

Fundamental of Electronics [AE]

Name of the Course: Diploma in Automobile Engineering		
Course Code: AE	Semester:	Third
Duration:	17weeks	Maximum Marks:
		50
Teaching Scheme :		Examination Scheme :
Theory:	2 hrs./week	Internal Examination :
		10 Marks
Tutorial:	Nil	Attendance, Assignment & Interaction :
		5 Marks
Practical:		End Semester Exam.:
		35 Marks
Credit : 2		
Aim:		
<p>In present day automobile or mechanical systems, application of electric and electronic engineering have larger role to play. For effective maintenance and operation of these components as well as circuits, automobile engineers/ technicians must have perfect knowledge of fundamentals of electronics and instrumentation.</p>		
Objective:		
<p>The students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concept of P and N types of semiconductors, know the working of electronic components like semiconductors diodes, rectifiers, filters, regulators, transistors, amplifiers, oscillators, & their operation. 2. The principle and working of semiconductor switching devices like SCRs, DIAC, TRIAC and optoelectronics devices, their working principles and applications. 3. Understand the operation & application of transducers in automobile. 4. Understand operation of signals, gates, flip-flops, encoder, decoder, counter, multiplexer used in electronic circuits of an automobile. 		
Pre-Requisite:		
Knowledge of Basic Physics and Modern Physics in Semester 1 and 2		
Contents (Theory) :		
Chapter	Name of the Topics	Hours
01	<p>Semiconductor diode :</p> <p>1.1 Review of P-type and N-type semiconductor, Junction of P-type & N-type i.e. PN junction, Barrier voltage, depletion region, Junction Capacitance.</p> <p>1.2 Forward biased & reversed biased junction, Diode symbol, circuit diagram for characteristics (forward & reversed), Characteristics of PN junction diode, Specifications:-Forward voltage drop, Reversed saturation current, maximum forward current, power dissipation.</p> <p>1.3 Package view of diodes of different power ratings (to be shown during practical hours).Sneer diode: construction, symbol, characteristics, equivalent circuit and specifications.</p>	06
02	<p>Rectifiers & Filters :</p> <p>2.1 Need of rectifier , definition ,Types of rectifier – Half wave rectifier, Full wave rectifier,(Bridge & centre tapped) Circuit operation</p> <p>2.2 Input/output waveforms for voltage & current, Average (dc) value of current & voltage (no derivation), Ripple, ripple factor, ripple frequency, PIV of diode used, efficiency of rectifier. (no derivation only definition), Comparison of three types of rectifier.</p>	06

	<p>2.3 Need of filters, Types of filters, A] shunt capacitor, B] Series inductor, C] LC filter ,D] π filter --- only circuit operation (no mathematical derivation), Input/output waveforms , limitations & advantages.</p> <p>2.4 Voltage regulator- Simple voltage regulator circuit using zener, familiarization with IC regulator circuit (like 78XX, 79XX series etc.).</p>	
03	<p>BIPOLAR JUNCTION TRANSISTOR, SWITCHING AND OPTOELECTRONIC DEVICES :</p> <p>3.1 Construction and operation of NPN and PNP transistors-V-I characteristics, transistor in active, saturation and cut-off-CE, CB, CC configuration and their differences, definitions of current gains.</p> <p>3.2 Transistor Biasing -- need of biasing, types of biasing circuits Fixed biased circuit, Base biased with emitter feedback, Base biased with collector feedback and Voltage divider bias circuit- concept only.</p> <p>3.3 Transistor as simple amplifier (common emitter configuration only) & oscillator in brief and their simple application.</p> <p>3.4 TRIAC, DIAC, Silicon control rectifier (SCR):-Symbol, working, applications –elementary ideas, Comparison between Transistor and SCR.</p> <p>3.5 Elementary ideas of LED, LCD, photodiode, phototransistor and solar cell and their applications only.</p>	06
04	<p>DIGITAL ELECTRONICS :</p> <p>4.1 Define analog signal and digital signal.</p> <p>4.2 Study of logic gates (NOT, OR, NOR, AND, NAND) symbols and truth table, Flