strains</p> <p>1.1 Types of loads, Simple stresses &amp; strains viz. tensile, compressive, Shear, Crushing, Thermal stresses, Hoop stresses &amp; corresponding strains, Volumetric Strain, Bulk modulus, Hook's law, Young's modulus, Modulus of Rigidity, stress-strain curves for ductile &amp; brittle materials, Poisson's ratio.</p> <p>1.2 Concept of stresses &amp; strains in thin cylindrical &amp; spherical shells subjected to internal pressure.</p> <p>1.3 Concepts of Buckling – Rankine's &amp; Euler's formulae for buckling load for columns / shafts under compression, concepts of equivalent length for various end conditions.</p> <p>1.4 Concepts of Deflection &amp; slope of beams – relation between bending moment &amp; slope. Deflection of simply supported beams and cantilever beams subjected to point load. (No derivation)</p> <p>(Problems on compressive &amp; tensile stresses, Thermal stresses, butt &amp; lap riveted joints, simple cases of buckling).</p>	10	18

02	<p>Strain Energy</p> <p>2.1 Concept, derivation &amp; use of expression for deformation of axially loaded members under gradual, sudden &amp; impact load.</p> <p>2.2 Strain energy due to self-weight.</p>	03	04
03	<p>Bending Moment &amp; Shear Force</p> <p>1.1 Shear force, bending moment &amp; relation between them.</p> <p>1.2 Shear force &amp; bending moment diagrams for simply supported beam &amp; cantilevers subjected to point loads &amp; Uniformly distribution load, concept of Uniformly varying load &amp; couples acting on beam</p>	08	10
	<p>1.3 Location of point of contraflexure. (Problems to be based on simply supported &amp; cantilever beams with point load &amp; UDL only)</p>		
04	<p>Moment of Inertia</p> <p>4.1 Definition of Moment of inertia, Moment of inertia of different laminae, radius of gyration.</p> <p>4.2 Parallel &amp; perpendicular axis theorem.</p> <p>4.3 Moment of inertia of rectangular, circular, semicircular. Triangular, Hollow Rectangular, symmetrical I - Section, Channel section, Tee- section, angle section about centroidal axis.</p> <p>4.4 Polar moment of inertia.</p>	03	08
05	<p>Bending &amp; Shear stresses</p> <p>5.1 Theory of simple bending, equation of bending.</p> <p>5.2 Assumptions in the theory of bending, moment of resistance, section modulus &amp; neutral axis.</p> <p>5.3 Shear stresses – concepts of direct &amp; transverse shear stress.</p>	06	08
06	<p><b>Combination of Bending &amp; Direct stresses</b></p> <p>6.1 Axial load, eccentric load, direct stresses, bending stresses maximum &amp; minimum stresses.</p> <p>6.2 Application of the above concepts for machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame, stresses at base of a short column, condition for no tension at extreme fibres, total stress variation diagrams. (Simple problems on above applications)</p>	08	10
07	<p>Principal Planes &amp; Principal Stresses</p> <p>7.1 Definition of principal plane &amp; principal stresses.</p> <p>7.2 Expression for normal and tangential stress, maximum shear stress.</p> <p>7.3 Stresses on inclined planes.</p> <p>7.4 Position of principal planes &amp; planes of maximum shear.</p> <p>7.5 Graphical solution using Mohr's circle of Stresses.</p>	06	06
Unit - 8	<p>Torsion</p> <p>8.1 Concept of Pure Torsion, Torsion equation for solid and hollow circular shafts. Assumptions in theory of pure Torsion.</p> <p>8.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft)</p>	04	06

**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.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Andrew Pytel Fedrinand L. Singer	Strength of Material		Addison-Wesley An imprint of Addison Wesley Longman, Inc. Forth edition
G.H.Ruder	Strength of Material		ELBS with Macmillan third edition
B.K.Sarkar	Strength of Material		Tata McGraw hill New Delhi
Dr. R. K.Bansal	A Text Book strength of Material		Laxmi Publication New Delhi
S Ramamrutham	Strength of Material		Dhanpat Rai & Publication New Delhi
R.S.Khurmi	Strength of Material		S.Chand Company Ltd. Delhi
G.K.Narula K.S.Narula	Materials Science		Tata McGraw hill New Delhi

**Reference books :- Nil**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Vitor Dias Da Silva	Mechanics and strength of materials		
Beer, Johnston & dewolf	Mechanics of materials		



Suggested List of Laboratory Experiments :- Nil	
S.No	
1	<ul style="list-style-type: none"> <li>• Study and demonstration of Universal Testing Machine &amp; its attachments.</li> </ul>
2	<ul style="list-style-type: none"> <li>• Study &amp; demonstration of Extensometer.</li> </ul>
3	<ul style="list-style-type: none"> <li>• Tension Test on mild steel, Aluminium &amp; compression test on cast iron on Universal Testing Machine.</li> </ul>
4	<ul style="list-style-type: none"> <li>• Direct Shear Test of mild steel on Universal Testing Machine.</li> </ul>
5	<ul style="list-style-type: none"> <li>• Brinell Hardness Test on Mild Steel.</li> </ul>
6	<ul style="list-style-type: none"> <li>• Rockwell hardness Test on Hardened Steel.</li> </ul>
7	<ul style="list-style-type: none"> <li>• Izod &amp; Charpy - Impact tests of a standard specimen.</li> </ul>
8	<ul style="list-style-type: none"> <li>• Torsion Test on Mild steel bar.</li> </ul>
9	<ul style="list-style-type: none"> <li>• Assignments: Drawing sheet on shear force &amp; bending Moment diagrams for a given loading (At least four problems.).</li> <li>a) Estimation of principal stresses and maximum shear strain for a given combined loading by analytical &amp; Mohr's circle method. (At least two problems.).</li> </ul>
Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : <b>Mechanical Engineering Group</b> (Mechanical Engineering Drawing)			
Course code: <b>AE/PG/PT/ME/MH/MI</b>		Semester : Third	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	2 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	4 hrs/week	End Semester Exam:	70 Marks
Credit : Nil			
Aim :- Nil			
S.No			
1.	<ul style="list-style-type: none"> <li>Understanding of drawing, which includes clear spatial visualization of objects and the proficiency in reading and interpreting a wide variety of production drawings. Also developing drafting skills.</li> </ul>		
Objective :-			
S.No	The Student should be able to –		
1.	<ul style="list-style-type: none"> <li>Interpret industrial drawings.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Interpret instructions related to manufacturing of components.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Use IS convention of representing various machine components.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Visualize the assembly of a given set of details of machine components.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Know the significance &amp; use of tolerances of size, forms &amp; positions.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)		Hrs/week	Marks
Unit -1	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
Unit -2	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	12
Unit -3	Developments of Surfaces. Developments of Lateral surfaces of cube,	08	10

	prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.		
	<p>Conventional Representation:-</p> <ol style="list-style-type: none"> <li>1. Standard convention using SP – 46 (1988) <ol style="list-style-type: none"> <li>(a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber</li> <li>(b) Long and short break in pipe, rod and shaft.</li> <li>(c) Ball and Roller bearing, pipe joints, cocks, valves, internal / external threads.</li> <li>(d) Various sections- Half, removed, revolved, offset, partial and aligned sections.</li> <li>(e) Knurling, serrated shafts, splined shafts, and chain wheels.</li> <li>(f) Springs with square and flat ends, Gears, sprocket wheel</li> <li>(g) Countersunk &amp; counterbore.</li> <li>(h) Tapers</li> </ol> </li> </ol>	04	08
	<p>Limits, Fits and Tolerances:-</p> <ol style="list-style-type: none"> <li>1. Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods.</li> <li>2. Introduction to ISO system of tolerancing, dimensional tolerances, elements of interchangeable system, hole &amp; shaft based system, limits, fits &amp; allowances. Selection of fit.</li> <li>3. Geometrical tolerances, tolerances of form and position and its geometric representation.</li> <li>4. General welding symbols, sectional representation and symbols used in Engineering practices</li> </ol>	04	06
	<p><b>Details to Assembly</b></p> <ol style="list-style-type: none"> <li>1. Introduction-</li> <li>2. Couplings – Universal couplings &amp; Oldham’s Coupling</li> <li>3. Bearing – Foot Step Bearing &amp; Pedestal Bearing</li> <li>4. Lathe tool Post</li> <li>5. Machine vice &amp; Pipe Vice</li> <li>6. Screw Jack</li> <li>7. Steam Stop Valve</li> </ol>	08	12
	<p><b>Assembly to Details</b></p> <ol style="list-style-type: none"> <li>1. Introduction –</li> <li>2. Pedestal Bearing</li> <li>3. Lathe Tail Stock</li> <li>4. Drilling Jig</li> <li>5. Piston &amp; connecting rod</li> <li>6. Gland and Stuffing box Assembly</li> <li>7. Valve – Not more than eight parts</li> </ol>	08	10

	8. Fast & loose pulley		
		Total	48
			70
<p>Practical: Skills to be developed:</p> <p>Intellectual Skills:</p> <ol style="list-style-type: none"> <li>1. Understand interpenetration of solid.</li> <li>2. Interpret limits, fits and tolerances on a given drawing.</li> <li>3. Visualize assembly of components from given details.</li> <li>4. Interpret Conventional symbols as per IS code SP46.</li> <li>5. Identify different materials and their properties.</li> </ol> <p>Motor Skills:</p> <ol style="list-style-type: none"> <li>1. Draw front view and top view of solids Penetrating one with other.</li> <li>2. Conventionally represent limit, fits and tolerances on a given drawing as per the manufacturing processes.</li> <li>3. Give surface roughness values and symbols on a part drawing..</li> <li>4. Setting and use of different drawing equipments.</li> <li>5. Record bill of materials in assembly drawing.</li> <li>6. Use computer aided drafting package.</li> </ol> <p>List of Practical:</p> <p>(Use first angle method of projection)</p> <ol style="list-style-type: none"> <li>1. Intersection of Solids <ol style="list-style-type: none"> <li>(i) One Sheet containing atleast two problems.</li> <li>(ii) Atleast four problems for home assignment in sketch book.</li> </ol> </li> <li>2. Development of surfaces Any two problems on development of surfaces of different objects. (one Sheet)</li> <li>3. Auxiliary views One sheet containing two problems At least two problems as home assignment in sketch book</li> <li>4. Conventional Representation as per SP – 46 (1988) - one sheet</li> <li>5. Limit, Fit, Tolerances and Machining Symbols – one sheet</li> <li>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</li> <li>7. Details to Assembly</li> </ol>			

Draw One sheet covering any one assembly and its details.

Solve at least two problems as home assignment in sketchbook.

8. Two problems on assembly drawings using any CAD Package

(Assembly containing maximum 6 to 7 components-minimum 12 hours)

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N.D.Bhatt	Machine Drawing		Charotar Publication, Anand
IS Code SP 46 (1988)	Code of practice for general engineering drawing.		Engineering Drawing Practice for School and colleges
L.K.Narayanan, P.Kannaich, K.VenkatReddy	Production Drawing		New Age International Publication
P.S.Gill	Machine Drawing		S.K.Kataria and Sons
M.L.Dabhade	Engineering Graphics (For Topic on Auxiliary Views)		--
Sidheshwar	Machine Drawing		Tata McGraw Hill

**Reference books :- Nil**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Paul Green	The Mechanical Engineering Drawing		
K.L.Narayana	Machine drawing		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

Name of the Course : Automobile Engineering (Automobile Transmission Systems)			
Course code: AE		Semester : Third	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	2 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :Nil			
Aim :- Nil			
S.No			
1.	<ul style="list-style-type: none"> <li>To acquaint students with the market needs and mechanical design trends in automotive industry</li> </ul>		
2.	<ul style="list-style-type: none"> <li>To provide students fundamental knowledge of key automotive mechanical systems, parts, and their integration</li> </ul>		
3.	<ul style="list-style-type: none"> <li>To enrich students' ability in utilizing design, engineering and marketing knowledge in product development of automotive mechanical parts and their integration.</li> </ul>		
Objective :-			
S.No	The Student will be able to -		
1.	<ul style="list-style-type: none"> <li>Understand the vehicle layouts, chassis frame &amp; location of various systems.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Know principle, construction and working of clutch, gearboxes, propeller shafts, universal joints, slip joints &amp; final drive in the transmission system.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Understand the terminology of wheels &amp; tyres.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Compare various types of transmission systems.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/week
			Marks
Unit -1	<b>Vehicle layout and Chassis frame:</b> 1.1 Classification and specifications of Chassis- 2-Wheeler, Passenger car, Commercial Vehicle. 1.2 Vehicle layout & its types—2 Wheel Drive- Front Engine Front Wheel Drive, Rear Engine Rear Wheel Drive, Front Engine Rear Wheel Drive & 4 Wheel Drive. 1.3 Major assemblies – their locations and functions. 1.4 Various loads acting on chassis frame. 1.5 Type of frames, frames construction, and material- 2 wheeler and 4 - wheeler.		08
Unit -2	<b>Clutches</b> 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,		10
			12
			14

	<p>Semi-centrifugal clutch, diaphragm clutch.</p> <p>2.3 Materials used for clutch lining.</p> <p>2.4 Hydraulic &amp; mechanical clutch linkage, Cable operated clutch linkage.</p> <p>2.5 Fluid coupling- principle, construction and working.</p>		
Unit - 3	<p><b>Gear Boxes</b></p> <p>3.1 Principle and necessity of Gear Box.</p> <p>3.2 Types, construction and working of gear boxes &amp; their layouts such as sliding mesh, constant mesh, synchromesh type, vario - drive, transfer case.</p> <p>3.3 Gear ratios with the help of power flow diagrams.</p> <p>3.4 Gear shift mechanism.</p> <p>3.5 Overdrive</p> <p>3.6 Concepts of automatic gear box.</p> <p>3.7 Torque Converter- principle, construction and working</p>	10	14
Unit – 4	<p><b>Propeller shafts, universal joints &amp; slip joints</b></p> <p>4.1 Necessity and function of Propeller Shaft.</p> <p>4.2 Constant velocity Joints- Inboard &amp; outboard Joints- Rzeppa Joint, Tripod Joint.</p> <p>4.3 Universal joint and slip joint.</p> <p>4.4 Hotchkiss drive and torque tube drive.</p>	06	08
Unit – 5	<p><b>Final drive</b></p> <p>5.1 Principle, Necessity and function of final drive and differential.</p> <p>5.2 Working of differential and differential lock. Backlash in differential.</p> <p>5.3 Types of rear axles such as semi - floating, three quarter floating and full floating type.</p> <p>5.4 Transmission in two wheeler- chain drive and belt drive.</p> <p>5.5 Spur differential construction.</p>	08	14
Unit – 6	<p><b>Wheels and Tyres</b></p> <p>6.1 Types of wheels, rims and tyres.</p> <p>6.2 Tyre materials, construction.</p> <p>6.3 Necessity and types of treads.</p> <p>6.4 Tyre inflation and its effect. Tyre rotation and nomenclature</p>	06	08
	<b>Total</b>	48	70

**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 & trial.
5. Take reading from various instruments like chassis dynamometer.

**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.
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 drive.
6. Open & observe universal joints such as Hooks universal joint.
7. Open the differential, sketch the unit with bearing locations.
8. Assembly & disassembly of any one type of rear axle.
9. Open any two types of tyres, wheels and rims, observe and sketch.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Anthony Schwaller	Motor automotive technology		Delmar Publisher Inc.
Tim Gills	Automotive service		Delmar Publisher Inc.
Anil Chikkara	Automobile Engineering Vol. II		Satya Prakashan New Delhi
Crouse / Anglin.	Automobile Mechanics		TATA McGraw – HILL
Kirpal Singh	Automobile Engineering Vol.I		Standard Publication
Harbans Singth Royat	The Automobile		S. Chand Publication
R.B. Gupta	Automobile Engineering		Satya Prakashan New Delhi
S. Srinivisan	Automotive Mechanics		TATA McGraw – HILL
H M SETHI	Automotive Technology		TATA McGraw– HILL

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
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R.K Rajput	A text book of Automobile Engineering		
John Whipp	Transmission Chassis & related systems		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : <b>Automobile Engineering</b> (Materials & Manufacturing Processes)				
Course code: <b>AE</b>		Semester : <b>Third</b>		
Duration :		Maximum Marks :		
Teaching Scheme		Examination Scheme		
Theory :	3 hrs/week	Mid Semester Exam:	- Marks	
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks	
Practical :	4 hrs/week	End Semester Exam:	70 Marks	
Credit :- Nil				
Aim :-				
S.No				
1.	<ul style="list-style-type: none"> <li>Knowledge of various materials required for cutting tools, Dies, Gears, Bearings and many other applications. Knowledge of selection of proper tool materials, heat treatments for specific materials, ferrous and non-ferrous materials and their alloys for various engineering application, as well as insulating, refractory and plastic materials as per the requirements is essential.</li> </ul>			
Objective :-				
S.No	The student will be able to:			
1.	<ul style="list-style-type: none"> <li>Know various engineering materials, their properties and selection of these materials for different engineering applications.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Know the different heat treatment processes and their applications.</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Understand the foundry operations and able to prepare the patterns, moulds and castings.</li> </ul>			
4.	<ul style="list-style-type: none"> <li>Select and use different cutting tools in machining operation.</li> </ul>			
5.	<ul style="list-style-type: none"> <li>Know basic machine tools like lathe machine and drilling machine used in manufacturing process.</li> </ul>			
6.	<ul style="list-style-type: none"> <li>Select appropriate speeds. Feeds and depth of cut for various machining operations.</li> </ul>			
Pre-Requisite :- Nil				
Contents : Theory (Name of the Topic)			Hrs/week	Marks
Unit -1	Engineering Materials : 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, Heat resistance		12	18

	<p>steels, Shock resistance steels, their composition, applications &amp; color coding as per BIS.</p> <p>1.3 Designation of cast iron and steel. Designation as per IS and SAE</p> <p>1.4 Non-ferrous metals and their alloys: 1.4.1 Aluminium and its 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.</p> <p>1.5 Polymeric materials : Thermoplastics , thermosetting Plastics, Fibre, rubber their properties and applications.</p> <p>1.6 Composite materials</p>		
Unit -2	<p>Heat treatment:</p> <p>2.1 Introduction : purpose, advantages, Fe-C phase transformation diagram, TTT diagram.</p> <p>2.2 Common heat treatment processes : Annealing, sub-critical annealing, normalizing, hardening, tempering .</p> <p>2.3 Surface hardening processes : case carburizing, nit riding, Induction and flame hardening.</p> <p>2.4 Selection and applications of heat treatment processes.</p>	10	12
Unit - 3	<p>Foundry:</p> <p>3.1 Types of Foundries , Advantages and disadvantages of foundry process.</p> <p>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.</p>	12	18
Unit - 4	<p>Fundamentals of machining:</p> <p>4.1 Mechanism of chip formation.</p> <p>4.2 Types of chips.</p> <p>4.3 Types of cutting tools: single and multi point.</p> <p>4.4 Cutting tool materials: Selection, Properties and types.</p> <p>4.5 Single point cutting Tool nomenclature and tool signature.</p> <p>4.6 Cutting fluids: Properties, types.</p>	06	08
Unit - 5	<p>Lathe and drilling machine :</p> <p>5.1 Process capability, geometrical and dimensional accuracy that can be achieved on lathe and drill machine.</p> <p>5.2 Classification of lathes and drilling machines.</p> <p>5.3 Accessories and attachments used on lathe.</p> <p>5.4 Operations performed on lathe – Turning, Facing, Knurling, Threading.</p> <p>5.5 Operations performed on drilling machines – drilling, reaming.</p>	08	14

	5.6 Cutting parameters: speed, feed and depth of cut.		
		Total	48
			70

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

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Elements of Workshop Technology Vol. - I & II		Media Promoters & Publishers
H. S. Bawa	Workshop Technology Vol. - I & II.		Tata McGraw-Hill Publishing
R. K. Jain	Production technology		Khanna Publishers. Delhi.
Dr. W. A. J. Chapman	Workshop Technology Part- I, II & III		ELBS & Edward Arnold ( Publishers ) Ltd., London
B. H. Amstead, Phillip Ostwald, Myronl Begeman.	Manufacturing Processes		John Wiley & Sons
H.M.T.	Production Technology		H.M.T.

Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Rajiv Asthana,Ashok Kumar,Narendra Dahotre	Materials Processing & manufacturing Science.		
Fritz Klocke	Manufacturing Processes		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION													
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES													
COURSE NAME: AUTOMOBILE ENGINEERING													
COURSE CODE : AE													
DURATION OF COURSE : 6 SEMESTERS													
SEMESTER: FOURTH SEMESTER										SCHEME : C			
Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME								Credits
		L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @		
					TA	CT	Total						
1	Theory of Machines & Mechanisms	03	--	02	10	20	30	70	--	--	25	4	
2	Automobile Engines	03	--	04	10	20	30	70	50	--	25	5	
3	Automobile Systems	03	--	02	10	20	30	70	--	25	25	4	
4	Heat Power Engineering	03	--	02	10	20	30	70	--	25	25	4	
5	Automobile Manufacturing Processes	03	--	02	10	20	30	70	--	--	25	4	
6	Computer Programming	01	--	02	--	--	--	--	50	--	--	2	
7	Professional Practices- IV	--	--	02	--	--	--	--	--	--	50	1	
<b>Total</b>		16	--	16	50	<b>100</b>	<b>150</b>	<b>350</b>	100	50	175	24	

STUDENT CONTACT HOURS PER WEEK: **32 HRS**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH**  
# , External Assessment @ , Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, P - Practical  
TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.  
**Total Marks : 825**

Minimum passing for sessional marks is 40%, and for theory subject 40%.  
Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : Diploma in Automobile Engineering (Automobile Engines)			
Course code: AE		Semester : Fourth	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	4 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :- Nil			
Objective :-			
S.No	Students will be able to:		
1.	<ul style="list-style-type: none"> <li>Understand engine principle and fundamentals.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Understand Constructional features of automobile engine components.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Understand Engine cooling system.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Understand Engine Lubrication systems.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Understand Fuel Systems.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Understand engine power calculations.</li> </ul>		
7.	<ul style="list-style-type: none"> <li>Analyse engine condition by performing Morse / Motoring test.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory(Name of the Topic)			Marks
Unit -1	Engine principles and fundamentals 1.1 Introduction 1.2 Basic engine nomenclature. 1.3 Classification of automobile engines. 1.4 Use of engines 1.5 Merits and Demerits of vertical and horizontal engines. 1.6 Four stroke SI and CI engine 1.7 Two stroke cycle engine. 1.8 Comparison of two stroke and four stroke cycle engine 1.9 Reasons for using single cylinder two stroke and four stroke cycle engine.	06	12
Unit -2	Constructional features of automobile engine components. 2.1 Cylinder block, cylinder liner, types of liner, comparison of dry and wet liners, cylinder head, gaskets, type of gaskets, piston, piston ring pin etc. 2.2 Piston, piston rings, Piston ring joints, piston pin. 2.3 Crank shaft, camshaft, connecting rod, valve, valve cooling, valve mechanisms, valve timing, port-timing diagram, manifolds, silencers, flywheel etc. 2.4 Types of camshaft drives.	08	12

	2.5 Rotary and reed valve		
Unit – 3	<p>Engine cooling system</p> <p>3.1 Introduction – Purpose of cooling</p> <p>3.2 Systems- Air cooling system, water cooling systems.</p> <p>3.3 Comparison of air &amp; water cooling systems.</p> <p>3.4 Parts of cooling system. Thermostat, water expansion tank, Temperature Indicator Pressure cap, water pump, fan and fan belt, radiator.</p> <p>3.5 Cooling water additions</p>	04	08
Unit – 4	<p>Lubrication systems</p> <p>4.1 Introduction</p> <p>4.2 Purpose of lubrication, parts to be lubricated, functions and properties of engine lubricating oils, additives for lubricants, classification of lubricating oils.</p> <p>4.3 Dry Sump lubrication system, wet sump lubrication system, petrol lubrication system, pressurized lubrication system, splash lubrication system.</p>	06	08
05	<p>Fuel Systems</p> <p>Part A</p> <p>5.1 Fuel feed system in petrol engines.</p> <p>5.2 Mechanical fuel pump, electrical fuel pump</p> <p>5.3 Principles of carburetion.</p> <p>5.4 Simple 112arburetor.</p> <p>5.5 Starting, Idling &amp; slow running, acceleration, Main metering system, choke system.</p> <p>5.6 S.U. Carburettor, solex 112arburetor.</p> <p>5.7 Carburettors used in two wheelers and four wheelers.</p>	07	10
	<p>Part B</p> <p>5.8 Requirement of fuel injection system.</p> <p>5.9 Various components &amp; Diesel Fuel injection system.</p> <p>5.10 Types of fuel injection pumps for single and multi cylinder engines, inline and rotary types of fuel injection pumps.</p> <p>5.11 Types of fuel injectors.</p> <p>5.12 Air fuel mixture ratio in a petrol and diesel engine and comparison.</p> <p>5.13 Mixture requirement for Transient conditions.</p>	07	08
06	<p>I.C. Engine Testing.</p> <p>6.1 Engine Power – Indicated, Brake and Frictional Power.</p> <p>6.2 Efficiency- Mechanical, Thermal, Relative and Volumetric.</p> <p>6.3 Fuel Consumption- BSFC</p> <p>6.4 Morse test, Motoring test.</p> <p>6.5 Heat Balance Sheet.</p>	10	12
	<b>Total</b>	<b>48</b>	<b>70</b>
Practical:			



Skills to be developed:

### 1 Intellectual Skills

- To identify engine components.
- To select tools / equipments for engine assembly / dismantling
- To interpret results from engine power calculations, observations.
- To read service manual for dismantling, assembly of engine.
- To understand working principle of SI / CI engine.

### R. Motor skills :

- To observe engine components & to sketch them.
- To adopt proper procedure of engine assembly, dismantling, engine trial.
- To measure certain parameters accurately. (Engine speed, coolant temp & mass flow rate of water).

List of Practical:

- 1) Operate a cut section model to explain two- stroke cycle engine.
- 2) Operate a Cut section model to explain four- stroke CI and SI engine
- 3) Dismantling and reassembling of following types of engines. (Any one from each category)
  - Moped, scooter, motorcycle Single cylinder petrol or diesel engines.
  - Four stroke petrol or diesel engines.
- 4) i) Remove the radiator from the vehicle, check it for leak, clean and reverse flush the radiator and refit.  
ii) Remove the water pump, clean, inspect and refit.  
iii) Remove the thermostatic valve, check and refit
- 5) Remove the 113arburetor from the engine of motor cycle, identify and check the components, draw the circuits and refit.
- 6) Remove the 113arburetor from the car engine, identify and check the components, draw the circuits and refit.
- 7) Open the fuel injection pump and fuel injector, identify the components – draw sketch and reassemble.
- 8) Perform a trial on a Multi-cylinder engine. Prepare a heat balance sheet.
- 9) Perform a Morse test on a Multi-cylinder engine.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
M.L Mathur R.P.Sharma	A course in internal combustion engine		Dhanpat Rai Publication
Newton, Steeds, Garrett.	The Motor vehicle		Butterworth Heinmann.
Dr. Kirpal Singh	Automobile Engineering Vol.-2		Standard Publishers.
Anil Chikara	Automobile Engineering Vol. I – Engines.		Satya Prakashan, New Delhi
Crouse / Anglin.	Automobile Mechanics		TATA McGRAW – HILL

R.B. Gupta	Automobile Engineering		Satya Prakashan
H. M. Sethi	Automotive Technology		Tata McGraw Hill.
S. Srinivasan	Automotive Engines		Tata McGraw Hill.
Reference books :- Nil			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ben George Elliot	Autotmobile Power Plants		
R.K Rajput	A text book of automobile engineering		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Automobile Engineering (Automobile Manufacturing Processes)			
Course code: <b>AE</b>		Semester : <b>Fourth</b>	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :- Nil			
Objective :-			
S.No	The student will be able to:		
1.	<ul style="list-style-type: none"> <li>Know the forging process and it's use in manufacturing automobile parts.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Know the different press tools and their operations.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Understand different welding process used in industry.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Selection and applications of different surface cleaning and coating process.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Know the different methods of surface finishing.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Know about CNC machines and to write CNC programming.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/week
Unit -1	Forging 1.1 Forgeable materials and forgeability. 1.2 Advantages and limitations of forging process. 1.3 Classification of forging processes. 1.4 Forging by open and close dies. 1.5 Forging sequences for connecting rods, crankshafts, camshafts, spanners and gears.	08	14
Unit -2	Press and press work R.P Materials used in press work. 2.2 Classification of presses. 2.3 Major parts of mechanical press and their functions . 2.4 Drive mechanisms used on presses. 2.5 Parts of standard die set. 2.6 Operations which can be performed on presses like Punching, piercing, blanking, forming, drawing. Press components used in automobiles.	10	14
Unit - 3	Welding processes 3.1 Classification of welding process. 3.2 Working principle of Gas welding and types of flames. 3.3 Arc welding process like metal arc, TIG. MIG.	10	14

	3.4 Resistance welding (spot, projection, seam, butt ) 3.5 Alluminium and Cast iron welding. 3.6 Brazing and soldering. 3.7 Introduction to Plasma arc welding. Specific applications pertaining to auto industry.		
Unit – 4	Surface Treatment and finishing processes 4.1 Selection and use of surface treatment and finishing process. 4.2 Surface cleaning processes: blasting, tumbling, alkaline, acid and electrolytic cleaning. 4.3 Surface coating processes : electroplating, galvanizing, Metal Spraying, painting. 4.4 Surface finishing processes : Lapping, honing, Super finishing, buffing, burnishing. (Applications from auto industry to be given).	10	14
Unit – 5	Introduction to CNC machines 5.1 NC and CNC machines. 5.2 Classifications of CNC machines. 5.3 Advantages and disadvantages of CNC machines. 5.4 Working principle of CNC machines. 5.5 Principle of Computer aided part programming. 5.6 Part programming – Do loop, Subroutine, Canned cycle.	10	14
	Total	48	70

**PRACTICAL:**

Skills to be developed:

Intellectual Skills:

1. To select sequence of operation as per job requirement.
2. To identify & understand different codes used in part programming of CNC machine.
3. To understand importance of surface treatment & surface finishing process.
4. To understand milling machines operations.
5. To understand the working principle of resistance welding.

Motor Skills:

1. To operate milling machine for different operations like gear cutting or key way cutting.
2. To operate resistance welding machines.
3. To develop part programming for simple jobs on CNC machine.
4. To operate presses for different operations.
5. To measure different parameters of job – produced.

List of Practical:

1. One composite job involving milling machine operations such as key way cutting, gear cutting by indexing, etc. for the batch of 4 to 6 students.
2. Assignment on any one of the following types of press working dies.
  - a. Progressive die
  - b. compound die
  - c. Combination die.

Draw the sketches of the die components.

3. One resistance welding job to show the working principle of resistance welding
4. One simple part programming job on CNC machine.
5. At least one industrial visit be arranged to show the different Milling machines, grinding machines, CNC machines, forging operations, Surface treatment and surface finishing processes.
6. Visit to press shop to observe various operations, and report on the industrial visit as a part of term work.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Elements of Workshop Technology. Vol. – I & II		Media Promoters & Publishers Pvt. Ltd. Mumbai.
H. S. Bawa	Workshop Technology Vol. – I & II.		Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
Dr. W. A. J. Chapman	Workshop Technology Part- I, II & III		ELBS & Edward Arnold ( Publishers ) Ltd., London.
B. H. Amstead, Phillip Ostwald, Myronl Begeman.	Manufacturing Processes		John Wiley & Sons ( Eighth Edition )
Aditan, Pabla	CNC machines programming & applications.		Willey Estarn Ltd.
H.M.T.	Production Technology		H.M.T.

**R. Video Cassettes and CDs:**

Video cassettes developed by:

-- Electronics Trades and Technology Development Corporation  
( A Govt. of India undertaking ), Akbar Hotel Annex , Chanakyapuri ,  
New Delhi – 110 02.

Learning Materials – CBT Packages developed by N.I.T.T.T.R, Bhopal.

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Uday Vaidya	Composites for Automotives		
Walter Fung	Textiles in automotive engineering		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

Name of the Course : Diploma in Automobile Engineering ( <b>Automobile Systems</b> )				
Course code: AE		Semester : Fourth		
Duration :		Maximum Marks :		
Teaching Scheme		Examination Scheme		
Theory :	3 hrs/week	Mid Semester Exam: -	Marks	
Tutorial:	0 hrs/week	Assignment & Quiz: 10	Marks	
Practical :	2 hrs/week	End Semester Exam: 70	Marks	
Credit : Nil				
Aim :-				
S.No				
1.	<ul style="list-style-type: none"> <li>This subject is Core Technology subject for Automobile Engineering course. This subject is part of Automobile systems concerning control of vehicles. Knowledge of this subject is required in the subjects like Automobile Component Design, Vehicle maintenance, vehicle testing. Conceptual knowledge of this subject is useful for understanding and improving the performance of Automobile system</li> </ul>			
Objective :-				
S.No	Students will be able to:			
1.	<ul style="list-style-type: none"> <li>Understand construction, working and functions of Automobile Systems</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Understand construction, working and functions of Automobile control systems such as steering, braking and suspension.</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Compare the developments in body engineering, control systems and safety equipment.</li> </ul>			
Pre-Requisite :- Nil				
Contents : Theory (Name of the Topic)			Hrs/week	Marks
Unit -1	Front Axle and Steering : 1.1 Types of front axle – Dead axle, live axle, type of stub axle arrangements- Elliot, reverse Elliot, lamoine, reverse lamoine. 1.2 Front wheel assembly. 1.3 Steering geometry – Caster, camber, king pin inclination, toe in– toe out, Correct Steering angle. 1.4 Under steering and over steering, Turning radius & its effect. 1.5 Construction, working & application of Steering gear box – rack and pinion type, recirculating ball type, worm & roller type. 1.6 Steering linkages & steering column. 1.7 Ackerman Principle & linkage. 1.8 Power assisted steering & its types (Hydraulic & electrical)		12	16
Unit -2	Brakes: 2.1 Function and necessity. 2.2 Classification of brakes and braking systems. 2.3 Principle, construction and working of –disc brakes, drum brake 2.4 Construction and working of the following–Mechanical braking system,		10	14

	<p>Hydraulic Braking system, Air braking system, Hydraulic operated air assisted braking system.</p> <p>2.5 Properties of brake fluids and their specifications</p> <p>2.6 Concept and working of antilock braking system.</p> <p>2.7 Parking brake.</p>		
Unit – 3	<p>Suspension Systems :</p> <p>3.1 Types of suspension systems – Rigid &amp; independent suspension</p> <p>3.2 Types of Independent suspension system-McPherson strut, wishbone type.</p> <p>3.3 Semi-elliptical Leaf spring, coil spring , torsion bar arrangement</p> <p>3.4 Telescopic shock absorber, Gas filled shock absorber, hydraulic shock absorber</p> <p>3.5 Air Suspension System.</p> <p>3.6 Anti roll bar, stabilizer bar.</p>	08	12
Unit – 4	<p><b>Body Engineering:</b></p> <p>4.1 Effect of stream lining on vehicle performance.</p> <p>4.2 Materials used in body construction and types of bodies.</p> <p>4.3 Protective and anti corrosive treatments, painting procedure.</p> <p>4.4 Safety devices –air bags, exhaust brake, emergency brake, Central locking, collapsible steering.</p>	06	10
Unit – 5	<p>Car Heating Ventilation &amp; Air Conditioning System(HVAC):</p> <p>5.1 Basic principle- vapour compression cycle, layout and operation of HVAC.</p> <p>5.2 Types of refrigerant used in car air conditioning and their Properties.</p> <p>5.3 Human comfort conditions.</p> <p>5.4 Temperature control system, humidity control.</p>	06	10
Unit – 6	<p><b>Vehicle Performance :</b></p> <p>R.P Resistance faced by the vehicle- Air resistance , rolling Resistance, gradient resistance.</p> <p>6.2 Define traction, tractive efforts, draw bar pull, gradeability and Acceleration, pitching, Bouncing, Rolling, Sway and yaw.</p> <p>6.3 Stability of vehicle on turn and slopes (No mathematical Treatment).</p>	06	08
	Total	48	70

**Practical:**

Skills to be developed:

Intellectual skill:

5. Identify concepts applied.
6. Identify parts like front axle, steering, brakes, suspension system.
7. Classify the system according to their application.
8. Select proper tools & their ranges.
9. Detect fault by observation, trial.

Motor skill:

1. Sketch the different devices.
2. Handle tools, equipment, instruments.
3. Observe the working of various systems under various parameters.

List of Practical:

1. Open the steering gearbox, observe the components and steering linkages, sketch and assemble.
2. Observe and draw layout of hydraulic braking system. Open master cylinder, wheel cylinder, and brake drum. Observe and sketch the components.
3. Observe and draw the layout of Hydraulically operated air assisted braking system.
4. Open, observe and sketch leaf spring and assemble.
5. Dismantle telescopic shock absorber, observe and sketch its components.
6. Observe and draw the layout of air suspension system.
7. Visit to body building and body manufacturing industry, prepare a report considering following points – layouts, body construction, body materials, body repair and painting procedure.
8. Observe and draw the layout of car air- conditioning. Measure temperature at various places.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Anthony Schwaller	Motor Automotive Technology		Delmar Publisher Inc.
Tim Gills	Automotive Service		Delmar Publisher Inc.
Anil Chikara	Automobile Engineering Vol. II		Satya Prakashan New Delhi
Crouse / Anglin.	Automobile Mechanics		TATA McGRAW – HILL
Kirpal Singh	Automobile Engineering Vol.I		Standard Publication
R.B. Gupta	Automobile Engineering		Satya Prakashan New Delhi
S. Srinivisan	Automotive Mechanics		TATA McGRAW – HILL
--	ASHRAE HANDBOOK OF HVAC		ASHRAE
Boyce H. Dwiggin	Automobile Air Conditioning		THOMSON LEARNING



Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Jack Erjavec	Automotive technology: A system Approach		
Tom Denton	Automobile Electrical And Electronic systems		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : <b>Mechanical Engineering Group</b> (Computer Programming)		
Course code: <b>ME/AE/PT/PG/MH</b>		Semester : Fourth
Duration :		Maximum Marks :
Teaching Scheme		Examination Scheme
Theory :	1 hrs/week	Mid Semester Exam: - Marks
Tutorial:	0 hrs/week	Assignment & Quiz: 10 Marks
Practical :	2 hrs/week	End Semester Exam: - Marks
Credit : Nil		
Aim :-		
S.No		
1.	<ul style="list-style-type: none"> <li>To study the basic principles of programming through a structured programming language like 'C' and Object Oriented Language.</li> </ul>	
Objective :-		
S.No	Students should be able to:	
1.	<ul style="list-style-type: none"> <li>Break a given task into subtasks.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Enhance logical thinking.</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Develop 'C' programs for simple applications</li> </ul>	
Pre-Requisite :- Nil		
Contents : Theory (Name of the Topic)		Hrs/week
Unit -1	<b>Introduction –</b> Problem, definition and analysis, algorithm, flow charts, tracing and dry running of algorithms. Introduction to 'C' programming, simple program using Turbo 'C' compiler and execution of 'C' program	02
Unit -2	C Fundamentals: Character set, constants, data types, identifiers, key words, variable declarations Types of Operators – unary, binary, arithmetic, relational, logical, assignment. Hierarchy of operators, expressions, library functions, Use of input/ output functions viz. Printf( ), Scanf( ), getch( ), putch( )	03
Unit – 3	Use of Control Statements:- if-else, while loop, do – while loop, for loop, switch, break and continue. Writing, Compiling, Executing and debugging programs	05
Unit – 4	Introduction to Subscripted variables, arrays, defining and declaring one and two dimensional arrays, reading and writing	03
Unit – 5	Concept of String, string input / output functions Defining and accessing a user defined functions, Passing of arguments, declaration of function prototypes Storage classes: automatic, external, static variables	03

Practical:

Intellectual Skills:

- Prepare and interpret flow chart of a given problem.
- Represent data in various forms.
- Use various control statements and functions

Motor Skills:

- Write program in 'C' language.
- Run and debug 'C' program successfully.

List of Practical:

To write simple programme having engineering application involving following statements

2. Use of Sequential structure
3. Use of if-else statements
4. Use of for statement
5. Use of Do-While Statement
6. Use of While statement
7. Use of break and Continue statement
8. Use of multiple branching Switch statement
9. Use of different format specifiers using scanf( ) and printf( )
10. Use of one dimensional array e.g. String, finding standard deviation of a group data
11. Use of two dimensional array of integers/ reals
12. Defining a function and calling it in the main

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Byron Gotfried	Introduction to 'C' programming		Tata McGraw Hill
Yashwant Kanitkar	Let us 'C'		BPB publications
Denis Ritchie and Kernighan	Introduction to 'C' programming		Prantice Hall Publications
Balguruswamy	Programming in 'C'		Tata Mc- Graw Hill

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Gary Willoughpy	Pure basics: A beginner's guide to computer programming		
J.B Dixit	Computer fundamentals and programming in C		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : <b>Diploma in Automobile Engineering (Heat Power Engineering)</b>			
Course code: <b>AE</b>		Semester : Fourth	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To understand the principles, construction &amp; working of various power producing &amp; power absorbing devices like boilers, turbines, compressors, pumps etc., To understand the concept of energy, work, heat &amp; conversion. To study of various sources of energy, basic laws &amp; concept of thermodynamics, gas laws, properties of steam &amp; generation. Heat transfer forms the basis for different power engineering application. Boilers find application in different process industries. Steam turbines and condensers are the major component of any steam power plant.</li> </ul>		
Objective :-			
S.No	Students will be able to		
1.	<ul style="list-style-type: none"> <li>learn to correlate the theoretical knowledge with practical aspects of systems of work producing and work absorbing devices like boilers, condensers, steam turbines, air compressors, gas turbines, etc</li> </ul>		
2.	<ul style="list-style-type: none"> <li>understand the various sources of energy and ways to harness it.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>understand the chemistry of combustion of fuels, estimation of calorific value, mass of air required for complete combustion of fuels.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>understand the basic concepts of heat transfer and it's application in various appliances.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>identify/observe/locate/ operate various parts of instruments / equipments carefully and follow test procedures.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>observe the behavior of devices with the change in parameters and make changes if necessary.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)		Hrs/week	Marks
Unit -1	Fundamental concepts of thermodynamics and various thermodynamic processes: 1.1 Basic concepts of – i) system ii) surrounding iii) Universe iv) open system v) closed system vi) Isolated system vii) steady flow energy equation viii) internal energy ix) enthalpy x) entropy. 1.2 Zeroth, first and second law of thermodynamics, General gas equation,	08	14

	<p>Characteristics of gas constant, Mol of gas, Universal gas constant, specific heats of ideal gases.</p> <p>1.3 Thermodynamic processes of ideal gases. Isobaric, Isochoric, Isothermal, Adiabatic and polytropic with representation on P-V and T-S diagram, work done, change in internal energy, change in enthalpy and relation between P,V &amp; T (Derivations only for adiabatic process)</p> <p>1.4 Air cycles: - P-V and T-S diagram and equations for air standard efficiency of Otto, Diesel &amp; Dual combustion cycle.</p>		
Unit -2	<p>Properties of steam and steam power:</p> <p>2.1 Formation of steam, various phases like wet steam, dry saturated Steam, superheated steam.</p> <p>2.2 Dryness fraction, degree of superheat, sensible heat, Latent heat, calculation of enthalpy of wet, dry saturated &amp; superheated steam using steam table.</p> <p>2.3 Study of boilers like three pass packaged type boiler, Water Tube &amp; Fire Tube Boiler. Mountings – Bourdan Pressure Gauge, Safety valves, Water level Indicator and fusible Plug. Accessories – Economiser, superheater and air pre-heater.</p> <p>2.4 Steam condenser: Principle, Function, locations in steam power plant. Surface condenser &amp; its Applications.</p> <p>2.5 Steam Turbines: Classification of turbines, construction and working of Impulse and Reaction turbine. Application of equation of continuity to steam turbine.</p>	08	14
Unit – 3	<p>Air Compressors:</p> <p>3.1 Various uses of compressed air and classification of compressors.</p> <p>3.2 Construction and working of single stage and two stage reciprocating air Compressors with P.V diagram. Necessity of multistaging and intercooling.</p> <p>3.3 Construction &amp; working of rotary compressors i) Centrifugal compressor ii) Axial flow compressor iii) Screw compressor</p> <p>3.4 Comparison of various compressors</p> <p>3.5 Air compressor terminology like i) Free air delivered ii) Capacity of compressor iii) Piston displacement iv) I.P., B.P. R. Volumetric efficiency vi) Isothermal efficiency vii) Overall Isothermal or Compressor efficiency</p>	06	10
Unit – 4	<p>Gas Turbines:</p> <p>4.1 Brayton cycle- P. V. diagram and thermal efficiency</p> <p>4.2 Classification of gas turbines.</p> <p>4.3 Construction and working of gas turbines i) open cycle ii) closed cycle gas turbines, P.V. &amp; T.S diagrams.</p>	04	06

	4.4 Turbojet & turboprop engine.		
Unit – 5	Sources of Energy & Power plants: 5.1 Classification of various conventional and non-conventional sources of energy. 5.2 Construction and working of power plants based on conventional energy sources : i) Thermal power plant ii) Diesel power plant iii) Gas turbine power plant. 5.3 Parameters of site selection : 5.4 Study the working and construction of non- conventional energy sources. i) Solar ii) Bio-diesel	06	10
Unit – 6	Heat transfer: 6.1 Modes of heat transfer–conduction, convection and radiation. 6.2 Conduction – Fourier’s law , thermal conductivity, conduction through cylinders, thermal resistance, composite walls, combined conduction and convection. 6.3 Thermal radiation, absorptivity, transmissivity, reflectivity, emissivity, black and gray bodies, Stefan-Boltzman law, Heat transfer by radiation. 6.4 Heat transfer in condenser and radiator.	06	08
	Total	48	70
<p>Practical: Skills to be developed:</p> <p>Intellectual Skills:</p> <ol style="list-style-type: none"> <li>a. Observe &amp; calculate thermal efficiency at constant pressure heating.</li> <li>b. To understand working of steam turbine.</li> <li>c. To refer relevant act &amp; list its salient features.</li> <li>d. To calculate efficiency of solar water heating system.</li> </ol> <p>Motor Skills :</p> <ol style="list-style-type: none"> <li>a. To observe &amp; draw boiler mountings.</li> <li>b. To start reciprocating air compressor &amp; to take measurements.</li> <li>c. To follow given procedure to conduct trial on reciprocating air compressor.</li> </ol> <p>List of Practical:</p> <ol style="list-style-type: none"> <li>1) Determine thermal efficiency of constant pressure heating. (Heating in open container and in pressure cooker)</li> <li>2) Study of boiler mounting- a) safety valve and b) Bourdon’s pressure gauge. Boiler accessories-a) economizer b) super-heater (construction and working should be studied with the help of models.) (for study of safety valves, practical experiments like replacing dead weight safety valve on ordinary</li> </ol>			

pressure cooker with lever safety valve can be carried out.)

- 3) Study and provisions of Indian boiler act with reference to duties of boiler inspector, registration process, transfer of boilers etc.
- 4) To conduct trial on reciprocating air compressor.
- 5) Dismantling and assembling of one reciprocating or rotary compressor.
- 6) Study of gas turbines used in turbocharger.
- 7) Study of functioning of domestic solar water heater and calculating its efficiency.
- 8) Determination of calorific value of solid or liquid fuel using Bomb calorimeter.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R. S. Khurmi & J. K. Gupta	A Text book of Thermal Engineering		S. Chand & Co. Ltd.
Patel and Karamchandani	Elements of Heat Engines (Vol. I, II & III)		Acharya Book Depot.
A. S. Rao	Thermal Engineering		Satya Prakashan
B. K. Sarkar	Thermal engineering		Tata McGraw Hill
Jones & Dugan	Engineering Thermodynamics		Prentice Hall of India
Yunus Cengel & Mike Boles	Thermodynamics		Tata McGraw Hill
Jesse S.Doolittle & Francis J Hale	Thermodynamics for Engineers.		John Willey & Sons
S. Domkundwar, Dr C.P. Kothandaraman & A.V. Domkundwar	A course in Thermal Engineering		Dhanpat Rai & Co.(P) Ltd, New Delhi

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
H Lee Willis	Power Distribution Planning		
K.C. Pal	Heat Power		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**



Name of the Course : Diploma in Automobile Engineering (Professional Practices-IV (AE))		
Course code: AE	Semester : Fourth	
Duration :	Maximum Marks :	
Teaching Scheme	Examination Scheme	
Theory : 0 hrs/week	Mid Semester Exam: - Marks	
Tutorial: 0 hrs/week	Assignment & Quiz: - Marks	
Practical : 2 hrs/week	End Semester Exam: - Marks	
Credit :- Nil		
Aim :-		
S.No		
1.	<ul style="list-style-type: none"> <li>To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion</li> </ul>	
Objective :-		
S.No	Student will be able to:	
1.	<ul style="list-style-type: none"> <li>Acquire information from different sources.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Prepare notes for given topic.</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Present given topic in a seminar.</li> </ul>	
4.	<ul style="list-style-type: none"> <li>Interact with peers to share thoughts.</li> </ul>	
5.	<ul style="list-style-type: none"> <li>Prepare a report on industrial visit, expert lecture.</li> </ul>	
Pre-Requisite :- Nil		
<b>Contents</b>		
	<b>Hrs/week</b>	
Unit -1	<p>Industrial Visits</p> <p>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.</p> <p>TWO industrial visits may be arranged in the following areas / industries</p> <ul style="list-style-type: none"> <li>i) Garage / service station. (Engine/chassis components, subsystems, their location.)</li> <li>ii) Vehicle manufacturing company.(Component manufacturing processes.)</li> <li>iii) Engine FIP testing unit.</li> <li>iv) Sugar Factory / SSI / Chemical Factory</li> <li>v) Machine shop having CNC machines.</li> </ul>	14
Unit -2	<p>Lectures by Professional / Industrial Experts to be organized from any of the following areas (3 Lectures : 2 hrs duration each):</p> <ul style="list-style-type: none"> <li>i) Interview Techniques.</li> <li>ii) Power steering</li> </ul>	06

	<ul style="list-style-type: none"> <li>iii) Antilock braking system</li> <li>iv) Air suspension system</li> <li>v) Automotive safety systems</li> <li>vi) Car heating, ventilation &amp; air conditioning system.</li> <li>vii) Vehicle performance</li> <li>viii) Alternative sources of energy (wind, solar and biomass)</li> <li>ix) Use of internet</li> </ul>	
Unit – 3	<p>Information Search:  Information search through manufacturers, catalogue, internet, magazines; books etc. and submit a report of max. 10 pages (Any Two topics)  Following topics are suggested :</p> <ul style="list-style-type: none"> <li>i) Two wheeler engine specifications.</li> <li>ii) Four wheeler engine specifications</li> <li>iii) Engine lubricants &amp; additives</li> <li>iv) Automotive gaskets and sealants</li> <li>v) Engine coolants and additives</li> <li>vi) Two wheeler 130umerical130.</li> <li>vii) Four wheeler 130umerical130.</li> <li>viii) Fuel injection pumps</li> <li>ix) Power steering</li> <li>x) Filters</li> <li>xi) Different drives/Transmission systems in two wheelers.</li> <li>xii) Types of Rolling Contact bearings – construction, mountings, applications, cost and suppliers.</li> <li>xiii) Radiators</li> <li>xiv) Maintenance procedure for solar equipment.</li> <li>xv) Drilling machines-types, tools and operation</li> </ul>	08
Unit – 4	<p>Seminar :</p> <p>Seminar topic should be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)</p>	08
Unit – 5	<p>Mini Project / Activities :</p> <ul style="list-style-type: none"> <li>a) Prepare one model – cardboard / acrylic / wood / metal / etc such as : i) Elliptical Trammel ii) Pantograph iii) Coupling iv) Geneva Mechanism v) Cam &amp; follower mechanism</li> <li>OR</li> <li>b) Dismantling and assembly (e.g. Piston – connecting rod, Cylinder head – valves, Tool post, valves etc.) Take measurement and prepare sketches of different parts.</li> <li>OR</li> <li>c) Make a small decorative water fountain unit.</li> </ul>	12

	OR d) Toy making with simple operating mechanism OR e) How it works ? (students to collect information on working of small assemblies or mechanisms) Such as - - door closer, mobile charger , microwave oven , washing machine , gas lighter , oil-can , grease gun , electromagnets , burglar alarm , central lock (automobile).		
Total		48	
Note: 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.			
Text Books:- Nil			
Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Diane .T Marsh	New directions in professional Practices		
Tobie S Stein, Jessica Bathurst	Performing Arts Management: A handbook of professional practices		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : <b>Mechanical Engineering Group</b> (Theory of Machines and Mechanisms)			
Course code: <b>ME/PT/PG/AE/MH</b>		Semester : Fourth	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit : Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To focus on understanding the concept of machines, mechanisms and their elements. Also study kinematics aspects of various links in mechanisms. To form foundation for kinematics synthesis, analysis and design of mechanisms.</li> </ul>		
Objective :-			
S.No	Student will be able to:		
1.	<ul style="list-style-type: none"> <li>Know different machine elements and mechanisms.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Understand Kinematics and Dynamics of different machines and mechanisms.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Select Suitable Drives and Mechanisms for a particular application.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Appreciate concept of balancing and Vibration.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Develop ability to come up with innovative ideas.</li> </ul>		
Pre-Requisite :- Nil			
Contents			Hrs/week
Marks			
Unit -1	Fundamentals and types of Mechanisms		
	1.1 Kinematics of Machines: - Definition of Kinematics, Dynamics, Statics, Kinetics, Kinematic link, Kinematic Pair and its types, constrained motion and its types, Kinematic chain and its types, Mechanism, inversion, machine and structure.		
	1.2 Inversions of Kinematic Chain.		
	1.2.1 Inversion of four bar chain, coupled wheels of Locomotive & Pentograph.		
	1.2.2 Inversion of Single Slider Crank chain- Rotary I.C. Engines mechanism, Whitworth quick return mechanism, Crank and Slotted lever quick return mechanism.		
	1.2.3 Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism & Oldham's Coupling.		
	1.3 Common Mechanisms		
	1.3.1 Bicycle free wheel Sprocket mechanism.		
	1.3.2 Geneva Mechanism.		
			08
			15

	<p>1.3.3 Ackerman's Steering gear mechanism.</p> <p>1.3.4 Foot operated air pump mechanism.</p>		
Unit -2	<p><b>Velocity and Acceleration in Mechanism</b></p> <p>2.1 Concept of relative velocity and relative acceleration of a point on link, angular velocity and angular acceleration, inter- relation between linear and angular velocity and acceleration.</p> <p>2.2 Drawing of velocity and acceleration diagram of a given configuration, diagrams of simple mechanisms. Determination of velocity and acceleration of a point on link by relative velocity method [Excluding coriollis components of acceleration].</p> <p>2.3 Analytical method [no derivation] and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.</p>	06	09
Unit - 3	<p><b>Cams and Followers</b></p> <p>3.1 Concept, definition and application of Cams and Followers.</p> <p>3.2 Classification of Cams and Followers.</p> <p>3.3 Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation.</p> <p>3.4 Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method).</p>	04	08
Unit - 4	<p><b>Power Transmission</b></p> <p>4.1 Types of Drives – Belt, Chain, Rope, Gear drives &amp; their comparison.</p> <p>4.2 Belt Drives – flat belt, V– belt &amp; its applications, material for flat and V-belt, angle of lap, belt length. Slip and creep. Determination of velocity ratio, ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission( Simple 133umerical)</p> <p>4.3 Chain Drives – Advantages &amp; Disadvantages, Selection of Chain &amp; Sprocket wheels, methods of lubrication.</p> <p>4.4 Gear Drives – Spur gear terminology, types of gears and gear trains, their selection for different application, train value &amp; Velocity ratio for compound, reverted and simple epicyclic gear train, methods of lubrication, Law of gearing.</p> <p>4.5 Rope Drives – Types, applications, advantages &amp; limitations of Steel ropes.</p>	12	14
Unit - 5	<p><b>Flywheel and Governors</b></p> <p>1.1 Flywheel – Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-S I.C. Engine (no Numericals). Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</p> <p>1.2 Governors – Types, concept, function and application &amp; Terminology of Governors.</p> <p>1.3 Comparison between Flywheel and Governor.</p>	05	06
Unit - 6	<p><b>Brakes, Dynamometers, Clutches &amp; Bearings</b></p> <p>6.1 Function of brakes and dynamometer, types of brakes and</p>	10	14

	<p>Dynamometers, comparison between brakes and dynamometer.</p> <p>6.2 Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake.</p> <p>6.3 Concept of Self Locking &amp; Self energizing brakes.</p> <p>6.4 Numerical problems to find braking force and braking torque for shoe &amp; band brake.</p> <p>6.5 Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometer.</p> <p>6.6 Clutches- Uniform pressure and Uniform Wear theories.</p> <p>6.7 Function of Clutch and its application, Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch v) Diaphragm clutch. (Simple 134umerical on single and Multiplate clutch).</p> <p>6.8 Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque &amp; power lost in friction (no derivation). Simple 134umerical.</p>		
	<p><b>Balancing &amp; Vibrations</b></p> <p>7.1 Concept of balancing. Balancing of single rotating mass. Graphical method for balancing of several masses revolving in same plane.</p> <p>7.2 Concept and terminology used in vibration, causes of vibrations in machines, their harmful effects and remedies.</p>	03	04
	<b>Totals</b>	48	70
<p>Practical:</p> <p>Skills to be developed:</p> <p>Intellectual Skills:</p> <ol style="list-style-type: none"> <li>1. Understand working of free wheel mechanism of a bicycle, Geneva mechanism, steering gear mechanism etc.</li> <li>2. Determine velocity and acceleration of links in a given mechanism.</li> <li>3. Analyze balancing of rotating masses in a single plane.</li> <li>4. interpret interrelationship between components of various braking mechanisms</li> <li>5. Understand concepts of vibrations in various machineries, their harmful effects and remedies.</li> <li>R. Compare various power transmission devices.</li> </ol> <p>Motor Skills:</p> <ol style="list-style-type: none"> <li>1. Drawing of velocity and acceleration diagrams.</li> <li>2. Assembly and dismantling of brakes and clutches.</li> <li>3. Drawing of cam profiles from a given data for I. C . Engine.</li> <li>4. Drawing of velocity and acceleration diagram.</li> </ol> <p><b>Note -</b> The Term work shall consist of Journal / lab manual and A-3 size sketch book.</p>			

**List of Practical:**

- 1) Find the ratio of time of cutting stroke to the time of return stroke for quick return mechanism of a shaper machine.
- 2) Sketch & describe working of bicycle free wheel sprocket mechanism.
- 3) Determination of velocity and acceleration by relative velocity method (four problems).
- 4) Determination of velocity and acceleration of piston of an I.C. engine's Slider Crank mechanism by Klein's construction, for different position of crank in between  $0^{\circ}$  and  $360^{\circ}$ . Represent graphically velocity versus crank angle and acceleration versus crank angle.
- 5) Draw the profile of radial cam for the given motion of follower. (At least four problems)
- 6) Determine the radius of rotation of flyball for different speed of governor and draw a graph between radius of rotation versus speed.
- 7) Dismantling and assembly of mechanically operated braking mechanism for two wheelers.
- 8) Determination of power transmitted by any belt drive using any one dynamometer.
- 9) Dismantling and assembly of multiplate clutch of two-wheeler.
- 10) Determine graphically balancing of several masses rotating in a single plane.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Khurmi Gupta	Theory of machines		Eurasia publishing House Pvt. Ltd. 2006 edition
S.S.Rattan	Theory of Machine		McGraw Hill companies II Edition
P.L.Ballaney	Theory of machines		Khanna Publication
Timo Shenko	Theory of machines		Wiley Eastern
Jagdishlal	Theory of machines		Bombay Metro – Politan book Ltd.
Ghosh – Mallik	Theory of machines		Affiliated East west press
Beven T.	Theory of machines		CBS Publication
J.E.Shigley	Theory of machines		Mc Graw Hill

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
George Henry Martin	Kinamatics and Dynamics of machines		
J.S rao	The theory of machines through solved problems		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

**ALL INDIA COUNCIL FOR TECHNICAL EDUCATION**  
**TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES**  
**COURSE NAME: AUTOMOBILE ENGINEERING**  
**COURSE CODE : AE**  
**DURATION OF COURSE : 6 SEMESTERS**  
**SEMESTER: FIFTH SEMESTER** **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME								Credits
		L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @		
					TA	CT	Total						
1	Automobile Component Design	03	--	02	10	20	30	70	--	25	25		
2	Advanced Automobile Engines	03	--	02	10	20	30	70	50	--	25		
3	Basic Electrical & Electronics	03	--	02	10	20	30	70	--	25	--		
4	Hydraulics & Pneumatics	03	--	02	10	20	30	70	--	25	25		
5	Elective-I ( Any One)												
	Mechatronics	03	--	02	10	20	30	70	--	--	25		
	Vehicle Aerodynamics and Design	03	--	02	10	20	30	70	--	--	25		
	Vehicle Testing	03	--	02	10	20	30	70	--	--	25		
	Environmental Pollution and Control	03	--	02	10	20	30	70	--	--	25		
6	Industrial Project & Entrepreneurship Development	01	01	02	--	--	--	--	--	--	25		
7	Professional Practices-V (AE)	--	--	03	--	--	--	--	--	--	50		
<b>Total</b>		<b>16</b>	<b>01</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>150</b>	<b>350</b>	<b>50</b>	<b>75</b>	<b>175</b>		

**STUDENT CONTACT HOURS PER WEEK: 32 HRS**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH**

# , External Assessment

@ , Internal Assessment

ESE – End Semester Exam.



ABBREVIATIONS: CT- Class Test, TA – Teachers Assessment, L – Lecture, TU – Tutorial, P – Practical  
TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

**Total Marks : 800**

Minimum passing for sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : MECHANICAL ENGINEERING GROUP (INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT)		
Course code: ME/PT/AE/PG /MH	Semester : FIFTH	
Duration :	Maximum Marks :	
Teaching Scheme	Examination Scheme	
Theory : 1 hrs/week	Mid Semester Exam: -	Marks
Tutorial: 1 hrs/week	Assignment & Quiz: -	Marks
Practical : 2 hrs/week	End Semester Exam: -	Marks
Credit : Nil		
Aim :-		
S.No		
1.	<ul style="list-style-type: none"> <li>To solve the problems involving drawings, designs, manufacturing, installation, testing and maintenance of machines. In order to cultivate the systematic methodology for problem solving using acquired technical knowledge &amp; skills, and to enhance the generic skills &amp; professional skills.</li> </ul>	
Objective :- Nil		
Pre-Requisite :- Nil		
Contents : Theory (Name of the Topic)		Hrs/week
Unit -1	<p>Entrepreneurship, Creativity &amp; Opportunities</p> <p>R.P Concept, Classification &amp; Characteristics of Entrepreneur</p> <p>1.2) Creativity and Risk taking.</p> <p>1.2.1) Concept of Creativity &amp; Qualities of Creative person.</p> <p>1.2.2) Risk Situation, Types of risk &amp; risk takers.</p> <p>1.3) Business Reforms.</p> <p>1.3.1) Process of Liberalization.</p> <p>1.3.2) Reform Policies.</p> <p>1.3.3) Impact of Liberalization.</p> <p>1.3.4) Emerging high growth areas.</p> <p>1.4) Business Idea</p> <p>Methods and techniques to generate business idea.</p> <p>1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea &amp; Feasibility of opportunity</p> <p>SWOT Analysis</p>	03

Unit -2	<p>Information And Support Systems</p> <p>2.1) Information Needed and Their Sources. Information related to project, Information related to support system, Information related to procedures and formalities</p> <p>2.2) SUPPORT SYSTEMS</p> <p style="padding-left: 40px;">R. Small Scale Business Planning, Requirements.</p> <p style="padding-left: 40px;">R. Govt. &amp; Institutional Agencies, Formalities</p> <p>Statutory Requirements and Agencies.</p>	03
Unit -3	<p>Market Assessment</p> <p>3.1) Marketing –Concept and Importance</p> <p>3.2) Market Identification, Survey Key components</p> <p>3.3) Market Assessment</p>	02
Unit -4	<p>Business Finance &amp; Accounts</p> <p>Business Finance</p> <p>4.1) Cost of Project</p> <ol style="list-style-type: none"> <li>1) Sources of Finance</li> <li>2) Assessment of working capital</li> <li>3) Product costing</li> <li>4) Profitability</li> <li>5) Break Even Analysis</li> <li>6) Financial Ratios and Significance</li> </ol> <p>Business Account</p> <p>4.2) Accounting Principles, Methodology</p> <ol style="list-style-type: none"> <li>1) Book Keeping</li> <li>2) Financial Statements</li> <li>3) Concept of Audit,</li> </ol>	03
Unit -5	<p>Business Plan &amp; Project Report</p> <p>5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost</p> <p>5.2) Project Report</p> <ol style="list-style-type: none"> <li>1) Meaning and Importance</li> <li>2) Components of project report/profile (Give list)</li> </ol> <p>5.3) Project Appraisal</p> <ol style="list-style-type: none"> <li>1) Meaning and definition</li> <li>2) Technical, Economic feasibility</li> <li>3) Cost benefit Analysis</li> </ol>	03
Unit -6	<p>Enterprise Management And Modern Trends</p> <p>6.1) Enterprise Management: -</p> <ol style="list-style-type: none"> <li>1) Essential roles of Entrepreneur in managing enterprise</li> <li>2) Product Cycle: Concept And Importance</li> </ol>	

	3) Probable Causes Of Sickness 4) Quality Assurance Importance of Quality, Importance of testing  6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	02
	Total	16

### Contents (*PART A*) *Industrial Project*)

Hrs/week

Following activities related to project are required to be dealt with, during this semester

Unit - 1	<ul style="list-style-type: none"> <li>Form project batches &amp; allot project guide to each batch. (Max. 4 students per batch).</li> </ul>	
Unit - 2	<ul style="list-style-type: none"> <li>Each project batch should select topic / problem / work by consulting the guide &amp; / or industry. Topic / Problem / work should be approved by Head of department.</li> </ul>	
Unit - 3	<ul style="list-style-type: none"> <li>Each project batch should prepare action plan of project activities &amp; submit the same to respective guide.</li> </ul>	
Unit - 4	<ul style="list-style-type: none"> <li>At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.</li> </ul>	
Unit - 5	<ul style="list-style-type: none"> <li>Action Plan should be part of the project report.</li> </ul>	

### Part B: Entrepreneurship Development

Hrs/week

OBJECTIVES: Students will be able to

Unit - 1	<ul style="list-style-type: none"> <li>Identify entrepreneurship opportunity.</li> </ul>	
Unit - 2	<ul style="list-style-type: none"> <li>Acquire entrepreneurial values and attitude.</li> </ul>	
Unit - 3	<ul style="list-style-type: none"> <li>Use the information to prepare project report for business venture.</li> </ul>	
Unit - 4	<ul style="list-style-type: none"> <li>Develop awareness about enterprise management</li> </ul>	

### Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Entrepreneurship Development	E. Gordon K.Natrajan		Himalaya Publishing. Mumbai
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.		Tata Mc Graw Hill Publishing co. ltd. New Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally		EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O.

A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi		Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : <a href="mailto:ediindia@sancharnet.in">ediindia@sancharnet.in</a> / <a href="mailto:olpe@ediindia.org">olpe@ediindia.org</a> Website : <a href="http://www.ediindia.org">http://www.ediindia.org</a>
National Directory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar		
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta		
A Handbook of New Entrepreneurs	P.C.Jain		
Evaluation of Entrepreneurship Development Programmes	D.N.Awasthi , Jose Sebastian		
The Seven Business Crisis & How to Beat Them.	V.G.Patel		
Poornima M. Charantimath	Entrepreneurship Development of Small Business Enterprises		Pearson Education, New Delhi
Special Edition for MSBTE	Entrepreneurship Development		McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore		Wheeler Publisher New Delhi
Entrepreneurship Development			NTTTI, Bhopal / Chandigarh

## 2) VIDEO CASSETTES

Subject	Source
Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmedabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : <a href="mailto:ediindia@sancharnet.in">ediindia@sancharnet.in</a> / <a href="mailto:olpe@ediindia.org">olpe@ediindia.org</a> Website : <a href="http://www.ediindia.org">http://www.ediindia.org</a>
Assessing Entrepreneurial Competencies	
Business Opportunity Selection and Guidance	
Planning for completion & Growth	
Problem solving-An Entrepreneur skill	

## GLOSSARY:

### **INDUSTRIAL TERMS**

Terms related to finance, materials, purchase, sales and taxes.

**Components of Project Report:**

1. Project Summary (One page summary of entire project )
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower ( Skilled, unskilled )
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market ( Survey, Demand & Supply )
12. Cost of Project, Source of Finance
13. Projected Profitability & Break Even Analysis
14. Conclusion.

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Kaushal Kumar Arora	Development Banking In India		
S Anil Kumar	Entrepreneurship Development		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :-**

S.No	Assignments
1	Assess yourself-are you an entrepreneur?
2	Prepare a project report and study its feasibility.

Name of the Course : AUTOMOBILE ENGINEERING (ADVANCED AUTOMOBILE ENGINES)			
Course code: AE		Semester : FIFTH	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	0 Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit : Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>The acquisition of the advanced technological knowledge, understanding, and awareness related to automobile field.</li> </ul>		
Objective :-			
S.No	Students will be able to:		
1.	<ul style="list-style-type: none"> <li>Compare the performance characteristics of SI and CI engines.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Understand, describe and draw the stages of combustion in SI and CI engines.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Understand, describe and differentiate between TBI and MPFI systems.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Understand, draw and describe the construction and working of electronic fuel injector, electric fuel pump and diesel electronic fuel injection system.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Understand draw and describe the glow plug construction and circuit with electronic control.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Understand and describe the pollutants emitted from S.I. and C.I. engines, list emission norms and describe the methods of pollution control.</li> </ul>		
7.	<ul style="list-style-type: none"> <li>Understand the drive cycle for measurement of pollutants.</li> </ul>		
8.	<ul style="list-style-type: none"> <li>Use manufacturer's workshop manual, conclude system/component condition.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/week
			Marks
Unit -1	<p><b>Engine Selection</b></p> <p>1.1 Comparison of SI and CI engines on the basis Thermal efficiency and fuel consumption</p> <p>1.2 Comparison of SI and CI engines on the basis of thermodynamic and operating variables.</p> <p>1.3 Comparison of performance characteristics.</p> <p>1.4 S.I. and C.I. Engine application- with purpose of selection.</p> <p>Note: - assignment on comparative study of engine specification and it rating on basis of various parameters.</p>		04
			06

Unit -2	<p><b><i>Fuels and Alternative Energy Options for Auto Engines</i></b></p> <p>2.1 Different types of fuels, calorific value  2.2 Properties of S.I. Engine fuel  2.3 Properties of C.I. Engine fuel  2.4 Fuel additives and their effects  2.5 LPG as SI engine fuel.  2.6 Alcohol as gasoline fuel blends.  2.7 Alcohol as CI engine fuel.  2.8 Natural gas as a Transport fuel.  2.9 Electric cars and hybrid vehicles.</p>	08	14
Unit – 3	<p><b>Theory Of Combustion</b></p> <p>3.1 Ignition limits  3.2 Stages of combustion in SI engine  3.3 Effect of engine variables on Ignition lag.  3.4 Effects of engine variables on flame propagation  3.5 Abnormal combustion- Detonation, pre-ignition, surface ignition, Effects of detonation.  3.6 Control of detonation.  3.7 SI engine combustion Chambers  3.8 Stages of combustion in CI engine  3.9 Air Fuel ratio in Diesel engines  3.10 Delay period and variables affecting delay period.  3.11 Diesel knock and its control.  3.12 CI engine combustion chambers.</p>	08	12
	<p>Computer Controlled Fuel-Injection System</p> <p><b>Part A</b></p> <p>4.1 Throttle body injection (TBI) system, comparison with carbureted engine fuel supply system.  4.2 Multi-Point fuel Injection system (MPFI)/ Port fuel injection (PFI) system. Types of injection- sequential, grouped and simultaneous injections. Comparison of MPFI and TBI systems.  4.3 Electronic control module (ECM) control functions.  4.4 Inputs and outputs of electronic control module (ECM).  4.5 Output control functions- Fuel Injection control, Spark advance control, Idle speed control, Exhaust gas recirculation control and other controls.</p> <p><b>Part B</b></p> <p>4.6 Construction and working of fuel Injector and fuel pump.  4.7 Electronically controlled diesel Injection pump.  4.7.1 Electronic control system  4.7.2 Fuel system  4.7.3 Glow plug circuits  4.7.4 Injection pump timing</p>	10	14
		08	12



	4.7.5 Electronic Injection advance. 4.8 Common rail direct injection system.		
	Fuel Economy, Air pollution and Emission Control 5.1 Fuel Economy standards. 5.2 Methods of improving fuel economy. 5.3 Pollutants from gasoline engines. 5.4 Effect of engine maintenance on exhaust emission 5.5 Gasoline engine emission control, Catalytic Converters. 5.6 Diesel emission, Diesel smoke and control 5.7 Exhaust-Gas recirculation (EGR) – EGR Valve and control 5.8 Early fuel evaporation system 5.9 Positive crankcase ventilation (PCV) system 5.10 Electric assist choke system 5.11 Evaporation emission control system 5.12 Euro Norms and Bharat stage Norms. Equipment for checking Exhaust emission from vehicles. 5.13 Comparison of diesel and gasoline emission	10	12
	Total	48	70
<p>Practical: Skills to be developed:</p> <p>Intellectual Skills:</p> <ol style="list-style-type: none"> <li>1. Identify types of combustion chamber.</li> <li>2. Locate faults in MPFI system.</li> <li>3. Identify components of electronic fuel injection system (EFI).</li> <li>4. Diagnose EFI system.</li> <li>5. Diagnose engine condition from exhaust gas analysis. To interpret results.</li> </ol> <p>Motor Skills:</p> <ol style="list-style-type: none"> <li>1) Observe combustion chamber.</li> <li>2) Observe EFI system components &amp; their locations.</li> <li>3) Use diagnostic tester for Electronics fuel injection system diagnosis.</li> <li>4) Set carburetor for proper / reduced exhaust emission.</li> <li>5) Set valve clearance by adopting proper procedure.</li> <li>6) Draw valve-timing diagram.</li> <li>7) Adopt recommended service manual procedure for testing EFI system &amp; exhaust gas analyzer application.</li> </ol>			
<p>List of Practical:</p> <p>R. Cylinder Head Observation and Combustion Chamber Identification: Remove the cylinder head of an engine. Observe the combustion chamber, location of valves, spark plug or Injector. ---Decarbonise combustion chamber. Clean and refit. ---Use any four engines: - a) Bullet, b) Luna, c) Multi cylinder Petrol Engine, d) Multi- cylinder Diesel engine, e)</p>			

Scooter Engine.

---Interpret the type of combustion chamber. Sketch them and describe the construction. State the characteristics of the combustion chamber.

---Check the valve-valve seats for leakage. Check the condition of Spark Plug or fuel injector. Check the glow plug operation.

2. Valve Clearance Adjustment and Valve Timing Investigation:

- Perform Tappet setting of a single cylinder four-stroke engine.
- Perform Tappet setting of a multi cylinder engine.
- Construct the Port timing diagram of a two- stroke engine.
- Construct the Valve timing diagram of a four-stroke engine.

R. Electronic Fuel Injection System Diagnosis:

Diagnose Electronic fuel Injection system with diagnostic tester/ engine scanner.

- Perform On-Board diagnosis.
- Read trouble code at engine check Light/Malfunction Indicator light.
- Use Engine scanning tool for diagnosis
- Locate various Components of Electronic fuel injection system.
- Identify components of EFI system.
- Perform stand –alone diagnosis using a Multi-meter and test lamp.

4 Exhaust Gas Analysis:

Perform Exhaust gas analysis of an engine exhaust using 4-gas analyzer:

- Diagnose engine condition from exhaust gas analysis.
- Follow test cycle –modes of operation.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Anthony Schwaller	Motor Automotive Technology		Delmar Publisher Inc.
Tim Gills	Automotive Service		Delmar Publisher Inc.
M.L Mathur R.P.Sharma	A Course in Internal Combustion engine		Dhanpat Rai Publication
Identified Experts	Santro & Accent Basic training Book		Hyundai Motors India Ltd.
Identified Experts	Service Manuals of all Euro –II vehicles.		Maruti motors India Ltd.
Dr. Kirpal Singh	Automobile Engg. Vol.-2		Standard Publishers.
Anil Chikara	Automobile Engineering Vol.i – Engines.		Satya Prakashan, New Delhi
Crouse / Anglin.	Automobile Mechanics		TATA McGRAW – HILL

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Heinz Heisler	Advanced Engine Technology		
Tom Denton	Advanced Automobile Fault Dignosis		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : AUTOMOBILE ENGINEERING (AUTOMOBILE COMPONENT DESIGN)			
Course code: AE		Semester : FIFTH	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To gain the knowledge and skills needed in automotive design and production.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>To develop skills in computer-aided design and manufacture (CAD/CAM).</li> </ul>		
3.	<ul style="list-style-type: none"> <li>To study the process of engineering problem solving.</li> </ul>		
Objective :-			
S.No	Students should able to :-		
1.	<ul style="list-style-type: none"> <li>Analyze the loads, type of induced stresses, resisting areas &amp; hence the modes of failure.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Identify modes of failure &amp; relevant theory for problem solving.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Analyze practical problems &amp; make use of materials, strength equations, factor of safety etc.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Use design data book to standardize component dimensions, and to select</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/week
Marks			
Unit -1	Basic concepts of Design 1.1 Introduction to design 1.2 Classification of design 1.3 Design consideration 1.4 Design procedure 1.5 Stress analysis: 1.5.1 Types of external loads 1.5.2 Types of induced stresses: tensile, compressive, shear, Crushing and bearing pressure, bending, torsion, thermal stresses, creep, proof stresses, resilience, principal stresses 1.5.3 Stress – strain diagram for ductile & brittle material & it's importance 1.5.4 Variable stresses in machine parts, fatigue & endurance limit, stress – time diagrams for variable stresses 1.5.5 Working stresses for static load, variable or fatigue load	16	14
	1.5.6		

	<p>Factor of safety, selection of factor of safety.</p> <p>1.5.7 Stress concentration causes and remedies</p> <p>1.5.8 Introduction to theories of failure –Maximum principle stress theory, Maximum shear stress theory, Distortion energy theory.</p> <p>1.5.9 Selection of material and justifications for Automobile components. Advanced Materials for automotive components</p> <p>1.6.0 Concept of standardization , Preferred numbers &amp; interchangeability in design practice.</p> <p>1.6.1 Common types of fasteners with their applications - Through Bolts, tap bolts, studs, cap screws , and machine screws ,designation of screw thread according to I.S., stresses in screw fasteners , Bolts of uniform strength.</p> <p>1.6.2 Bearings-Classification ,location in Automobiles systems &amp; selection of bearings</p> <p>1.6.3 Post design aspects - Ergonomic aspect, Aesthetic consideration (shape, color, surface finish) for Automobile</p>		
Unit -2	<p>Design of machine elements</p> <p>2.1 Design of socket &amp; spigot type cotter joint.</p> <p>2.2 Design of knuckle joint</p> <p>2.3 Design of Turn buckle</p> <p>2.4 Applications of above machine elements in an automobile.</p>	06	08
Unit - 3	<p><b>Design of shafts, keys &amp; Couplings.</b></p> <p>3.1 Conceptual understanding of shaft, axles &amp; spindles.</p> <p>3.2 Design of shaft for torsion, rigidity, bending, combined Torsion &amp; bending.</p> <p>3.3 Comparison of solid &amp; hollow shafts.</p> <p>3.4 Design of propeller shaft, whirling &amp; critical speed.</p> <p>3.5 Design of rear axle.</p> <p>3.6 Types of keys, design of sunk rectangular key, woodruff key.</p> <p>3.7 Effect of keyways on shaft.</p> <p>3.8 Design of couplings- muff, flange, and bush pin type flexible.</p>	10	10
Unit - 4	<p><b>Design of levers.</b></p> <p>4.1 Types of levers</p> <p>4.2 Design of</p> <p>4.2.1 rocker arm,</p> <p>4.2.2 bell crank lever,</p> <p>4.2.3 hand lever</p> <p>4.2.4 Pedals for rectangular cross-section &amp; fulcrum pin only.</p>	06	06
Unit - 5	<p><b>Design of Chassis Component</b></p> <p>5.1 Design of clutch- Single plate &amp; Multi plate.</p> <p>5.2 Teeth calculation of gears for sliding mesh/constant mesh gear box for given data.</p>	10	12

	5.3 Design of semi elliptical leaf spring , helical spring - torsion & compression		
Unit - 6	<b>Design of engine components</b> 6.1 Data of engine specifications and calculations of cylinder dimensions for given power 6.2 Design of cylinder head thickness and bolts 6.3 Design of valve seat & valve lift 6.4 Design of piston crown by bending strength and thermal considerations. 6.5 Design of piston rings and skirt length 6.6 Design of piston pin for bearing, bending & shear considerations 6.7 Design of connecting rod cross -section (I section). 6.8 Design of big end, cap and bolts. 6.9 Design of overhung crank shaft.	16	20
	Total	64	70

Practical:

Skills to be developed:

Intellectual Skills:

- 1) Analyze the loads, resisting areas, types of induced stresses on automobile components.
- 2) Analyze the modes of failure of different automobile components & identify the methods, strength equations to overcome the failures.
- 3) Calculate the dimensions of automobile components.
- 4) Identify different engine & chassis components.
- 5) Identify different fasteners & bearings used in automobiles.

Motor Skills:

- 1) Draw various automobile components as per the designed dimensions.
- 2) Use advanced materials for automobile components.
- 3) Use design data book to standardize component dimensions.
- 4) Prepare bill of materials.
- 5) Use various CAD software to draw automobile components.

List of Practical:

1. Identify & classify the different engine & chassis components according to the type of load to which they are subjected. Also state the types of induced stresses in them.
2. Identify the different engine & chassis components which may fail due to stress concentration, observe & state remedy to reduce stress concentration
3. Use of advanced materials with justifications for components like gears, piston, piston rings, leaf springs, cylinder head & block etc.
4. Identify different fasteners & bearings used in an automobile, justify their locations.
5. Design any machine element & coupling for specified data, select suitable materials, prepare assembly-detail drawing on CAD indicating overall dimensions, tolerances, hardness & surface finish, also Prepare bill of material.
6. DESIGN PROJECT

Design of Power train(Piston, Piston rings, piston pin, connecting rod, crankshaft)/ transmission train (clutch, teeth calculations of gear box, propeller shaft and rear axle)/ leaf spring /coil spring for specified data, select suitable materials, prepare drawing indicating overall dimensions, tolerances, hardness & surface finish.

NOTES:

- ❖ Design project activity should be completed in a group of 5-6 students
- ❖ Use of design data book is compulsory.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R.K.Jain	Machine Design		Khanna publication
R.S.Khurmi & J.K.Gupta	Machine Design		Eurasia Publication House .
Pandya & shah	Machine Design		Dhanpat rai & sons
P C Sharma D K Aggarwal	Machine Design		S K KATARIA & sons
R B Gupta	Auto design		Satya prakashan
N.K Giri.	Problems in Automobile Engineering		Khanna publication
K M Aggarwal	Auto design problems		Satya prakashan
Griles	Automobile Design Vol,2,3		--
J.E. Shigley	Machine Design		McGraw Hill
--	Machine tool design Handbook		CMTI
Design data Book	--		P S G Coimbatore
Robert L. Norton	Machine Design An integrated approach		Prentice-Hall.

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R.K Rajput	A text book pf Automobile Engineering		
Heinz Heisler	Advanced Engine technology		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

Name of the Course : AUTOMOBILE ENGINEERING (ENVIRONMENTAL POLLUTION & CONTROL (ELECTIVE I))				
Course code: AE		Semester : FIFTH		
Duration :		Maximum Marks :		
Teaching Scheme		Examination Scheme		
Theory :	3 hrs/week	Mid Semester Exam:	- Marks	
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks	
Practical :	2 hrs/week	End Semester Exam:	70 Marks	
Credit :- Nil				
Aim :-				
S.No				
1.	<ul style="list-style-type: none"> <li>To provide interdisciplinary foundation training for students from a natural science or engineering background intending to pursue a career, with or without further postgraduate training, in pollution control, environmental management or resource conservation.</li> </ul>			
Objective :-				
S.No	Students should able be to:			
1.	<ul style="list-style-type: none"> <li>Know the global importance of clean environment.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Classify the pollutants</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Know the sources of pollutants.</li> </ul>			
4.	<ul style="list-style-type: none"> <li>Understand effect of pollutants on environment &amp; economy.</li> </ul>			
5.	<ul style="list-style-type: none"> <li>Know about environment &amp; control acts &amp; ISO 14000 standards.</li> </ul>			
6.	<ul style="list-style-type: none"> <li>Operate pollution control devices.</li> </ul>			
Pre-Requisite :- Nil				
Contents : Theory (Name of the Topic)			Hrs/week	Marks
Unit -1	Introduction 1.1 Environment 1.2 Ecosystem 1.3 Classification of pollution & pollutants 1.4 Environment & pollution control acts 1.5 ISO 14000 standards, 1.6 Kyoto treaty / protocol, carbon units.		04	06
Unit -2	Air Pollution Part A 2.1 Sources & classification of air pollution 2.2 Effects of air pollution on human health 2.3 Effects of air pollution on economy 2.4 Photochemical air pollution 2.5 Air pollution from major Industrial operations e.g. Fertilizer industries aluminum manufacturing plants, Acid plants, Cement industries, Coal &		10	14



	<p>tar industries, paper industries, Refinery &amp; petrochemical industries</p> <p>Part B</p> <p>Air pollution due to Automobiles-design and operating parameters and methods of control</p> <p>2.6 Pollution due to S. I. Engines. Design &amp; operating parameters responsible for emission and methods of pollution control.</p> <p>2.7 Pollution due to C. I. Engines. Design &amp; operating parameters responsible for emission and methods of pollution control.</p> <p>2.8 Air quality &amp; emission standards of India &amp; Europe</p> <p>2.9 Air pollution in Indian metro cities- Delhi, Mumbai, Chennai, Kolkata</p>	14	18
Unit – 3	<p>Water Pollution</p> <p>3.1 Sources of water pollution.</p> <p>3.2 Effects of water pollution.</p> <p>3.3 Water pollution analysis</p> <p>    3.3.1 Physical examination of water</p> <p>    3.3.2 Chemical characteristics of water</p> <p>    3.3.3 Biological investigation of water</p> <p>3.4 Definitions of Important terms used in water pollution – Dissolved O<sub>2</sub>, Chemical O<sub>2</sub> demand, Biological O<sub>2</sub> demand, Theoretical O<sub>2</sub> demand, Total solids, Total suspended solids, Total dissolved solids, Turbidity, Alkalinity, Acidity.</p> <p>3.5 Water quality standards</p> <p>3.6 Steps in Water treatment</p> <p>3.7 Sampling &amp; analysis of water pollution</p>	06	10
Unit – 4	<p>Noise Pollution</p> <p>4.1 Definition of noise</p> <p>4.2 Sources of noise</p> <p>4.3 Types of noise – Impulsive &amp; sonic noise</p> <p>4.4 Effects of noise on health</p> <p>4.5 Noise measurement</p> <p>4.6 Noise mapping</p>	04	08
Unit – 5	<p>Other Types Of Pollution</p> <p>5.1 Solid waste</p> <p>    5.1.1 Classification of solids</p> <p>    5.1.2 Solid waste management</p> <p>    5.1.3 Method of solid waste disposal</p> <p>    5.1.4 Reuse, Recycling &amp; recovery of materials from refuse</p> <p>5.2 Soil pollution</p> <p>    5.2.1 Chemistry of soil</p> <p>    5.2.2 Soil irrigation by effluents</p> <p>    5.2.3 Agricultural pollution</p> <p>5.3 Radiation pollution</p> <p>    5.3.1 Sources &amp; effects of radiation</p> <p>    5.3.2 Radiation exposure standards</p> <p>    5.3.3 Radiation protection</p>	10	14

	5.3.4 Treatment & disposal of radiation waste 5.4 Global pollution 5.4.1 Green house effect 5.4.2 Acid rain 5.4.3 Ozone depletion problem		
		Total	48
			70

Practical:

Skills to be developed:

Intellectual Skills:

- Understand various types of pollutants in air and water.
- Know the safe levels of pollutants in air/ water.
- Understand the concept of noise pollution.
- Write report on pollution level and suggest remedial measures.

Motor Skills:

- Measure the different pollutants by using the exhaust gas analyzer.
- Determine acidity/ alkalinity of water sample.
- Measure the noise level at different sites/ public places like Bus stand, air-port, railway station etc.
- Determine quality of water with reference to turbidity, hardness, suspended particles, dissolved pollutants etc.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
M.N. Rao & H.V.N. Rao	Air pollution		Tata McGraw Hill
William H. Course & Donald L. Anglin	Automotive Mechanics		Tata McGraw Hill
K.K. Ramlingam	Internal Combustion Engines		Scitech
G.S. Bilgi	Water Supply and Sanitary Engineering		Dhanpat Rai and Sons.
P. Meenakshi	Elements of Environment Science & Engineering		Prentice-Hall
S.Deswal & A. Deswal	A basic course in environmental studies		Dhanpat Rai and Sons.
P. Aarne Vesilind & Susan M. Morgan	Introduction to Environmental Engineering.		Thomson

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
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C.S Rao	Environmental Pollution Control Engineering		
McKinney	Environmental pollution control microbiology		
<b>Suggested List of Laboratory Experiments :-</b>			
S.No			
1	<ul style="list-style-type: none"> <li>• Measure CO, HC from the S.I. engine exhaust using gas analyzer &amp; compare it with pollution norms.</li> </ul>		
2	<ul style="list-style-type: none"> <li>• Measure particulate matter, from C.I. engine exhaust using smoke meter &amp; compare it with pollution norms.</li> </ul>		
3	<ul style="list-style-type: none"> <li>• Determine SPM, NO<sub>x</sub>, SO<sub>x</sub> in ambient air using high volume sampler.</li> </ul>		
4	<ul style="list-style-type: none"> <li>• Determine turbidity, chlorides &amp; sulphates of a given raw water sample.</li> </ul>		
5	<ul style="list-style-type: none"> <li>• Determination of hardness of given raw water sample.</li> </ul>		
6	<ul style="list-style-type: none"> <li>• Determine solids, total suspended solids, total dissolved solids in a given water sample.</li> </ul>		
7	<ul style="list-style-type: none"> <li>• Determine acidity / alkalinity of a given water sample.</li> </ul>		
8	<ul style="list-style-type: none"> <li>• Visit site where actual recycling &amp; recovery of materials is done from refuse. Eg. Plastics, Glass, Paper, Agricultural waste etc. &amp; prepare a report.</li> </ul>		
9	<ul style="list-style-type: none"> <li>• Case study: Air pollution due to automobiles at different places in your city.</li> </ul>		
10	<ol style="list-style-type: none"> <li>1. Case study : Measure noise level in your city at different places like Bus stand, Railway station, Air port, Hospitals, Schools, Traffic jam conditions etc. &amp; prepare a report on it.</li> </ol>		
<b>Suggested List of Assignments/Tutorial :- Nil</b>			

Name of the Course : AUTOMOBILE ENGINEERING (HYDRAULICS & PNEUMATICS)			
Course code: AE		Semester : <b>FIFTH</b>	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To provide basic understanding of maintaining hydraulic and pneumatic processes.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>To provide basis for the students to gain skills for a range of hydraulic and pneumatic processes in a maintenance environment.</li> </ul>		
Objective :-			
S.No	Student will be able to:		
1.	<ul style="list-style-type: none"> <li>Understand the basic properties of fluid, important principles of hydraulics with their applications and hydraulic devices used in practice.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Identify fluid power system components.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Select appropriate tools to dismantle and assemble the components.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Diagnose probable causes of failure of components of hydraulic and pneumatic circuits.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Verifying the conditions of fittings, oil, pipes, seals &amp; packing of hydraulic systems in automobile vehicles.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Construct the Hydraulic and Pneumatic circuits for various applications.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)		Hrs/week	Marks
Unit -1	<p><b>Fluid Mechanics</b></p> <p>1.1 Overview of fluid properties Ideal fluid , Real Fluid, Specific Weight, Specific gravity, Surface tension, Capillarity, Viscosity. Definitions and applications only. Specifications and standards of hydraulic fluids. Pascal's law.</p> <p>1.2 Measurement of Pressure Concept of atmospheric pressure, gauge pressure, absolute Pressure. Pressure Gauges - Piezometer tube, simple and differential manometer, micro – manometer. (Theoretical Treatment only, No Analytical treatment / Problems on Manometers.) Bourdon tube pressure gauge.</p>	06	10
Unit -2	<b>Hydrodynamics</b>	08	10

	<p>2.1 Law of continuity. Law of continuity and its applications.</p> <p>2.2 Bernoulli's Theorem. Energy possessed by the liquid in motion. Bernoulli's theorem and its applications such as Venturimeter, Orifice meter and pitot tube. (Analytical treatment with derivation for measurement of discharge is expected).</p> <p>2.3 Hydraulic coefficients Concept of Vena Contracta. Coefficient of contraction, coefficient of velocity, coefficient of discharge, Coefficient of resistance. Relation between the hydraulic coefficients.</p> <p>2.4 Types of fluid flow Steady, unsteady, rotational, irrotational, laminar, turbulent, one, two &amp; three dimensional flow, Uniform &amp; non uniform flow.</p>		
Unit - 3	<p>Hydraulic Devices</p> <p>3.1 Simple Hydraulic Devices. Working principles, construction and applications of Hydraulic jack, Hydraulic ram, Hydraulic lift, Hydraulic press.</p> <p>3.2 Centrifugal Pumps. Types, Construction and working of centrifugal pump Types of casing. Need of priming. Heads, Losses and Efficiencies of Centrifugal Pump. (No Analytical Treatment.) Net positive suction head, Fault findings and remedies. Pump selection.</p> <p>3.3 Reciprocating Pumps Construction &amp; Working of single &amp; Double Acting Reciprocating pump. Positive &amp; Negative slip. Air vessels - their function &amp; Advantage. Power and Efficiencies of Reciprocation Pump. (No Analytical Treatment.) Reasons of cavitations and separation.</p> <p>3.4 Other Pumping Devices. Gear pumps used in hydraulic circuits, Vane type, Screw pumps, Swash plate pump. Comparison of above pumps for various characteristics.</p> <p>3.5 Air Compressors. Reciprocating Compressors. Rotary compressor used in pneumatic circuits</p>	12	18

Unit – 4	<b>Basic Components of Hydraulic &amp; Pneumatic Systems</b>  4.1 Hydraulic & Pneumatic symbols 4.2 Air Motors: Type, construction, working. 4.3 Hydraulic Motors: Type, construction, working. 4.4 Valves: Classifications of valves, poppet, ball, needle, throttle, pressure control directional control, sequencing synchronizing ,rotary spool, sliding spool two position, multi position. Non-return valves. Construction & operation of above valves.	08	10
Unit – 5	<b>Accessories of Hydraulic &amp; Pneumatic circuit</b>  5.1 Filters: Types, function, construction. 5.2 Hoses & Connectors: Type, construction and applications. 5.3 Seals & Gaskets: Types, function, construction.	06	08
Unit - 6	<b>Hydro Pneumatic Systems &amp; Circuits</b>  6.1 Comparison of Hydraulic and pneumatic circuits.  6.2 Hydraulic Circuits: Meter in, Meter out, Bleed off, Sequencing. Applications of hydraulic circuits: Hydraulic power steering – Reaction piston type, Mobile Hydraulic system and Earthmovers  6.3 Simple Pneumatic Circuits. Speed control circuits. Sequencing circuits. Applications of pneumatic circuits – Air brake, Low cost Automation in industries, Pneumatic power tools.	08	14
	<b>Total</b>	48	70

Practical:

Skills to be developed:

*Intellectual Skills:*

- 1) Understand the basic principles of Hydraulics and their applications.
- 2) Measure discharge, pressure head and velocity of flow.
- 3) Understand the working of hydraulic & pneumatic system.
- 4) Identify the component used in Hydraulic and Pneumatic Circuit. Design small circuits using these components.
- 5) Co-relate the performance hydraulic & pneumatic system.
- 6) Identify the faults and suggest remedies.
- 7) Write report.

**Motor Skills:**

1. Connect different components as per hydraulic & Pneumatic circuit.
2. Construct & assemble centrifugal, reciprocating pump & procedure of testing.
3. Assemble & dismantle centrifugal & gear pump.
4. Use & operate pressure gauge, venturi- meter, stopwatch & orifice meter.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Pippengen & Hicks	Industrial Hydraulics		Tata McGraw Hill Int.
S. R. Mujumdar	Oil Hydraulic System – Principle and Maintenance		Tata McGraw Hill Co.
S. R. Mujumdar	Pneumatics Systems – Principle and Maintenance		Tata McGraw Hill Co.
Dr. P. N. Modi Dr. S.M. Seth	Hydraulic and Fluid Mechanics		Standard book house, Delhi
V. Thanikacha T.T.T.I. - Chennai	Hydraulics and Hydraulic Machinery		Tata McGraw Hill Co.
Harry L. Stewart.	Pneumatics and Hydraulics		D. B. Taraporevala sons & co. private Ltd. Mumbai
S. Ramamrutham	Hydraulics, Fluid Mechanics & Fluid Machinery		Dhanpat Rai publishing company
Dr. Jagdish Lal	Fluid Mechanics and Hydraulics		Metropolitan books Co. private Ltd. Delhi
-----	Vicker’s Industrial Hydraulic Manual		Vicker’s system international Ltd. Pimpri, Pune – 411018
Sameer Shaikh Iliyas Khan	Treaties on Hydraulics Pneumatics Fluid system		R. K. Publication, Kolhapur

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Andrew Parr	Hydraulics & Pneumatics		
S.R Mujumdar	Pneumatics Systems:Principles & maintenance		

**Suggested List of Laboratory Experiments :-**

S.No	
1	<ul style="list-style-type: none"> <li>• Experimental Verification of Bernoulli’s Theorem.</li> </ul>
2	<ul style="list-style-type: none"> <li>• Experimental determination of Coefficient of Discharge of Venturimeter / Orifice-meter.</li> </ul>
3	<ul style="list-style-type: none"> <li>• Symptoms, faults, causes and remedies in general hydraulic components and circuits.</li> </ul>

4	<ul style="list-style-type: none"><li>• Dismantling and assembly of centrifugal pump and gear pump used in automobile.</li></ul>
5	<ul style="list-style-type: none"><li>• Construct two simple hydraulic circuits like meter in, meter out, bleed off and involving different valves etc. using trainer kit and observe the working of those circuits.</li></ul>
6	<ul style="list-style-type: none"><li>• Construct any two simple pneumatic circuits using trainer kit observe the working of those circuits.</li></ul>
7	<ul style="list-style-type: none"><li>• Trial on centrifugal pump to determine its discharge and efficiency.</li></ul>
8	<ul style="list-style-type: none"><li>• Trial on reciprocating pump to determine efficiency</li></ul>
Suggested List of Assignments/Tutorial :- Nil	



Name of the Course : <b>MECHANICAL ENGINEERING GROUP</b> (MECHATRONICS (ELECTIVE-I))				
Course code: <b>ME/PT/AE/PG/MH</b>		Semester : FIFTH		
Duration :		Maximum Marks :		
Teaching Scheme		Examination Scheme		
Theory :	3 hrs/week	Mid Semester Exam:	- Marks	
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks	
Practical :	2 hrs/week	End Semester Exam:	70 Marks	
Credit :- Nil				
Aim :-				
S.No				
1.	<ul style="list-style-type: none"> <li>The integration of electronics engineering, electrical engineering, computer technology and control engineering with mechanical engineering as a part in the design, manufacture and maintenance of wide range of engineering products and processes. To study the systems used in automation.</li> </ul>			
Objective :-				
S.No	Students should be able to:			
1.	<ul style="list-style-type: none"> <li>Identify various input and output devices in an automated system.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Understand and draw ladder diagrams.</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Write simple programs for PLCs.</li> </ul>			
4.	<ul style="list-style-type: none"> <li>Interpret and use operations manual of a PLC manufacturer.</li> </ul>			
5.	<ul style="list-style-type: none"> <li>Use simulation software provided with the PLC.</li> </ul>			
6.	<ul style="list-style-type: none"> <li>Understand interfacing of input and output devices.</li> </ul>			
Pre-Requisite :- Nil				
Contents : Theory (Name of the Topic)			Hrs/week	Marks
Unit -1	<p>Introduction to Sensors, Transducers and Actuators Principle, working and applications of-Limit switches, proximity switches like inductive ,capacitive and optical (deflecting and through beam type) , Thumb wheel switches magnetic reed switches ,Optical encoders-displacement measurement,rotary,incremental, opto-couplers.</p> <p>Actuator – solenoids – on-off applications, latching, triggering</p> <p>Types of relays- solid state</p> <p>Types of motors – DC motors, DC brushless motors, AC motors, stepper motors , servo motors</p>		06	08
Unit -2	<p><b>8085 Microprocessor</b></p> <p>Architecture, Pin configuration, working of microprocessor, and applications.</p> <p>Introduction to ICs used for interfacing such as –</p> <p>Programmable peripheral devices , USART, memory, keyboard, display –</p>		08	10

	LCD,LED,I/O device, ADC, DAC etc  <b>8051 Microcontroller</b> Architecture, Pin configuration, working of microcontroller, Applications Comparison of microprocessor and microcontroller , advantages and disadvantages		
Unit - 3	<b>Programmable Logic Controller (PLC)</b> Introduction, PLC definition, PLC block diagram, Difference between relay panel and PLC, ,power supply, input/output modules (analog, digital) concepts of sink/source, set/reset, latch/unlatch, advantages and disadvantages, installation , troubleshooting and maintenance	08	12
Unit - 4	<b>Selection of a PLC Programming equipment, Programming formats</b> Ladder diagrams and sequence listing, large process ladder diagram construction, flowcharting as a programming method , Basic PLC functions Register basics, timer functions, counter functions Intermediate functions – Arithmetic functions, number comparison and number conversion functions Data handling functions- SKIP, Master control relay, Jump, Move, Block move, Table to register and register to table move functions. FIFO and LIFO functions, File Arithmetic and Logic function	16	22
Unit - 5	ONS and CLR functions and their applications PLC digital bit functions and applications Sequencer functions and cascading of sequencers PLC matrix functions Discrete and analog operation of PLC, Networking of PLCs. PLC auxiliary commands and functions,	06	10
Unit - 6	Online, offline, stop/run modes of operations, uploading/downloading between PLC and PC, Introduction to SCADA and DCS	04	08
	Total	48	70
<p><b>Practical:</b></p> <p>Intellectual Skills:</p> <ol style="list-style-type: none"> <li>1. Identification of various sensors and transducers used in automated systems</li> <li>2. Interpretation of circuits in automation</li> <li>3. Interpretation and use</li> </ol> <p>Motor skills:</p> <ol style="list-style-type: none"> <li>1. Use of simulation software for PLCs</li> <li>2. Preparation of ladder diagrams</li> <li>3. Testing of interfacing ICs</li> </ol> <p>List Of Practical:</p>			

Term work shall consist of detailed report on the following experiments :

1. Identification and demonstration of different sensors and actuators.
2. Demonstration of the working of various digital to analog and analog to digital converters.
3. Development of ladder diagram, programming using PLC for
  - a) measurement of speed of a motor
  - b) motor start and stop by using two different sensors
  - c) simulation of a pedestrian traffic controller
  - d) simulation of four road junction traffic controller
  - e) lift / elevator control
  - f) washing machine control
  - g) tank level control
  - h) soft drink vending machine control
4. Trace, interpret and demonstrate working of at least two electro pneumatic systems.
5. Trace, interpret and demonstrate working of at least two electro hydraulic systems.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Bolton W.	Mechatronics- Electronic control systems in Mechanical and Electrical Engineering		Pearson Education Ltd.
Histand B.H. and Alciatore D.G.	Introduction to Mechatronics and Measurement systems		Tata McGraw Hill Publishing
John W. Webb and Ronald Reis	Programmable Logic Controllers		Prentice Hall of India
NIIT	Programmable Logic Control – Principles and Applications		Prentice Hall of India
Kolk R.A. and Shetty D.	Mechatronics systems design		Vikas Publishing, New Delhi
Mahalik N.P.	Mechatronics principles, concepts and applications		Tata McGraw Hill Publishing

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ganesh S Hegde	Mechatronics		
Bolton	Mechatronics: Electronic control systems in mechanical & electrical engineering		

**Suggested List of Laboratory Experiments :- Nil**

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : AUTOMOBILE ENGINEERING (VEHICLE AERODYNAMICS AND DESIGN (ELECTIVE-I))				
Course code: AE		Semester : FIFTH		
Duration :		Maximum Marks :		
Teaching Scheme		Examination Scheme		
Theory :	3 hrs/week	Mid Semester Exam:	- Marks	
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks	
Practical :	2 hrs/week	End Semester Exam:	70 Marks	
Credit :- Nil				
Aim :-				
S.No				
1.	<ul style="list-style-type: none"> <li>The aim of this subject is to introduce students to some basic aspects of the subject of vehicle aerodynamics.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>To illustrate explanations of the physical principles involved in context with vehicle aerodynamics.</li> </ul>			
Objective :-				
S.No	Students will be able to:			
1.	<ul style="list-style-type: none"> <li>Understand concepts of aerodynamics</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Calculate various forces &amp; moments acting on moving vehicles</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Know the stability of vehicle on slope &amp; turns.</li> </ul>			
4.	<ul style="list-style-type: none"> <li>Get concepts of vehicle model testing in wind tunnel for estimating drag coefficients.</li> </ul>			
5.	<ul style="list-style-type: none"> <li>Estimate tractive effort required to propel the vehicle &amp; parameters which decide vehicle performance.</li> </ul>			
6.	<ul style="list-style-type: none"> <li>Apply the knowledge in vehicle body work and rework.</li> </ul>			
Pre-Requisite :- Nil				
Contents : Theory (Name of the Topic)			Hrs/ week	Marks
Unit -1	Aerodynamics: 1.1 Introduction of aerodynamics: Historical Examples and future trends. 1.2 Classification & practical objectives of aerodynamics 1.3 Fundamental aerodynamic variables like Pressure, Density, Temperature, Flow Velocity. 1.4 Aerodynamic forces & moments like Relative Wind, Free Stream, Lift, Drag. 1.5 Concept of airfoil and air dam.		06	10
Unit -2	<i>PART A : Ergonomic consideration</i> 2.1 Concept of Visibility 2.2 Concept of Blind spot		04	06



Text Books:			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
John. D Anderson, Jr.	Fundamentals of aerodynamics		McGraw-Hill Books Company, International student Edition
Wolf-Heinrich Hucho	Aerodynamics of road vehicles from fluid mechanics to vehicle		SAE International
Butlerworths, by Wolf-Heinrich Hucho	Aerodynamics of road vehicles from fluid mechanics to vehicle		SAE International
Richard stone, Jeffrey k. Ball	Automotive Eng. Fundamentals		SAE International
John Fenton	Vehicle body layout and analysis		Hutchinson, London
Joseph Heitner	Automotive mechanics		--
William H. Crouze	Automotive mechanics		--
Lanusz Powloski	Vehicle body engineering		Business books Ltd., London
Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mark Gleason	Vehicle aerodynamics design & technology		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :-			
S.No			
1	<ul style="list-style-type: none"> <li>Study of ergonomics of human body &amp; hence the design of driver's and passenger's seat.</li> </ul>		
2	<ul style="list-style-type: none"> <li>Comparison of visibility of different vehicles. Prepare a report.</li> </ul>		
3	<ul style="list-style-type: none"> <li>Procedure for measurement of various aerodynamic forces and moments.</li> </ul>		
4	<ul style="list-style-type: none"> <li>Study of wind tunnel and procedure for wind load distribution on various body structures.</li> </ul>		
5	<ul style="list-style-type: none"> <li>Case study of an accidental vehicle, which took place due to improper body rework /body building.</li> </ul>		
6	<ul style="list-style-type: none"> <li>Procedure of measurement of air drag in wind tunnel.</li> </ul>		
7	<ul style="list-style-type: none"> <li>Prepare aerodynamic shape with the help of Graphics Software.</li> </ul>		
8	<ul style="list-style-type: none"> <li>Simple sketches of modern passenger car, truck, bus etc with suitable design showing importance of Aerodynamics.</li> </ul>		
9	<ul style="list-style-type: none"> <li>Simple sketches of airflow patterns on various types of vehicle.</li> </ul>		

Name of the Course : AUTOMOBILE ENGINEERING (VEHICLE TESTING (ELECTIVE-I))			
Course code: AE		Semester : FIFTH	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :- Nil			
Objective :-			
S.No	The students will able to:		
1.	<ul style="list-style-type: none"> <li>Define and understand the terms efficiency, Vehicle performance, testing.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Understand the meaning of vehicle testing and quality assurance.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Classify vehicle testing as Component level and Vehicle level testing.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Identify the various instruments and equipments required for testing and know their use and capabilities and analyze the parameters to be recorded.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Use the proper instrument/equipment and measure the required quantity accurately.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Use appropriate correlations to calculate efficiency, power, torque, fuel consumption etc.</li> </ul>		
7.	<ul style="list-style-type: none"> <li>Get acquainted with standard test procedures and conduct the same.</li> </ul>		
8.	<ul style="list-style-type: none"> <li>Evaluate and tabulate the test data in appropriate manner.</li> </ul>		
9.	<ul style="list-style-type: none"> <li>Plot the performance Characteristics graphically and interpret the results.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/week
Marks			
Unit -1	<p>Overview of Vehicle Testing</p> <p>1.1 Need and importance of vehicle testing</p> <p>1.2 Classification, Accuracy, Test data.</p> <p>1.3 Basis of tests- driving cycles, Homologation</p> <p>1.4 Requirements of test- Test equipments, Procedure, Quality Personnel.</p> <p>1.5 Testing instruments and equipments- Use, capabilities and Parameters of the following equipments to be recorded Engine dynamometer, Compression tester, Stroboscope, Computerized engine analyzer, Petrol/Diesel engine scanner, Infrared exhaust gas analyzer, Diesel smoke meter, Vacuum tester, Chassis dynamometer etc.</p> <p>1.6 Testing Standards- SAE, ASMT standards; ARAI,</p>	12	16



	<p>CMVI regulations.</p> <p>1.7 Significance of test.</p> <p>1.8 Production part approval process</p>		
Unit -2	<p>Laboratory Testing of Vehicle Subsystems</p> <p>Part A:</p> <p>2.1 Noise, Vibration and Harshness (NVH) testing- Types of NVH- Pass by noise, In cab noise, Floor vibrations.</p> <p>2.2 Engine Performance parameters testing- Power, Torque, Efficiency, Fuel consumption, Dry and wet compression test, Charging system test, Regulated voltage test, Starter motor voltage drop test, Ignition system oscilloscope test.</p> <p>2.3 Engine emission testing as per Indian driving cycles.</p> <p>2.4 Lubricating oil pump pressure test.</p>	10	14
	<p>PART B:</p> <p>2.6 Cooling system- Leakage test, pressure test, Vacuum test of pressure cap, Corrosion test- Hot spots and cold spots.</p> <p>2.7 Fuel Injection pump – pressure test, Injector testing, Calibration and Phasing.</p> <p>2.8 Transmission Testing- Efficiency Vs O/P Speed, Torque ratio Vs O/P Speed, Input speed Vs O/P Speed, O/P Torque Vs O/P Speed, Parasitic losses Vs Input Speed, NVH test.</p> <p>2.9 Tyre Testing- Tyre wear pattern identification and causes, Endurance test, Strength test, High speed performance test, Tubeless tyre resistance to bead unseating.</p>	10	14
Unit - 3	<p>On-Road Testing of Vehicles</p> <p>PART A:</p> <p>3.1 Introduction of sampling technique.</p> <p>3.2 Vehicle level performance parameters- Acceleration, Drive ability, Gradeability, Restartability, Brakes testing, Steering effort Testing, Speedometer and odometer testing.</p> <p>3.3 Accelerated endurance testing procedures- Torture tracks e.g. Belgian Pave, Corrugated, Long wave pitching, Pot hole, Sand patch, Mud patch, Steering pad, High speed, Serpentine courses, Gradient, Shallow water trough, Deep wading trough, Cross Country, Step Climbing, Draw bar or winch pull test.</p>	08	14
	<p>PART B:</p> <p>3.4 Moving barrier collision test- Frontal impact, Rear impact, Side impact, roof crash.</p> <p>3.5 Barrier Collision test with vehicle acceleration and occupant loading.</p> <p>3.6 Roll over test without collision.</p> <p>3.7 Inverted vehicle drop test</p> <p>3.8 Vehicle ride and handling parameters and effect of steering changes, suspension changes on handling characteristics- Definitions of – Ride and comfort, Roll, Lurch, Tramp, Yaw, pitching, bouncing, Steady-state</p>	08	12

	cornering, Steering characteristics.		
		Total	70
<p>Practical: Skills to be developed:</p> <p>Intellectual Skills:</p> <ul style="list-style-type: none"> <li>• Understand methods of temperature and pressure measurement of cooling system.</li> <li>• Understand performance characteristics/ parameters of a motor vehicle and to analyze the same after a test drive.</li> <li>• Understand the fuel measurement methods.</li> <li>• Understand the use of exhaust gas analyzer and to analyze the exhaust gas constituents.</li> </ul> <p>Motor Skills:</p> <ul style="list-style-type: none"> <li>• Observe the measurement of temperature and pressure of cooling system.</li> <li>• Observe various test facilities at organizations like ARAI, VRDE, TATA MOTORS and alike.</li> </ul> <p>List of Practical/ Assignments:</p> <ol style="list-style-type: none"> <li>1. Use of any three test instruments and three equipments</li> <li>2. NVH testing.</li> <li>3. Testing procedures of any three engine performance parameters.</li> <li>4. Check exhaust emission of petrol/ diesel vehicle.</li> <li>5. Prepare a report based on industrial visit to test tracks of any organization like VRDE, ARAI, TATA Motors.</li> </ol>			
<b>Text Books:</b>			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
R.B. Gupta	Automobile Engineering		Satya Prakashan
SAE International Handbook	-----		SAE Publication
W.H. Crouse, D.L. Anglin	Automotive Mechanics		Tata Mc Graw Hill
Anil Chikkara	Automobile Engineering Vol. III		Satya Prakashan
M. L. Mathur, R.P. Sharma	Internal Combustion Engines		Dhanpat Rai & Sons
N. K. Giri	Automobile Mechanics		Khanna Publication.
Ken Layne	Automotive Engine Performance		Prentice Hall career Technology
Don Knowles	Automobile Mechanics: Understanding New Techniques		Prentice Hall career Technology
VRDE & CIRT Manuals			

Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Joseph B. Glassford	The Hands on vehicle: Testing reference		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : <b>AUTOMOBILE ENGINEERING (BASIC ELECTRICAL AND ELECTRONICS)</b>			
Course code: <b>AE</b>		Semester : <b>FIFTH</b>	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To study concepts, principles &amp; procedure of operating electrical machines, circuits &amp; systems and their applications. To study measurements of electrical quantities to judge the performance of electrical machines and also study about running and maintaining various electrical machines and drives.</li> </ul>		
Objective :-			
S.No	Students will be able to:		
1.	<ul style="list-style-type: none"> <li>Understand the basic concepts of electrons, electricity, magnetism, transformer, measuring instruments that will be useful while troubleshooting/ maintenance of electrical circuits.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Understand principle and working of electric motors.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Identify various electrical symbols and their operation in automotive wiring.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Know the working of electronic components like semiconductors, diodes, rectifiers, filters, regulators, transistors, amplifiers, oscillators, &amp; their operation.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Understand the operation &amp; application of transducer in automobile.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Understand operation of signals, gates, flip-flops, encoder, decoder, counter, multiplexer used in electronic circuits of an automobile</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/week
Marks			
Unit -1	<b><i>Basic concepts &amp; principles of Electrical Engineering</i></b> 1.1 Voltage, Current, Resistance, Ohm's law 1.2 Magnetism, Electromagnetism, Law of Electromagnetic Induction 1.3 AC fundamentals, Concept of active and reactive power 1.4 Application of measuring Instruments – volt meter, ammeter, inductive/ tongue tester and multimeters. 1.5 Principles of transformers. Ampere turns ratio. 1.6 Construction of transformer. 1.7 Core and shell type transformer.		12
			16

	1.8 Auto transformer-types and comparison.		
Unit -2	<p>Electric Motors and Generators</p> <p>2.1 DC motors:-Principle, Construction, types and applications</p> <p>2.2 AC motors:-Principle, Construction and applications</p> <p>2.3 Stepper motor-Types of stepper motor, principle, construction, applications and specifications.</p> <p>2.5 Concept and working principle of D.C. generator and alternator.</p>	06	10
Unit - 3	<p>Wiring and Lighting Circuit</p> <p>3.1 Symbols of electrical circuits and wiring colour code, size, comparison of insulated &amp; ground return system, Positive &amp; negative return system, their comparison.</p> <p>3.2 Need of wiring Harness, Wiring diagram of :- Head light, Turn indicator, Horn, Windshield wiper, Power window, Power seat, Battery ignition, Magneto ignition.</p>	06	10
	<p><i>Basic Electronics</i></p> <p>4.1 Semiconductors,</p> <p>4.2 Diode :-PN junction, zener diode symbol, Characteristics and application.</p> <p>4.3 Rectifier-half, full, Bridge type with filters(C,LC,<math>\Pi</math> type).</p> <p>4.4 Transistor:- BJT:-NPN, PNP transistor, symbol, working.</p> <p>4.5 TRIAC, DIAC, , Silicon control rectifier(SCR):-Symbol, working . Comparison between Transistor and SCR.</p> <p>4.6 Amplifier:-Common emitter configuration only</p> <p>4.7 Power device:-photodiode, LED, LDR, phototransistor working</p> <p>4.8 TRIAC,DIAC, Silicon control rectifier(SCR):-Symbol, working</p> <p>4.9 Concept of Oscillators</p>	10	10
	<p><i>Transducers/Sensors and their applications</i></p> <p>5.1 Electromechanical type transducers: -Potentiometric resistances type, Inductive (LVDT), Capacitive, Piezoelectric.</p> <p>5.2 Photoelectric type transducers: Photoemissive ,Photovoltaic, Photoconductive</p> <p>5.3 AC/DC Electronic timer block diagram study</p> <p>5.4 Concept of General measurement system &amp; difference between mechanical and electrical/electronic instruments</p> <p>5.5 Measurement of Pressure:- Working of thermocouple vacuum gauge, Pirani vacuum gauge, Varying pressure measurement;</p> <p>5.6 Measurement of Flow:- Hot wire anemometer, Ultrasonic flow meter;</p> <p>5.7 Measurement of Temperature:- Working of Thermopiles,</p>	10	18

	Thermister ; 5.8 Measurement of Speed:- contactless electrical tachometer:- Inductive, Capacity type tachometer, Stroboscope; 5.9 Measurement of Force:- Strain gauge load cell; 5.10 Electrical method for moisture measurement		
	<i>Digital Electronics</i> 6.1 Define analog signal and digital signal 6.2 Study of logic gates( NOT,OR, NOR, AND, NAND ) symbols and truth table 6.3 Study of flip flops only RS & D : symbols and truth table 6.4 Working principle with block diagram of shift register & counter 6.5 Working principle with block/ logic diagram of encoder & decoder 6.6 Working principle with block/logic diagram of multiplexer and demultiplexer 6.7 Working of seven segment LED display	04	06
	Total	48	70

Practical:

Skills to be developed:

Intellectual Skills:

- Select equipment such as motors, meters & components.
- To interpret circuits.

Motor Skills:

- To draw circuits.
- To measure various parameters.

**List of Practical:**

- 1) For a given resistive & inductive series & parallel circuit, select ammeter, voltmeter & wattmeter. Make the connections and measure current, voltage and power drawn by the circuit. Measure it by clip on meter & compare it.
- 2) For a given DC Shunt/Series motor, select suitable meters, make connections as per diagram, check the connections and run the motor. Take the meter readings to draw speed torque characteristics. Make suitable changes in the connections to reverse the direction of rotation.
- 3) For the above given motor prepare a circuit to control its speed above & below normal, plot its graph.
- 4) Testing of components like diode, LED, SCR, diac, triac, Zener diode ,inductor, capacitor using a multimeter
- 5) Verify truth tables for logic gates- . NOT, AND, OR, NAND, NOR.
- 6) Calculation of Vdc of half and full wave rectifier with and without filter.

7) Line & load regulation of alternator output using Zener diode

8) To measure shaft speed by using Stroboscope.

Study and observe the characteristics of LVDT.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Sedha	Applied Electronics		S. Chand & company LTD
Thomas. Malvino	Electronic Principles		Tata Mc-Graw hill publishing company LTD
Theraja BL	Fundamentals of Electrical & Electronics Engineering		Nirja Construction & Development Co Ltd Nirja Construction & Development Co Ltd
Albert Paul Malvino, Donald Leach	Digital principles & Applications,		Mc-Graw hill & company
Thomas. G.Beckwith, N.Lewis Buckwith, Roy. D.Marangoni forward by G.K. Sharma	Mechanical Measurement		Narosa Publishing House
Ernest Doebelin	Measurement System- Application & design		Mc-Graw-Hill-International Edition
A K Sawney.	Electrical and Electronic Measuring Instruments		Dhanpat Rai and sons.
P L Kohli	Automotive Electrical Equipments		Tata McGraw Hill.

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R.K Rajput	Basic Electrical And Electronics engineering		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

Name of the Course : AUTOMOBILE ENGINEERING (PROFESSIONAL PRACTICES-V (AE))	
Course code: AE	Semester : FIFTH
Duration :	Maximum Marks :
Teaching Scheme	Examination Scheme
Theory : 0 hrs/week	Mid Semester Exam: - Marks
Tutorial: 0 hrs/week	Assignment & Quiz: - Marks
Practical : 3 hrs/week	End Semester Exam: - Marks
Credit:- Nil	
Aim :-	
S.No	
1.	<ul style="list-style-type: none"> <li>To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.</li> </ul>
Objective :-	
S.No	Student will be able to:
1.	<ul style="list-style-type: none"> <li>Acquire information from different sources.</li> </ul>
2.	<ul style="list-style-type: none"> <li>Prepare notes for given topic.</li> </ul>
3.	<ul style="list-style-type: none"> <li>Present given topic in a seminar.</li> </ul>
4.	<ul style="list-style-type: none"> <li>Interact with peers to share thoughts.</li> </ul>
5.	<ul style="list-style-type: none"> <li>Prepare a report on industrial visit, expert lecture.</li> </ul>
Pre-Requisite :- Nil	
Contents : Activity	
Hrs/week	
Unit -1	<p><b>Industrial Visits</b>  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 (2 visits).  Following are the suggested type of Industries/ Fields -</p> <ul style="list-style-type: none"> <li>i) A modern garage with engine scanning facility (diagnosis of electronic fuel injection systems).</li> <li>ii) A vehicle manufacturing company (Exhaust gas analysis, vehicle testing).</li> <li>iii) Central Institute of Road Transport, Pune.</li> <li>iv) Vehicle Research, Development &amp; Establishment, A'nagar.</li> <li>v) Automotive Research Association of India, Pune.</li> <li>vi) Hydroelectric power plant / sub-station.</li> <li>vii) Vehicle body building workshop.</li> <li>viii) A refuse, recycling / reclamation site.</li> <li>ix) Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc.</li> <li>x) Wheel Balancing unit for light and/or heavy motor vehicles.</li> </ul>
Unit -2	<b><i>The Guest Lectures from field/industry experts,</i></b>



	<p>professionals to be arranged (2 Hrs duration), minimum 3 nos. from the following or alike topics. A brief report, on the guest lectures, is to be submitted by each student as a part of Term work.</p> <ul style="list-style-type: none"> <li>a) Electronic fuel injection systems.</li> <li>b) Exhaust gas analysis.</li> <li>c) Vehicle testing.</li> <li>d) Computer aided drafting.</li> <li>e) Electric motors &amp; generators.</li> <li>f) Automotive wiring &amp; lighting.</li> <li>g) Transducer application in automobiles.</li> <li>h) Environmental pollution &amp; control.</li> <li>i) Vehicle aerodynamics &amp; design.</li> <li>j) Earth moving machines.</li> <li>k) Automobile pollution, norms of pollution control.</li> </ul>	
Unit - 3	<p>Information Search :- Search information on Any Two of the following suggested topics and write a report (group size – 3 to 5 students, report – up to 10 pages)</p> <ul style="list-style-type: none"> <li>a) Common rail direct injection system / MPFI / TBI system.</li> <li>b) LPG conversion kit.</li> <li>c) CNG conversion kit.</li> <li>d) Vehicle pollution norms &amp; pollution control methods.</li> <li>e) Alternative fuels &amp; energy options.</li> <li>f) Vehicle / Engine tuning. ( Tappet clearance values, injection timing, ignition timing, injector opening pressure, spark plug gap, trouble code of MPFI / CRDI system, Idling RPM, Clutch lining thickness, various clearances in clutches, differential backlash, brake lining thickness, various clearances in brakes, steering backlash).</li> <li>g) Vehicle aerodynamics &amp; design.</li> <li>h) Vehicle testing.</li> <li>i) Laboratory testing of vehicle subsystems As per IS/SAE norms)</li> <li>j) Bio-diesel</li> </ul>	
4	<p><b>Group Discussion :</b> The students should discuss in-group of six to eight students and write a brief report on the same as a part of term work. <b>The faculty members may select ANY TWO topics for group discussion.</b> Some of the suggested topics are -</p> <ul style="list-style-type: none"> <li>I) CNG versus LPG as a fuel.</li> <li>II) Petrol versus Diesel as a fuel for cars.</li> <li>III) Trends in automobile market.</li> <li>IV) Load shading and remedial measures.</li> </ul>	

	<p>V) Rain water harvesting.  VI) Trends in energy.  VII) Disaster management.  VIII) Safety in day-to-day life.  IX) Energy Saving in Institute.  x) x) Nano technology.</p>		
5	<p><b>Seminar :</b>  Seminar topic should be related to the subjects of fifth semester / topics from information search &amp; guest lectures given above. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)</p>		
6	<p><b>Mini Project : Any other equivalent/Similar topics (any one) .</b>  1) Design / Drawing of engine component in a group of 4 students.  2) Prepare Models of Fuel injection pump components using suitable material.  3) Preparing preventive maintenance schedule for an automobile.  <b>OR</b>  Modular Courses on ANY One of the suggested or alike relevant topic be undertaken by a group of students (Min 10): a) LPG/CNG conversion of vehicles b) Advance features in CAD.  Two Assignments be completed on the course work as a part of the Term Work.</p>		
Text Books:- Nil			
Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Peter Piven	Architects essentials of ownership transitions		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION													
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES													
COURSE NAME: AUTOMOBILE ENGINEERING													
COURSE CODE :AE													
DURATION OF COURSE : 6 SEMESTERS													
SEMESTER: SIXTH SEMESTER										SCHEME : C			
Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME								Credits
		L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @		
					TA	CT	Total						
1	Management Ø	03	--	--	10	20	30	70	--	--	--		
2	Automotive Electrical & Electronic Systems	03	--	02	10	20	30	70	--	25	25		
3	Transport Management	03	01	--	10	20	30	70	--	--	25		
4	Vehicle Maintenance	03	--	04	10	20	30	70	50	--	25		
5	Elective II ( Any One)												
	Alternate Energy Sources And Management \$	03	--	02	10	20	30	70	--	--	25		
	CAD -CAM And Automation \$	03	--	02	10	20	30	70	--	--	25		
	Automobile Air Conditioning	03	--	02	10	20	30	70	--	--	25		
	Special Purpose Vehicles	--	--	02	10	20	30	70	--	--	25		
	Industrial Project	--	--	05	--	--	--	--	--	50	50		
	Professional Practices- VI (AE)	01	--	03	--	--	--	--	--	--	50		
<b>Total</b>		15	16		50	<b>100</b>	<b>150</b>	<b>350</b>	50	75	200		

STUDENT CONTACT HOURS PER WEEK: **31 HRS**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH**

# , External Assessment                      @ , Internal Assessment                      ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, P - Practical

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

**Total Marks : 675**

Minimum passing for sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : DIPLOMA IN AUTOMOBILE ENGINEERING (ALTERNATE ENERGY SOURCES AND MANAGEMENT (ELECTIVE-II))			
Course code: ME/AE/PG/PT/MH/MI		Semester : <b>SIXTH FOR ME/AE/PG/PT AND SEVENTH FOR MH/MI</b>	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>To develop, operate and maintain alternative energy sources systems. It is therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.</li> </ul>		
Objective :-			
S.No	Students should be able to:		
1.	<ul style="list-style-type: none"> <li>Develop awareness for effective utilization of alternative energy sources.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Identify different components of solar energy and wind energy devices.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Identify and analyze biomass plant.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Identify and apply energy conservation techniques for commonly used power absorbing and generating devices.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Apply principles of energy conservation and energy management techniques.</li> </ul>		
Pre-Requisite :- Nil			
Contents : <b>Theory</b>			
	Hrs/week	Marks	
Unit -1	Introduction to Energy Sources		
	1.1 Introduction.		
	1.2 Major sources of energy: Renewable and Non-renewable.		
	1.3 Primary and secondary energy sources.		
	1.4 Energy Scenario:		
	- Prospects of alternate energy sources.		
	- Need of Alternate energy sources.		
	<b>06</b>	<b>04</b>	
Unit -2	Solar Energy		
	2.1 Principle of conversion of solar energy into heat and electricity		
	2.2 Solar Radiation: Solar Radiations at earth's surface		
	Solar Radiation Geometry: Declination, hour angle, altitude angle, incident angle, zenith angle, solar azimuth angle		
	2.3 Applications of Solar energy: -		
	- Construction and working of typical flat plate collector and		
	<b>08</b>	<b>10</b>	

	<p>solar concentrating collectors and their applications, advantages and limitations</p> <ul style="list-style-type: none"> <li>- Space heating and cooling.</li> <li>- Photovoltaic electric conversion.</li> <li>- Solar distillation, Solar cooking and furnace.</li> <li>- Solar pumping and Green House.</li> </ul> <p>Agriculture and Industrial process heat. (no derivations and numericals)</p>		
Unit - 3	<p><b>Wind Energy</b></p> <p>3.1 Basic Principle of wind energy conversion.</p> <p>3.2 Power in wind, Available wind power formulation, Power coefficient, Maximum power</p> <p>3.3 Main considerations in selecting a site for wind mills.</p> <p>3.4 Advantages and limitations of wind energy conversion.</p> <p>3.5 Classification of wind mills</p> <p>3.6 Construction and working of horizontal and vertical axis wind mills, their comparison</p> <p>3.7 Main applications of wind energy for power generation and pumping.</p>	<b>06</b>	<b>08</b>
Unit - 4	<p><b>Energy from Biomass</b></p> <p>4.1 Common species recommended for biomass.</p> <p>4.2 Methods for obtaining energy from biomass</p> <p>4.3 Thermal classification of biomass</p> <p style="padding-left: 20px;">a) Gasified, b) Fixed bed and fluidized</p> <p>4.4 Application of gasifier</p> <p>4.5 Biodiesel production and application</p> <p>4.6 Agriculture waste as a biomass</p> <p>4.7 Biomass digester</p> <p>4.8 Comparison of Biomass with conventional fuels</p>	<b>08</b>	<b>12</b>
Unit - 5	<p><b>Energy Conservation</b></p> <p>A. Energy conservation and Management:-</p> <p>5.1 Global and Indian energy market</p> <p>5.2 Energy scenario in various sectors and Indian economy</p> <p>5.3 Need and importance of energy conservation and management</p> <p>5.4 Concept of Payback period, Return on investment (ROI), Life cycle cost, Sankey diagrams, specific energy consumption.</p>	<b>04</b>	<b>08</b>
Unit - 6	<p><b>Energy Conservation Techniques</b></p> <p>6.1 Distribution of energy consumption</p> <p>6.2 Principles of energy conservation.</p> <p>6.3 Energy audit</p> <p>6.4 Types of audit</p> <p>6.5 Methods of energy conservation</p>	<b>08</b>	<b>14</b>

	6.6 Cogeneration and its application 6.7 Combined cycle system 6.8 Concept of energy management 6.9 Study of different energy management techniques like - Analysis of input - Reuse and recycling of waste - Energy education - Conservative technique and energy audit		
Unit - 7	<b>Economic approach of Energy Conservation</b> 7.1 Costing of utilities like steam, compressed air, electricity and water. 7.2 Ways of improving boiler efficiency 7.3 Thermal insulation, Critical thickness of insulation. 7.4 Waste heat recovery systems, their applications, criteria for installing unit. An introductory approach of energy conservation in compressed air, refrigeration, air conditioning, pumps and fans.	<b>08</b>	<b>14</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dr B.H.Khan	Non conventional energy Resources		Tata McGraw Hill
G. D. Rai	Non conventional energy sources		Khanna publication
S. P. Sukhatme	Solar energy		Tata McGraw Hill
H. P. Garg	Solar energy		Tata McGraw Hill
Arrora Domkundwar	Power plant engineering		Dhanpat Rai & co.
P.H. Henderson	India- The energy sector		Oxford University Press
D. A. Ray	Industrial energy conservation		Pergaman Press
W. C. Turner	Energy management handbook		Wiley Press
K. M. Mittal	Non-conventional energy source		--
Krupal Singh Jogi	Energy resource management		Sarup and sons

**2.Cassettes/CD/websites:**

1. CDs developed by National Power Training Institute, (Under the ministry of Power, Government of India) Opposite VNIT, South Ambazari road, Nagpur
2. Website of Bureau of Energy and Efficiency.(www.bee-india.nic.in)

3. Website for Akshay Urja News Bulletin. ([www.mnes.nic.in](http://www.mnes.nic.in))

Reference books :-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.L Sah	Renewable & novel energy sources		
Ann Chambers	Renewable energy in non-technical language		

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	<ul style="list-style-type: none"><li>To collect information about global and Indian energy market.</li></ul>
2	<ul style="list-style-type: none"><li>To perform an experiment on solar flat plate collector used for water heating.</li></ul>
3	<ul style="list-style-type: none"><li>To study construction and working of photo voltaic cell.</li></ul>
4	<ul style="list-style-type: none"><li>To study construction, working and maintenance of solar cooker.</li></ul>
5	<ul style="list-style-type: none"><li>Visit to plant of solar heating system for hotel/hostel/railway station etc.</li></ul>
6	<ul style="list-style-type: none"><li>To study construction and working of horizontal axis wind mill or to visit a nearest wind farm.</li></ul>
7	<ul style="list-style-type: none"><li>To visit a biomass/ biogas plant of municipal waste or else where.</li></ul>
8	<ul style="list-style-type: none"><li>Perform energy audit for workshop/Office/Home/SSI unit.</li></ul>
9	<ul style="list-style-type: none"><li>Study of various waste heat recovery devices</li></ul>



Name of the Course : <b>DIPLOMA IN AUTOMOBILE ENGINEERING</b> (AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS)			
Course code: <b>AE</b>		Semester : SIXTH	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>The main aim of this subject is to impart the basic knowledge of electrical and electronic circuits as well as microprocessor in modern vehicles.</li> </ul>		
Objective :-			
S.No	Students will be able to:		
1.	<ul style="list-style-type: none"> <li>Diagnose and repair the defects in the circuits, to protect circuits &amp; understand working of electromagnetic gauges as well as electrical accessories.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Understand the purpose, construction, rating, testing of battery &amp; major reasons of battery failure.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Identify components, operation and testing of starting as well as charging system.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Understand the basic need, components, and operations of ignition system as well as trouble shooting of the ignition system</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Understand lighting system &amp; accessories.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Troubleshoot various complaints in electrical &amp; electronics system.</li> </ul>		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)			Hrs/ week
Unit -1	Electrical & Electronic Components 1.1 Purpose and operation of electrical components like switches, relays, solenoids, buzzers, and resistors. 1.2 Purpose of circuit protection devices like fuses, maxi fuses, circuit breakers (Manual and automatic resetting types.) and fusible links 1.3 Testing of circuit defects like open circuit, shorts, shorts to grounds, voltage drop. Working of Electromagnetic gauges like temp Gauges, fuel gauge, engine oil pressure gauge, Speedo-meter gauge. Features of scan tester. 1.6 Working of electrical accessories like wind shield wiper, washer pumps, blower motor, electro chromic mirror, power window, power seat, power door lock		12
			18



	4.6 Electronic (or solid state) ignition system with distributor- circuit diagram and working. 4.7 Distributor less/ computer controlled coil ignition system operation. 4.8 Sensors and Ignition Control Module for triggering and timing of spark.		
Unit - 5	<b><u>Advanced lighting accessories -fundamentals</u></b> 5.1 Operation of automatic headlight dimming. 5.2 Operation of automatic on/off headlight with time delay. 5.3 Use and working of fiber optics & its diagnosis 5.4 Operation of keyless entry 5.5 Operation of common anti-theft system 5.6 Purpose & operation of automatic door lock system	<b>05</b>	<b>06</b>
Unit - 6	<b>Diagnosis of electronic components &amp; Systems</b> 6.1 Sensor testing:- Oxygen sensor, Engine coolant sensor, Intake air temp. sensor, Throttle position sensor, Manifold absolute pressure sensor. 6.2 Electronic fuel Injector testing:- only sound test, Ohmmeter test. 6.3 Onboard diagnosis (OBD):- 6.3.1 Purpose of (onboard diagnostic second generation) OBD II, flash codes of Malfunction indicator light. 6.3.2 OBD II terminology:- Drive cycle, Trip, Warm up cycle (Definitions only) 6.3.3 SAE J2012 standards Diagnostic Trouble Code(DTC) :-5 digits only 6.4 Troubles of electronic gauges like. 6.4.1 Gauge reads low constantly. 6.4.2 Gauge reads high constantly. 6.4.3 Inaccurate Gauge reading.	<b>05</b>	<b>06</b>
	<b>Total</b>	<b>48</b>	<b>70</b>
<p><b>Practical:</b> Skills to be developed:</p> <p>Intellectual Skills:</p> <ul style="list-style-type: none"> <li>• Understand various test procedures for battery as specified by manufacturer.</li> <li>• Understand the precautions while handling a battery.</li> <li>• Identify the alternator components, starter motor components and understand test procedure of some of the components.</li> <li>• Understand principle of stroboscope operation and concept of ignition timing adjustment.</li> <li>• Understand the test and service procedure for spark plug, distributor and spark plug cords.</li> <li>• Identify and locate sensors and to understand diagnostic procedures (on-board and stand alone diagnosis).</li> </ul> <p>Motor Skills:</p> <ul style="list-style-type: none"> <li>• Take specific gravity reading using hydrometer, to correct it using temperature correction</li> </ul>			

factor.

- Perform alternator tests as specified by manufacturer.
- Perform alternator component tests as specified by manufacturer.
- Measure parameters such as current, voltage drop using multimeter.

*List of Practical:*

1 Specific gravity of electrolyte, High rate discharge test of battery. Load test of battery. Alternator-component identification and output test, Regulated Voltage Output Test charging circuit resistance test. Electrical testing of rotor and stator of alternator Starter Motor –component identification, starter current draw test and voltage drop test. Adjustment of ignition timing of a multi cylinder engine with strobe (neon light) Inspection of spark plug cords, Servicing of spark plugs and distributor Location and identification of sensors. Stand alone diagnosis.  
7 Assignment - On Board Diagnosis.

Demonstration: Trainer kits as well as charts of electronic circuits may be prepared for Demo.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Barry Hollenbeck	Automotive Electricity, Electronics & Computer Controls		Delmar Publishers
Jack Erjavec, Robert Scharff	Automotive Technology: A System Approach		Delmar Publisher Inc
P. L. Kohli	Automotive Electrical Equipment		Tata McGraw-Hill
Trevor Mellard	Automotive electronic systems		ELBS

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Tom Denton	Automobile electrical & electronic systems		
James Haldeman	Diagnosis and troubleshooting of automotive electrical,electronics & computer engineering		

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN AUTOMOBILE ENGINEERING (AUTOMOBILE AIR CONDITIONING (ELECTIVE-II))			
Course code: AE		Semester : SIXTH	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	2 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>Aim of the Subject is to make student to understand &amp; apply the knowledge in servicing various systems &amp; subsystems of HVAC.</li> </ul>		
Objective :-			
S.No	The student will be able to:		
1.	<ul style="list-style-type: none"> <li>Identify various HVAC systems and sub systems.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Explain working &amp; construction of HVAC Systems and sub systems.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Carry out repair and maintenance of HVAC Systems and sub systems.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Carry out retrofitting and alteration of HVAC Systems.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Know environmental aspects related to HVAC Systems.</li> </ul>		
Pre-Requisite :- Nil			
Contents : <b>Theory (Name of Topic)</b>			Hrs/week
Unit -1	<p><b>Introduction</b></p> <p>1.1 Environmental &amp; safety aspects in heating, ventilation &amp; air conditioning systems</p> <p><u>1.2</u> Human comfort control - comfort zone, air movement, wind chill factor, odour problems &amp; effects of humidity.</p> <p>1.3 Heat transfer fundamentals- forced &amp; natural convection, radiation, evaporation &amp; conduction.</p> <p>1.4 Requirements of heating, ventilation &amp; air conditioning in cars, multi utility vehicles, vans, safari, heavy passenger vehicles, coaches, cargo vehicle cabin, vehicle carrying perishable commodities &amp; cryogenic substances.</p> <p>1.5 Controlled &amp; uncontrolled ventilation - working, application &amp;</p>	06	10

	comparison.		
Unit - 2	<p><b>Case &amp; Duct System</b></p> <p>2.1 Construction &amp; working of Air intake section, core section &amp; distribution section.</p> <p>2.2 Construction &amp; working of Downstream, upstream, split &amp; hybrid.</p> <p>2.3 Construction &amp; working of rear heating &amp; cooling system.</p>	<b>06</b>	<b>10</b>
Unit - 3	<p><b>Air Conditioning System</b></p> <p><b>Part A</b></p> <p>3.1 General layout of Air conditioning system.</p> <p>3.2 Construction &amp; working of following refrigeration sub systems – thermostatic expansion valve, fixed orifice tube &amp; rotary vane air cycle system.</p> <p>3.3 Construction &amp; working of evaporator, condenser, accumulator.</p> <p>3.4 Receiver driers &amp; accumulator- Types, construction &amp; working</p> <p>3.5 Construction &amp; working of reciprocating, scroll &amp; rotary vane compressors. Drive systems for compressors.</p>	<b>06</b>	<b>10</b>
	<p><b>Part B</b></p> <p>3.1 <i>Construction &amp; working of electromagnetic clutch</i></p> <p>3.2 Metering devices- comparison of thermostatic expansion valve &amp; fixed orifice tube. Types working &amp; comparison of thermostatic expansion valves i.e. H valve, block type, internally equalized &amp; externally equalized.</p> <p>3.3 Functions of thermostatic expansion valve i.e. Throttling action, modulating action &amp; controlling action. Construction &amp; working of remote bulb.</p>	<b>06</b>	<b>10</b>
Unit - 4	<p><b>System Control Devices &amp; Electrical Circuits</b></p> <p>4.1 System controls - Construction &amp; working of typical vacuum system &amp; electronic temperature control system.</p> <p>4.2 Construction &amp; working of vacuum operated devices i.e. vacuum reserve tank, vacuum restrictor, vacuum motor, check valve &amp; check relays.</p> <p>4.3 Switches - Construction &amp; working of high- side temperature switch, low-side temperature switch, high-pressure switch, low- pressure switch, pressure regulator, ambient switch &amp; superheat switch.</p> <p>4.4 Sensors- Construction &amp; working of sun load sensor, outside temperature sensor &amp; in car temperature sensors.</p> <p>4.5 Construction &amp; working of Aspirator.</p> <p>4.6 Construction &amp; working of blower clutch control, heater control, and time delay relay for heater control.</p> <p>4.7 Mode doors and temperature doors.</p> <p>4.8 Electrical circuits- Typical climate control system &amp; Electronic climate control system, their electrical circuits &amp; working.</p>	<b>11</b>	<b>14</b>

Unit - 5	Repairs & maintenance of Air Conditioning system 5.1 Visual & acoustic check, side glass, leak test, temperature test, Procedure of charging & discharging. Moisture removal procedure. 5.2 Service equipments & tools – Vacuum pump, Manifold & gauge i.e. Low side & high side, gauge calibration, recovery unit & recycling unit, Halide (freon) & Fluorescent leak detector, nitrogen leak test 5.3 Compressor service - Symptoms, faults, cause & remedy. 5.4 Electromagnetic clutch service - Symptoms, faults, cause & remedy. 5.5 Performance testing procedure of thermostatic expansion valve & fixed orifice tube. 5.6 Refrigerant lubricants- Properties & types 5.7 Refrigerant- types, Packaging, storage, restrictions, color code & purity test Hoses & connectors – construction of system hoses, charging hose with shutoff valve & connectors. Retrofitting from CFC- R12 to HFC- 134 A – need, procedure & Precautions	09	12
Unit - 6	<b>Comfort Heating System</b> 6.1 Function, construction, working, maintenance, general faults and their remedies of Comfort Heating System.	04	04
	<b>Total</b>	<b>48</b>	<b>70</b>

**Practical:**

Skills to be developed:

Intellectual Skills:

- Select tools for servicing of heating, ventilation & air conditioning system. (HVAC).
- Diagnose electrical system faults, control system faults.
- Diagnose various faults in car HVAC system.
- Understand charging & evacuation procedures of refrigerant from the HVAC system.
- Understand construction of three different compressors & to identify them.

Motor Skills:

- Perform lubrication of air conditioning system & servicing of heating system as per manufacturer's service procedure.
- Carry-out diagnostic procedure to trace faults in car heating, ventilation & air conditioning.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
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Boyce H. Dwiggin	Automobile Air Conditioning		Thomson Learning
--	Service Manual		Subros Company
--	Service Manual		Sanden Company
--	Service Manual		Baher Company
<b>CD.s:</b>			
<ul style="list-style-type: none"> <li>• C. D. on various Topics of Automobile Engineering By SAE Publisher.</li> </ul>			
Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Stevan Daley	Automotive Air conditioning & Climate control system		
K.K Jain	Automobile Engineering		
Suggested List of Laboratory Experiments :-			
S.No	Name of Practical		
1	Demonstration of all parts of all subsystems & assembly & disassembly of three different types of compressors.		
2	Identification & use of tools, gauges & equipment for servicing.		
3	Demonstration of charging & evacuation of refrigerant from system.		
4	Demonstration of leakage testing using soap solution & other techniques.		
5	Diagnosis of electrical systems faults.		
6	Diagnosis of control systems faults.		
7	Perform lubrication of A C system & servicing of heating system.		
8	Retrofitting from CFC- R12 to HFC- 134 A		
9	Diagnosis of various running faults in car HVA C		
Suggested List of Assignments/Tutorial :- Nil			



Name of the Course : DIPLOMA IN AUTOMOBILE ENGINEERING (CAD-CAM & AUTOMATION (ELECTIVE – II))				
Course code: AE/ME/PG/PT/MH/MI		Semester : <b>SIXTH FOR ME/AE/PG/PT AND SEVENTH FOR MH/MI</b>		
Duration :		Maximum Marks :		
Teaching Scheme		Examination Scheme		
Theory : 3 hrs/week		Mid Semester Exam: - Marks		
Tutorial: 0 hrs/week		Assignment & Quiz: 10 Marks		
Practical : 2 hrs/week		End Semester Exam: 70 Marks		
Credit :- Nil				
Aim :-				
S.No				
1.	<ul style="list-style-type: none"> <li>To study quality &amp; precision oriented shorter manufacturing cycle time with the use of CAD/CAM technology. The prerequisites of this subject have been introduced in earlier subjects such as engineering graphics, engineering drawing &amp; mechanical engineering drawing.</li> </ul>			
Objective :-				
S.No	Student should be able to:			
1.	<ul style="list-style-type: none"> <li>Understand the fundamentals &amp; use CAD.</li> </ul>			
2.	<ul style="list-style-type: none"> <li>Conceptualize drafting and modeling in CAD.</li> </ul>			
3.	<ul style="list-style-type: none"> <li>Prepare CNC part programming.</li> </ul>			
4.	<ul style="list-style-type: none"> <li>Operate CNC machines.</li> </ul>			
5.	<ul style="list-style-type: none"> <li>Conceptualize automation and FMS.</li> </ul>			
Pre-Requisite :- Nil				
Contents : <b>Theory (Name of the Topic)</b>			<b>Hrs/week</b>	<b>Marks</b>
Unit -1	<b>Introduction to CAD/CAM</b> Computers in industrial manufacturing. Product Cycle, CAD/CAM CAD/CAM hardware:- basic structure, CPU, Memory, I/O devices, Storage devices and system configuration		<b>06</b>	<b>08</b>
Unit -2	<b>Geometric Modelling</b> Requirement of geometric modelling, Types of geometric models. Geometric construction method-sweep, solid modelling- Primitives & Boolean operations, free formed surfaces (Classification of surface only) (No numerical treatment)		<b>10</b>	<b>14</b>
Unit -3	Introduction to computer numerical Control Introduction - NC, CNC, DNC, Advantages of CNC, The coordinate system in CNC, Motion control system - point to point, straight line, Continuous path (Contouring). Application of CNC.		<b>05</b>	<b>08</b>

Unit – 4	<b>Part programming</b> Fundamentals, manual part programming, NC –Words, Programming format, part programming, use of subroutines and do loops, computer aided part programming (APT).	<b>12</b>	<b>16</b>
Unit – 5	<b>Industrial Robotics</b> Introduction, physical configuration, basic robot motions, technical features such as - work volume, precision and speed of movement, weight carrying capacity, drive system, End effectors, robot sensors. Application – Material transfer, machine loading, welding, spray coating, processing operation, assembly, inspection.	<b>09</b>	<b>14</b>
Unit - 6	<b>Automation</b> Basic elements of automated system, advanced automation functions, levels of automation. Flexible manufacturing system :-Introduction, FMS equipment, FMS application, Introduction to CIM	<b>06</b>	<b>10</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

Practical:

**Skills to be developed:**

Intellectual Skills:

1. interpret the various features in the menu of solid modeling package
2. synthesize various parts or components in an assembly
3. prepare CNC programmes for various jobs
4. understand the concept of finite element method
5. prepare a report of visits

Motor Skills:

1. operate a turning center and a machining center
2. operate and use solid modeling packages for drawing of assemblies
3. draw sketches of assemblies for converting into solid models
4. handle various tools used in CNC

List of Practicals:

1. Two assignments on CAD for 2D drafting (Using AutoCAD)
2. Two assignments on CAD for 3D Modelling. (Using any 3-D Modelling software like CATIA, ProE, Sdidworks etc.)
3. Manufacturing one turning and one Milling component on CNC.
4. At least four assignments on part programming using subroutines do loops for turning and milling

component.

5. Report writing on visit to industry having CNC machine.
6. Report writing on visit to industry having robot Application.
7. Report writing on visit to Industry having Automation in manufacturing.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
P. N. Rao	CAD/CAM Principles and Applications		Tata McGraw-Hill
RadhaKrishna P. & Subramanyam	CAD/CAM/CIM		Wiley EasternLtd
B.S.Pabla and M.Adithan	CNC Machine		New age International(P)Ltd
Groover M.P. & Zimmers Jr	Computer Aided design and manufacturing		Prentice hall of India

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Naveed A Sherwaani	Algorithms for VLSI Physical design automation		
P. Radhakrishnan	CAD/CAM/CIM		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

Name of the Course : <b>DIPLOMA IN AUTOMOBILE ENGINEERING (INDUSTRIAL PROJECT)</b>	
Course code: <b>AE/ME/PG/PT/MH/MI</b>	Semester : <b>SIXTH FOR AE/ME/PG/PT AND SEVENTH FOR MH/MI</b>
Duration :	Maximum Marks :
Teaching Scheme	Examination Scheme
Theory : 0 hrs/week	Mid Semester Exam: - Marks
Tutorial: 0 hrs/week	Assignment & Quiz: - Marks
Practical : 5 hrs/week	End Semester Exam: - Marks
Credit :- Nil	
Aim :-	
S.No	
1.	<ul style="list-style-type: none"> <li>To solve the problems involving drawings, designs, manufacturing, installation, testing and maintenance of machines. In order to cultivate the systematic methodology for problem solving using acquired technical knowledge &amp; skills, and to enhance the generic skills &amp; professional skills.</li> </ul>
Objective :-	
S.No	The student will be able to-
1.	<ul style="list-style-type: none"> <li>Identify, analyze &amp; define the problem</li> </ul>
2.	<ul style="list-style-type: none"> <li>Generate alternative solutions to the problem identified.</li> </ul>
3.	<ul style="list-style-type: none"> <li>Compare &amp; select feasible solutions from alternatives generated.</li> </ul>
4.	<ul style="list-style-type: none"> <li>Design, develop, manufacture &amp; operate equipment/Program.</li> </ul>
5.	<ul style="list-style-type: none"> <li>Acquire higher-level technical knowledge by studying recent development in mechanical engineering field.</li> </ul>
6.	<ul style="list-style-type: none"> <li>Compare machines/devices/apparatus for performance practices.</li> </ul>
7.	<ul style="list-style-type: none"> <li>Work effectively in team.</li> </ul>
Pre-Requisite :- Nil	
Contents (Skills to Be Developed©)	
Unit -1	<b>Skills to Be Developed:</b>  <b>Intellectual Skills</b>  1. Design the related machine components & mechanism.  2. Convert innovative or creative idea into reality.  3. Understand & interpret drawings & mechanisms

	4. Select the viable, feasible & optimum alternative from different alternatives.
Unit -2	<p>Motors skills</p> <ol style="list-style-type: none"> <li>1. Use of skills learnt in workshop practical.</li> <li>2. Assemble parts or components to form machine or mechanisms.</li> <li>3. Classify &amp; analyze the information collected.</li> </ol> <p>Implement the solution of problem effectively.</p>
<p><b>Notes:</b> 1) Project group size: Maximum 4 students.  2) Project report will be of minimum 40 pages unless otherwise specified.  3) Project diary should be maintained by each student.</p>	
<p><b>Part A-Project</b></p> <p>A batch of maximum 4 students will select a problem and then plan, organize &amp; execute the project work of solving the problem in a specified duration. Student is expected to apply the knowledge &amp; skills acquired. Batch may select any one problem/project work from following categories.</p> <ol style="list-style-type: none"> <li>1. Fabrication of small machine / devices/ test rigs/ material handling devices/ jig &amp; fixtures/ demonstration models, etc. Report involving aspects of drawing, process sheets, costing, Installation, commissioning &amp; testing should be prepared and submitted.</li> <li>2. Design &amp; fabrication of mechanisms, machines, Devices, etc. Report involving aspects of designing &amp; fabricating should be prepared &amp; submitted.</li> <li>3. Development of computer program for designing and /or drawing of machine components, Simulation of movement &amp; operation, 3D modeling, pick &amp; place robots etc.</li> <li>4. Industry sponsored projects- project related with solving the problems identified by industry should be selected. One person / engineer from industry is expected to work as co- guide along with guide from institution.</li> <li>5. Literature survey based projects:Project related with collection tabulation, classification, analysis &amp; presentation of the information. Topic selected must be related with latest technological developments in mechanical or mechatronix field, and should not be a part of diploma curriculum. Report should be of min 60 pages.</li> <li>6. Investigative projects- Project related with investigations of causes for change in performance or structure of machine or component under different constraints through experimentation and data analysis.</li> </ol>	

7. Maintenance based projects: The institute may have some machine/ equipment/ system which are lying idle due to lack of maintenance. Students may select the specific machines/equipment/system. Overhaul it, repair it and bring it to working condition. The systematic procedure for maintenance to be followed and the report of the activity be submitted.
- h) Industrial engineering based project: Project based on work study , method study, methods improvement, leading to productivity improvement, data collection, data analysis and data interpretation be undertaken .
8. Low cost automation projects: Project based on hydraulic/pneumatic circuits resulting into low cost automated equipment useful in the identified areas.
  9. Innovative/ Creative projects – Projects related with design, develop & implementation of new concept for some identified useful activity using PLC, robotics, non-conventional energy sources, CIM , mechatronics, etc.
  10. Environmental management systems projects: Projects related with pollution control, Solid waste management, liquid waste management, Industrial hygiene, etc, Working model or case study should be undertaken.
  11. Market research/ survey based projects: Projected related with identification of extent of demand, sales forecasting, Comparative study of marketing strategies, Comparative study of channels of distribution, Impact of variables on sales volume, etc. The project involves extensive survey & market research activities information to be collected through various mechanisms/tools & report be prepared.
- m) Project based on use of appropriate technology particularly benefiting rural society or economically weaker section.
- n) Project can be selected other than the area specified above. Project should provide viable and feasible solution to the problem identified. Report should be of min 50 pages.

### **Part B- Seminar**

Every student will prepare & deliver the seminar. Evaluation of seminar will be carried out by panel of at least three teaching staff from mechanical/ production /automobile department.

12. Selection of topic for the seminar should be finalized in consultation with teacher guide allotted for the batch to which student belongs.
13. Seminar report should be of min.10 & max. 20 pages & it should be certified by guide teacher and head of the department
14. for presentation of seminar, following guide lines are expected to be followed:-
  - a) Time for presentation of seminar: 7 to 10 minutes /student.
  - b) Time for question/answer : 2 to 3 minutes /student

c) Evaluation of seminar should be as follows:-

Presentation: 15 marks

Use of A. V. aids: 05 marks

Question /answer: 05 marks

Total: 25marks

d) use of audio visual aids or power point presentation is desirable.

4. Topic of the seminar should not be from diploma curriculum

5. Seminar can be on project selected by batch.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Karl Smith	Project management & team work		Tata- Mc Graw Hill
Clifford gray & Erik Lasson	Project management		Tata- Mc Graw Hill

**Magazines:**

1. Invention intelligence magazine

2. Popular mechanics Journals/ Magazines

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Nigel J Smith	Engineering Project management		
Dennis Snow	Plant Engineers		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :- Nil**

<b>Name of the Course :</b> DIPLOMA IN PRODUCTION ENGINEERING / TECHNOLOGY (MANAGEMENT)			
<b>Course code:</b> EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR /CO/CM/IF/EE/EP/CH/CT/PS/CD/EDEI/CV/FE/IU/MH/MI		<b>Semester :</b> SIXTH FOR EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/ CS/CR/ CO/CM/IF/EE/EP/CH/CT/PS/CD/EDEI/CV/FE /IU/ AND SEVENTH FOR MH / MI	
<b>Duration :</b>		<b>Maximum Marks :</b>	
<b>Teaching Scheme</b>		<b>Examination Scheme</b>	
<b>Theory :</b> 3 hrs/week	<b>Mid Semester Exam:</b> -		<b>Marks</b>
<b>Tutorial:</b> 0 hrs/week	<b>Assignment &amp; Quiz:</b> 10		<b>Marks</b>
<b>Practical :</b> 0 hrs/week	<b>End Semester Exam:</b> 70		<b>Marks</b>
<b>Credit :- Nil</b>			
<b>Aim :- Nil</b>			
<b>Objective :-</b>			
<b>S.No</b>	<b>The students will able to:</b>		
1.	<ul style="list-style-type: none"> <li>Familiarize environment in the world of work</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Explain the importance of management process in Business.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Identify various components of management.</li> </ul>		
	<ul style="list-style-type: none"> <li>Describe Role &amp; Responsibilities of a Technician in an Organizational Structure.</li> </ul>		
	<ul style="list-style-type: none"> <li>Apply various rules and regulations concerned with Business &amp; Social Responsibilities of the Technician.</li> </ul>		
<b>Pre-Requisite :- Nil</b>			
<b>Contents: Theory</b>			<b>Hrs/week</b>
<b>Unit -1</b>	Overview Of Business 1.1. Types of Business <ul style="list-style-type: none"> <li>Service</li> <li>Manufacturing</li> <li>Trade</li> </ul> 1.2. Industrial sectors Introduction to <ul style="list-style-type: none"> <li>Engineering industry</li> <li>Process industry</li> <li>Textile industry</li> <li>Chemical industry</li> <li>Agro industry</li> </ul> 1.3 Globalization <ul style="list-style-type: none"> <li>Introduction</li> <li>Advantages &amp; disadvantages w.r.t. India</li> </ul> 1.4 Intellectual Property Rights (I.P.R.)	02	---
<b>Unit -2</b>	Management Process	07	10



	<p>2.1 What is Management?</p> <ul style="list-style-type: none"> <li>• Evolution</li> <li>• Various definitions</li> <li>• Concept of management</li> <li>• Levels of management</li> <li>• Administration &amp; management</li> <li>• Scientific management by F.W.Taylor</li> </ul> <p>2.2 Principles of Management (14 principles of Henry Fayol)</p> <p>2.3 Functions of Management</p> <ul style="list-style-type: none"> <li>• Planning</li> <li>• Organizing</li> <li>• Directing</li> <li>• Controlling</li> </ul>		
Unit - 3	<p>Organizational Management</p> <p>3.1 Organization :-</p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Steps in organization</li> </ul> <p>3.2 Types of organization</p> <ul style="list-style-type: none"> <li>• Line</li> <li>• Line &amp; staff</li> <li>• Functional</li> <li>• Project</li> </ul> <p>3.3 Departmentation</p> <ul style="list-style-type: none"> <li>• Centralized &amp; Decentralized</li> <li>• Authority &amp; Responsibility</li> <li>• Span of Control</li> </ul> <p>3.4 Forms of ownership</p> <ul style="list-style-type: none"> <li>• Proprietorship</li> <li>• Partnership</li> <li>• Joint stock</li> <li>• Co-operative Society</li> <li>• Govt. Sector</li> </ul>	07	12
Unit - 4	<p>Human Resource Management</p> <p>4.1 Personnel Management</p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Functions</li> </ul> <p>4.2 Staffing</p> <ul style="list-style-type: none"> <li>• Introduction to HR Planning</li> <li>• Recruitment Procedure</li> </ul> <p>4.3 Personnel- Training &amp; Development</p> <ul style="list-style-type: none"> <li>• Types of training</li> <li>➤ Induction</li> <li>➤ Skill Enhancement</li> </ul>	08	14

	<p>4.4 Leadership &amp; Motivation</p> <ul style="list-style-type: none"> <li>• Maslow's Theory of Motivation</li> </ul> <p>4.5 Safety Management</p> <ul style="list-style-type: none"> <li>• Causes of accident</li> <li>• Safety precautions</li> </ul> <p>4.6 Introduction to –</p> <ul style="list-style-type: none"> <li>• Factory Act</li> <li>• ESI Act</li> <li>• Workmen Compensation Act</li> <li>• Industrial Dispute Act</li> </ul>		
Unit – 5	<p>Financial Management</p> <p>5.1. Financial Management- Objectives &amp; Functions</p> <p>5.2. Capital Generation &amp; Management</p> <ul style="list-style-type: none"> <li>• Types of Capitals</li> <li>• Sources of raising Capital</li> </ul> <p>5.3. Budgets and accounts</p> <ul style="list-style-type: none"> <li>• Types of Budgets</li> <li>➤ Production Budget (including Variance Report )</li> <li>➤ Labour Budget</li> <li>• Introduction to Profit &amp; Loss Account ( only concepts) ; Balance Sheet</li> </ul> <p>5.4 Introduction to –</p> <ul style="list-style-type: none"> <li>• Excise Tax</li> <li>• Service Tax</li> <li>• Income Tax</li> <li>• VAT</li> <li>• Custom Duty</li> </ul>	08	14
Unit – 6	<p>Materials Management</p> <p>6.1. Inventory Management (No Numericals)</p> <ul style="list-style-type: none"> <li>• Meaning &amp; Objectives</li> </ul> <p>6.2 ABC Analysis</p> <p>6.3 Economic Order Quantity</p> <ul style="list-style-type: none"> <li>• Introduction &amp; Graphical Representation</li> </ul> <p>6.4 Purchase Procedure</p> <ul style="list-style-type: none"> <li>• Objects of Purchasing</li> <li>• Functions of Purchase Dept.</li> <li>• Steps in Purchasing</li> </ul> <p>6.5 Modern Techniques of Material Management</p> <ul style="list-style-type: none"> <li>• Introductory treatment to JIT / SAP / ERP</li> </ul>	08	14
Unit – 7	<p>Project Management ( No Numericals)</p> <p>7.1 Project Management</p> <ul style="list-style-type: none"> <li>• Introduction &amp; Meaning</li> <li>• Introduction to CPM &amp; PERT Technique</li> <li>• Concept of Break Even Analysis</li> </ul> <p>7.2 Quality Management</p>	08	06

	<ul style="list-style-type: none"> <li>• Definition of Quality , concept of Quality , Quality Circle, Quality Assurance</li> <li>• Introduction to TQM, Kaizen, 5 'S', &amp; 6 Sigma</li> </ul>		
		Total	48 70
<b>Text Books:</b>			
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>	<b>Name of the Publisher</b>
Dr. O.P. Khanna	Industrial Engg & Management		Dhanpal Rai & sons New Delhi
Dr. S.C. Saksena	Business Administration & Management		Sahitya Bhavan Agra
W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management		Prentice- Hall
Rustom S. Davar	Industrial Management		Khanna Publication
Banga & Sharma	Industrial Organisation & Management		Khanna Publication
Jhamb & Bokil	Industrial Management		Everest Publication , Pune
<b>Reference books :-</b>			
<b>Name of Authors</b>	<b>Titles of the Book</b>	<b>Edition</b>	<b>Name of the Publisher</b>
Kathryn Best	The fundamental of design management		
<b>Suggested List of Laboratory Experiments :- Nil</b>			
<b>Suggested List of Assignments/Tutorial :- Nil</b>			

Name of the Course : DIPLOMA IN AUTOMOBILE ENGINEERING (PROFESSIONAL PRACTICES-VI (AE))		
Course code: AE	Semester : <b>SIXTH</b>	
Duration :	Maximum Marks :	
Teaching Scheme	Examination Scheme	
Theory : 1 hrs/week	Mid Semester Exam: -	Marks
Tutorial: 0 hrs/week	Assignment & Quiz: -	Marks
Practical : 3 hrs/week	End Semester Exam: -	Marks
Credit :- Nil		
Aim :-		
S.No		
1.	<ul style="list-style-type: none"> <li>To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.</li> </ul>	
Objective :-		
S.No	Student will be able to:	
1.	<ul style="list-style-type: none"> <li>Acquire information from different sources.</li> </ul>	
2.	<ul style="list-style-type: none"> <li>Prepare notes for given topic.</li> </ul>	
3.	<ul style="list-style-type: none"> <li>Present given topic in a seminar.</li> </ul>	
4.	<ul style="list-style-type: none"> <li>Interact with peers to share thoughts.</li> </ul>	
5.	<ul style="list-style-type: none"> <li>Prepare a report on industrial visit, expert lecture.</li> </ul>	
Pre-Requisite :- Nil		
Contents		Hrs/week
Unit -1	<b>Industrial Visits</b> Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work. <b>TWO</b> industrial visits may be arranged in the following areas / industries to observe - Material Handling System, quality control charts / production record / layout flow systems / Facilities / Hydraulic & pneumatic systems / Working of Boilers and steam engineering applications. vi) Auto / Electronic equipment manufacturing industry. vii) Modern service station or garage (understanding of latest scanning & testing equipments, auto air-conditioning) viii) Earth Moving Equipment Maintenance Shop. ix) Transport organization (records of transport , transport management)	<b>20</b>
Unit -2	<b>Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any of the</b>	<b>12</b>

	<p><b>following areas (4 lectures of 2 hrs duration each):</b></p> <p>a) Electrical accessories b) Types of Batteries c) Charging systems d) Electronic ignition system e) Advanced auto mobile lighting accessories f) Auto sensors &amp; actuators g) Motor vehicle rules h) Transport management i) Estimation &amp; valuation of a vehicle j) Buying a new / used vehicle k) Driving skills l) Motor industry m) Maintenance management &amp; record keeping n) Engine / chassis / body maintenance o) Air conditioning &amp; heating systems p) Earth moving machines q) Tractors r) Excavators s) Fork lift trucks t) Road- roller u) Automated Guided Vehicles (AGV) v) Career opportunities in RTO, Service stations, Marketing, Surveyor, Insurance, R&amp;D, call centers ,CAD, NDT, Railways, Defense, Aeronautics, Marine, Software development, Information Technology w) Continuing education / Open universities programmes for diploma holders.</p>	
Unit - 3	<p><b>Information Search :</b> Search information on any <b>TWO</b> of the following suggested topics and write a report (Group size – 3-5 students, Report – upto 10 pages).</p> <p><b>Collection of information related to :</b></p> <ol style="list-style-type: none"> <li>Buying of a new / old vehicle (cost, make, model etc.).</li> <li>Road signs, signals &amp; traffic regulation.</li> <li>Motor vehicle taxes/ insurance.</li> <li>Elements of transport.</li> <li>Automotive batteries – Construction, features &amp; specifications.</li> <li>Automotive electrical / electronic accessories.</li> <li>Starting &amp; charging system.</li> <li>Maintenance management &amp; record keeping.</li> <li>Chassis &amp; body maintenance.</li> <li>A Special purpose vehicle.</li> <li>Maintenance of Automobile air-conditioning systems.</li> </ol>	18
Unit – 4	<p><b>Group Discussion:</b> The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topics of (ANY TWO) group discussions may be selected by the faculty members. Some of the suggested topics are -</p> <ol style="list-style-type: none"> <li>Solar Vehicles / Electric Vehicles.</li> <li>Vehicles – Comparison.</li> <li>Two stroke versus Four stroke automobile engines</li> <li>Tribological aspects in automobiles</li> <li>Energy Conservation In Institutes</li> <li>Creativity and Innovativeness.</li> <li>Attributes of Product Design</li> </ol>	08
	<p><b>Student Activities :</b> The students in a group of 3 to 4 will perform any one of the following activities (other similar activities to be considered), and write a report as part of term work.</p>	12

	Activity (Any Two): v) Collecting internal communication forms. vi) Collecting Failure data for automobile / machines / equipments. vii) Study of Hydraulic Circuit of any one system/machine tool like – dumpers, Earth moving equipment, Auto service station.	
	<b>Total</b>	<b>70</b>
Text Books: Nil		
Reference books :- Nil		
Suggested List of Laboratory Experiments :- Nil		
Suggested List of Assignments/Tutorial :- Nil		

Name of the Course : DIPLOMA IN AUTOMOBILE ENGINEERING (SPECIAL PURPOSE VEHICLES (ELECTIVE-II))			
Course code: AE		Semester : SIXTH	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory : 0 hrs/week		Mid Semester Exam: - Marks	
Tutorial: 0 hrs/week		Assignment & Quiz: 10 Marks	
Practical : 2 hrs/week		End Semester Exam: 70 Marks	
Credit : - Nil			
Aim :- Nil			
Objective :-			
S.No	The student will be able to:		
1.	<ul style="list-style-type: none"> <li>Know importance of earth moving machines &amp; agricultural machines in India.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Identify various systems &amp; subsystems of earth moving machines &amp; agricultural machines</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Explain working &amp; construction of various systems &amp; subsystems in earth moving machines &amp; agricultural machines</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Carry out preventive maintenance of earth moving machines &amp; agricultural machines.</li> </ul>		
Pre-Requisite :- Nil			
Contents : <b>Theory</b>			Hrs/week
Unit -1	<b>Earth Moving Machines – Introduction</b> 1.1 General layout, Application & Classification of earth moving machines. Comparison of tyred & crawler tractor 1.2 General Specifications of a typical earth moving machine. 1.3 Comparison between general automobile & earth moving machine on following parameters: <ul style="list-style-type: none"> <li>Traveling Speed</li> <li>Working conditions</li> <li>Power output &amp; power variations</li> <li>Controls</li> <li>Torque &amp; torque variations.</li> <li>Steering</li> <li>Suspension</li> <li>Fuel &amp; fuel consumption</li> <li>Hydraulics</li> <li>Power take offs</li> <li>Clutch</li> <li>Brakes</li> <li>Driving license</li> </ul>		10
			14

	<ul style="list-style-type: none"> <li>• RTO registration</li> </ul> <p>1.4 Implications of earth moving machines on economy &amp; infrastructure development:</p> <ul style="list-style-type: none"> <li>○ Next five year plan</li> <li>○ Role of earth moving machine in road laying, bridge construction, building construction, tunnel, mining &amp; in disaster management.</li> </ul>		
Unit -2	<p><b>Tractor Dozer</b></p> <p>2.1 Tractor dozer- types, layout , power train &amp; bucket swing Applications i.e. ripping, blasting Vs ripping)</p> <p>2.2 Rippers – types i.e. hinge &amp; parallelogram, their application &amp; comparison.</p> <p>1.6 Ripper tip selection.</p> <p>1.7 Dozing, &amp; Underwater application.</p> <p>2.5 Dozer blade – types i.e. straight dozer, angle dozer, S’ blade, ‘U’ blade, ‘C’ blade, ‘A’ blade, and their applications.</p> <p>2.6 Track shoe construction &amp; working.</p> <p>2.7 Under carriage maintenance.</p> <p>2.8 Safety precautions for Dozer operations.</p>	<b>07</b>	<b>10</b>
Unit - 3	<p><b>line (Rope Operated Excavator)</b></p> <p>3.1 Applications of dragline i.e. excavating channels, ditches, trenches, underwater soil, stripping overburden, shallow grading, general excavation, loading into hoppers, loading hauling units, sloping &amp; grading.(simple sketches only)</p> <p>3.3 Clamshell - application, capacity, bucket, construction &amp; size</p> <p>3.4 Hoe and Cranes - their working &amp; Application.</p>	<b>06</b>	<b>08</b>
Unit -4	<p><b>Loaders &amp; Excavators:</b></p> <p>4.1 <b>Crawler loader</b> – working &amp; attachments i.e. standard bucket, bulk handling bucket, fork lift attachment, crane attachment Stability &amp; safety of crawler loader operations.</p> <p>4.2 <b>Wheeled loader</b> –types i.e. back hoe &amp; front hoe, working, capacity &amp; output.</p> <p>4.3 <b>Hydraulic Excavator:</b> Application, block diagram, types of buckets &amp; their applications e.g. 3 in 1 bucket, ejector bucket, square hole bucket, ditch digging bucket, clay bucket and hydraulic grab.</p> <p>4.4 <b>Scraper:</b> Block diagram, types – Towed &amp; self-propeller,</p> <p>4.5 <b>Motor Grader</b> – Block diagram, constructions, application, stability &amp; safety, capacity &amp; outputs.</p>	<b>09</b>	<b>14</b>
Unit -5	<p><b>Tractor:</b></p> <p>5.1 Comparison of tractor with an automobile</p> <p>5.2 Indian tractor industry</p> <p>5.3 General Layout of a tractor</p> <p>5.4 Power train &amp; transmission layout of a tractor</p> <p>5.5 Tractor Power take off its working &amp; construction</p> <p>5.6 Tractor tyres construction &amp; selection</p>	<b>09</b>	<b>14</b>



	5.7 Counterweight & its importance 5.8 Types of implements in tractors, its uses & its effect on performance of a tractor 5.9 Power tiller- Comparison with tractors, Various attachments & its applications		
Unit -6	<b>Forklift Truck , tipper &amp; road roller</b> 6.1 Forklift Truck- Types, layout, lifting mechanism, counterweight & steering mechanism. Safety in operation. 6.2 Tipper – Types, construction & working tipping mechanism & maintenance. Safety in operation of tipper. 6.3 Road roller- Types, layout , operation & maintenance.	<b>07</b>	<b>10</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

**Practical:**

Skills to be developed:

Intellectual Skills:

Identify tractor systems, components of tractor transmission system.

- To select proper tools and equipment for servicing of tractors.
- To read Manufacturer's service manual for servicing procedures.
- To observe components and subsystems of tractor, dozer, excavator, fork lift, road roller.
- To observe earth moving machines that are in operation.

Motor Skills:

- To adopt recommended service manual procedure for servicing of tractor.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Jagman Singh	Art of earth moving		
Radichev	Tractors and automobile.		
Burge	Tractors and their power units		
Trucker	Earth moving plant		

**C. D.s:** on various Topics of Automobile Engineering By SAE Publisher.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	List of Practical/ Assignments:
1	<ul style="list-style-type: none"> <li>• Visit to service center of Tractor or Dozer or Excavator or Fork lift or Road roller. Write report on various mechanisms used, service procedure adopted, cost of equipment and</li> </ul>

	other financial aspects.
2	<ul style="list-style-type: none"> <li>• Visit to a mine/ construction site to observe various operations of Earth Moving Machines. Write a report on the visit.</li> </ul>
3	<ul style="list-style-type: none"> <li>• Assignment on specifications and features like hydraulic circuit, control systems of any one earth moving machine,</li> </ul>
4	<ul style="list-style-type: none"> <li>• Assignment on specifications and capacities of any one dozer. Draw the sketches of various dozer blades stating their applications.</li> </ul>
5	<ul style="list-style-type: none"> <li>• Assignment on applications of any one Rope operated excavator/ fork lift.</li> </ul>
6	<ul style="list-style-type: none"> <li>• Assignment on working of crawler loader and its attachments/ road roller types and operations.</li> </ul>

Name of the Course : <b>DIPLOMA IN AUTOMOBILE ENGINEERING (TRANSPORT MANAGEMENT)</b>			
Course code: <b>AE</b>		Semester : <b>SIXTH</b>	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam: -	Marks
Tutorial:	1 hrs/week	Assignment & Quiz: 10	Marks
Practical :	0 hrs/week	End Semester Exam: 70	Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>The develop fundamental concepts and strategies and the structures and processes of transport management and related activities are explored.</li> </ul>		
Objective :-			
S.No	The students will be able to:		
1.	<ul style="list-style-type: none"> <li>Study &amp; fill up the forms required as per Motor Vehicle Act.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Prepare small project reports of bus / goods transport organization enabling him to work in different organizations like MSRTC, private organization.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Start SSI unit or may be able to work as service provider.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Understand, prepare the different documents used in transport organization. If necessary, he can modify the ideas of documentation.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Enter in the business of buying and selling of old &amp; new vehicles.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Create awareness of ideal driving which includes safety, legal aspects</li> </ul>		
7.	<ul style="list-style-type: none"> <li>.Understand the purpose of research institutes in India, which are working on advancements of automobiles rather than adopting the idea of reverse engineering.</li> </ul>		
Pre-Requisite :- Nil			
Contents			Hrs/week
Unit -1	<i>Introduction to transport management</i> <b>1.1 Motor Vehicle Act:</b> Short titles used in MVA, Definitions, Terms regarding vehicle. <b>1.2 Licensing of Drivers of Motor Vehicle:</b> Necessity, Age limit, Responsibility of owners, Restriction on holding a driving license, General, Preliminary test and driving test. <b>1.3 Conductor's license:</b> Necessity, Eligibility, Documents required and rules for conductors. <b>1.4 Registration of Vehicles:</b> Necessity, Where to be made, How to be made, Temporary registration, Production of vehicle at the time of registration, Form and manner of display of registration mark, Size of letters and numerals of registration		14
			20

	<p>mark, Transfer of Ownership of Motor Vehicle.</p> <p><b>1.5 Control of Transport:</b>  Transport authorities, Difference between STA &amp; RTA, Necessity of Permit, All types of Permit, Transfer of permit, Temporary permit, Tourist permit, National permit. Speed limits.</p> <p><b>1.6 Construction of Motor Vehicle:</b>  Overall dimensions, General provision regarding construction and maintenance of motor vehicle. Power of central government to make rules.</p> <p><b>1.7 Taxation:</b>  Objectives, Basis of taxation, Methods of levying tax, Tax exemption.</p> <p><b>1.8 Insurance:</b>  Motor Vehicle Insurance, No-fault liability, Procedure for accident claim.</p>		
Unit -2	<p>Transport Management</p> <p><b>Part A</b></p> <p><b>2.1 Terms used in transportation:</b>  Road transport service, Transport vehicle, Public service vehicle, Goods vehicle, Public place, Depot, Route, Trip, Time table, Vehicle schedule, Fare.</p> <p><b>2.2 Comparison of Modes of transport.</b></p> <p><b>2.3 Requirements of goods and passenger transport on the basis of—</b>  Volume, type, weight of material; class of passenger.</p> <p><b>2.4 Basic elements in Transport Management:</b></p> <p><b>2.4.1 Market potential:</b>  Type of goods/ passengers, Period of use, Probable competition.</p> <p><b>2.4.2 Selection of vehicle:</b>  Type of load, Class of passenger, Type of service.</p> <p><b>2.4.2 Organization setup:</b>  Govt., Semi Govt., Private.</p> <p><b>2.4.4 Legal compliance:</b>  Documents required as per MVA, Registration.</p> <p><b>2.4.5 Policies of transport organization:</b>  Policies towards passenger, employees, like Long distance service, Express service, Night service and others.</p> <p><b>Part B</b></p> <p><b>2.4.6 Layout of organization:</b>  <b>Location, elements considered in location, Passenger amenities, infrastructural facilities.</b></p> <p><b>2.4.7 Scheduling:</b>  Basic factors in bus, crew(staff) and maintenance scheduling, calculation of number of buses.</p> <p><b>2.4.8 Freight calculation:</b>  <b>Time base, Distance base, Contract, per passenger, cubic feet tone</b></p>	06	08

	<p><b>method. Structure of fare, fixed cost- Maintenance cost, depreciation cost, insurance, interest on capital, variable cost, Hiring of trucks, Toll, staff wages, Miscellaneous cost.</b></p> <p>2.4.9 Record keeping :</p> <p><b>Log book, Trip operational sheet, Vehicle ledger, Truck history card, Monthly operational sheet, Goods consignment note, various types of bookings, Use of Computer.</b></p>		
Unit - 3	<p><b>Estimation and Valuation of Vehicle:</b></p> <p>3.1 Role of surveyor.</p> <p>3.2 Procedure of survey and valuation of vehicle.</p> <p>3.3 Accident survey report.</p> <p><b>3.4 Importance of warranty system and protection of law: How to deal with defects, benefits of warranty system. Protection of law.</b></p>	08	12
	<p><b>3.5 Buying a new vehicle: Factors to be considered -</b> Ex-showroom price and on road price, use of vehicle, when and where to buy, Closing the deal, Running in. inspecting the vehicle, Points to check: test drive, Controls, Bonnet, Suspension, Switches, Seat, Noise, Ventilation, Safety, Boot, Interior Storage.</p> <p><b>3.6 Buying a used vehicle:</b> When &amp; where to buy: Dealers, used car firms, Private sellers, Garages, Auctions. Factors to be considered-- Depreciation, Model and year, Oil leak, Oil Pressure, Exhaust , Battery, Odometer, Bonnet, Crash damage, Rust, Suspension damage, Tyres, Switches &amp; accessories, Lights, Chrome, Wiring , Steering, Hydraulic System, Structural corrosion, Floor, Test drive.</p> <p><b>3.7 Preparations for selling :</b> When to sell, How to sell, Auctions, Garages, Private sale, Preparing the car, Documentation, Selling price, Safeguards.</p>		
Unit - 4	<p><b>Driving skills:</b></p> <p><b>4.1 Instructions in driving of motor vehicle :</b> Driving theory, traffic education, light vehicle driving practice, Vehicle mechanism &amp; repair, Public relations for drivers, Fire hazards, vehicle maintenance, first aid.</p> <p><b>4.2 Traffic signs:</b> Mandatory signs, Cautionary signs, Informatory signs. Traffic signals. Causes of accident and remedies.</p> <p><b>4.3 Measures to avoid accidents</b></p> <p><b>4.4 Defensive driving :</b></p> <p><b>4.5 Rain and flood, fog and mist, snow and ice,</b></p> <p><b>4.6 Fitness to drive :</b> Driving and age, stress due to traffic jam, night driving.</p>	08	12
Unit - 5	<p><b>Motor Industry</b></p> <p>5.1 The Automobile Industry In India (Collection of Data of various</p>	08	12

	companies) 5.2 Importance of Automobile Engineer. 5.3 Working of Various State Transport Organizations. (MSRTC, BEST)		
Unit – 6	<b>Functions &amp; Role in Automobile Industry:</b> Various Research Organizations like- Central Institute of Road Transport. Automotive Research Association of India. Vehicle Research, Development & Establishment. Central Road Research Institute. Petroleum Conservation & Research Association	<b>04</b>	<b>06</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dr. P. Sudarsanam.	Passenger Amenities in STU		CIRT, Pune
Dr. P. Sudarsanam.	Fare structure in STU		CIRT, Pune
Dr. P. Sudarsanam.	Bus station Management		CIRT, Pune.
Dr. P. Sudarsanam	Bus & Crew scheduling		CIRT, Pune.
O.P. Khanna.	Industrial Organization & Management		Dhanpat Rai & sons
Dr. P.G. Patankar. Director.	Compedium of Transport Terms		CIRT, Pune
Bharat Kalaskar	Vahan Mitra		Sanjivini Prakashan, Pune
Book Of The Car	--		Drive Publications Limited Automobile Association

**Reference books :-**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Stephan Shaw	Airline Marketing and Management		
Andrew Hastie	Practical Transport management		

**Suggested List of Laboratory Experiments :- Nil**

**Suggested List of Assignments/Tutorial :-**

S.No	The following tutorials / assignments may be completed by a group 5 or 6 students. (1 Hr/ Week)		
1	1. Study, fill up, highlight the important points & prepare report on following forms under M V rules -- a. Medical certificate    b. Learner's license.    c Driving license.		

	d. Addition of license. e. Renewal license f. Registration of vehicle. g. Transfer of vehicle.	
2	Prepare a report on buying of a new vehicle.	
3	Prepare a report on buying /selling an old vehicle.	
4	Prepare a report showing different road signs and signals.	
<b>Note:</b> It is recommended that the eligible student as per M.V. Act should seek license up to LMV.		
<b>M. V. Acts:</b>		
	<b>Title</b>	<b>Publication</b>
1	Motor Vehicle Act, 1988	Home Department (M .S.)
2	Central M. V. Rules 1989	Home Department (M .S.)

Name of the Course : <b>DIPLOMA IN AUTOMOBILE ENGINEERING (VEHICLE MAINTENANCE)</b>			
Course code: <b>AE</b>		Semester : <b>SIXTH</b>	
Duration :		Maximum Marks :	
Teaching Scheme		Examination Scheme	
Theory :	3 hrs/week	Mid Semester Exam:	- Marks
Tutorial:	0 hrs/week	Assignment & Quiz:	10 Marks
Practical :	4 hrs/week	End Semester Exam:	70 Marks
Credit :- Nil			
Aim :-			
S.No			
1.	<ul style="list-style-type: none"> <li>Promote efficient planning of transport activities, effective maintenance of vehicles, co-ordination of trips, and the use of correct vehicles for specific tasks, to limit transport costs to the minimum</li> </ul>		
Objective :-			
S.No	The student will be able to:		
1.	<ul style="list-style-type: none"> <li>Understand use of tools and equipments.</li> </ul>		
2.	<ul style="list-style-type: none"> <li>Draw layout of Automobile workshop.</li> </ul>		
3.	<ul style="list-style-type: none"> <li>Compare and understand types of maintenance systems.</li> </ul>		
4.	<ul style="list-style-type: none"> <li>Critique whether to repair or replace.</li> </ul>		
5.	<ul style="list-style-type: none"> <li>Execute dismantling of assemblies.</li> </ul>		
6.	<ul style="list-style-type: none"> <li>Check the parts for proper functioning.</li> </ul>		
7.	<ul style="list-style-type: none"> <li>Execute various adjustments to be done for proper functioning.</li> </ul>		
8.	<ul style="list-style-type: none"> <li>Execute tuning of assemblies</li> </ul>		
Pre-Requisite :- Nil			
Contents : <b>Theory</b>			
	<b>Hrs/week</b>	<b>Marks</b>	
Unit -1	<b>Auto Workshop Layout &amp; Equipments</b>		
	1.1 General safety precautions and procedures.		
	1.2 Functions of General shop equipments and tools (of the below mentioned tools and equipments only) -wheel balancer, wheel aligner, crankshaft aligner and straightner, engine analyzer, arbor press, drill press, battery charger, tyre changer, car washer, lift, FIP calibration machine, head light aligner, valve grinder, honing machine, cylinder boring machine.		
	1.3 Layout with equipments required for dealers of two- wheeler, Four wheelers - cars and commercial vehicles. For road - side garages.		
	1.4 Layout of modern workshop for specialised job work, crankshaft		
	<b>06</b>	<b>10</b>	



	grinding, engine (re-boring), F.I.P repairs, crankshaft journal boring, brake drum boring.		
Unit -2	<p><b>Maintenance management and record Keeping</b></p> <p>2.1 Necessity of maintenance</p> <p>2.2 Types of maintenance and their applications</p> <p>2.2.1 Preventive maintenance system.</p> <p>2.2.2 Scheduled maintenance system</p> <p>2.2.3 Break down maintenance system</p> <p>2.3 General maintenance schedule -Daily, weekly, monthly &amp; periodic maintenance. for various vehicles -Two –wheelers, LMV, HMV</p> <p>2.4 General servicing procedure. Decision to repair or replace.</p> <p>2.5 Workshop records- history sheet, work order, activity file</p>	<b>06</b>	<b>08</b>
Unit - 3	<p><b>Engine Maintenance</b></p> <p><b>Part A:</b></p> <p>3.1 Troubles, Causes &amp; remedies in engine, fuel system, cooling system, lubrication system &amp; MPFI Engine.</p> <p>3.2 Checking and Servicing of following engine components: cylinder head, cylinder block, cylinder liners, piston, piston ring, crank-shaft, connecting rod, valves.</p> <p>3.3 Tuning of engine</p> <p><b>Part B:</b></p> <p>3.4 Fuel feed system service carburetor dismantling, cleaning and tuning, injector cleaning and testing, FIP phasing and calibration, MPFI -injector testing and cleaning. sensor testing ).</p> <p>3.5 Lubrication system service. – change oil filter, check oil pump, and diagnose causes for excessive oil consumption, external oil leakage, and low oil pressure in an automobile engine.</p>	<b>08</b>	<b>12</b>
Unit – 4	<p><b>Chassis &amp; Body Maintenance</b></p> <p><b>Part A:</b></p> <p>4.1 Checking and repairing of Clutch for clutch plate thickness, run-out, rivet depth, warpage of pressure plate.</p> <p>4.2 Adjustment of clutch.</p> <p>4.3 Troubles, Causes and remedies of clutch.</p> <p>4.4 Checking gearbox for run out of main shaft and lay shaft, for wear of synchronizer and worn bearings, checking oil seals.</p> <p>4.5 Troubles, Causes and remedies of gearbox</p> <p>4.6 Checking and adjusting differential for ring gear run-out, backlash in ring gear, tooth contact between ring gear and pinion, bearing preload.</p> <p>4.7 Troubles, Causes and remedies of propeller shaft, differential and rear axle.</p> <p>4.8 Inspection and repair of master cylinder, wheel cylinder, brake drum, brake disc, brake linings and brake pads.</p>	<b>10</b>	<b>14</b>

	4.9 Adjustment of hydraulic brakes – shoe clearance, brake pedal free travel, pedal to wall clearance, parking brake adjustment. 4.10 Bleeding of hydraulic brakes 4.11 Troubles, Causes and remedies in brake system. <b>Part B:</b> 4.12 Troubles, Causes and remedies of suspension system. Lubrication of leaf springs 4.13 Procedure of wheel alignment (after chassis height adjustment) by wheel alignment gauges and procedure of wheel balancing. Troubles, Causes and remedies of steering system. 4.14 Care of wheels and tires, retreading of tires and vulcanizing. Tire rotation. 4.15 Frame repairs (cracks, loose rivets, skewness in frames) and alignments. 4.16 Body repairs- denting, denting tools and equipments 4.17 Repainting procedure, patch work. 4.18 Painting defects. 4.19 Adjustment of doors and locks	<b>09</b>	<b>12</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

**Practical:**

Skills to be developed

Intellectual Skills:

- Select tool and equipment for vehicle maintenance.
- Diagnose faults and suggest remedies.
- Understand tuning, backlash and detonation.

Motor Skills:

- Put vehicle on the ramp
- Use diagnostic tester
- Use service manuals for maintenance of vehicle.

**List of Practical:**

1. Remove multi-cylinder engine from a vehicle, dismantle, clean, inspect and repair following components
  - cylinder head for warpage and cracks, refacing by grinding or cutting, straightening cylinder heads
  - cylinder block for measurement of ovality and taperedness , cylinder boring , honing process, changing of liners.
  - Piston and piston rings for wear, appearance, piston head for signs of deposits and

detonation, oversize piston, ring groove clearance, removing and refitting rings.

2. Tuning of carburettor, tuning and maintenance of diesel fuel injection system.
3. Servicing lubrication system – change oil filter, check oil pump, diagnose causes for excessive oil consumption, external oil leakage, and low oil pressure in an automobile engine.
4. Overhauling of clutch and gear box- dismantling, inspection of clutch and gearbox parts – pressure plate, clutch plate, gear shaft bearing, synchromesh unit, shifting ring forks etc. repairing, replacement of components and reassembling of the clutch and gear box, adjustment of shifting mechanism. Adjust the clutch paddle.
5. Dismantle the propeller shaft and differential, Check wear in universal joints, straightness in propeller shaft, remove bushes and bearings and reassemble it. Check the differential gears for wear, run out, backlash, tooth contact. Adjust the final drive and obtain even tooth contact.
6. Adjustment of mechanical and hydraulic brakes and renewal of brake liners, repairing of master cylinder, wheel cylinder, brake chamber, brake bleeding, skinning scored brake drum.
7. To remove and refit the drag link and steering gearbox. Adjust joints and track rod ends. Do the Adjustment of steering gear to take up backlash.
8. Evacuation, charging and trouble shooting of Air conditioner.

**Text Books:**

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Tim Gills	Automotive Service		Delmar Publisher Inc.
Crouse / Anglin.	Automobile Mechanics		TATA McGraw – HILL
Anil Chikara	Automobile Engineering Vol. III Auto Marketing and Workshop Techniques		Satya Prakashan, New Delhi
Anil Chikara	Automobile Engineering Vol. IV Body repair techniques		Satya Prakashan, New Delhi
Anil Chikara	Automobile Engineering Vol. V Paint techniques		Satya Prakashan, New Delhi
Dr. Kirpal Singh	Automobile Engineering Vol. I		Standard Publishers.
Anthony Schwaller	Motor Automotive Technology		Delmar Publisher Inc.
Ken Layne	Automotive Engine Performance		Prentice Hall Career Technology
Ian Norman, Robert Scharff, John Corinchoke	Heavy Duty Truck System		Delmar Publisher Inc.
--	Santro & Accent Basic training Book		Hyundai Motors India Ltd.
--	Service Manuals of all		Maruti motors India Ltd.

	Euro –II vehicles.		
S.Srinivasan	Automotive Mechanics		Tata McGraw Hill.
Reference books :-			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Roy Brooks,Jack Herst John Whip	Maintenance and repair of road vehicles		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			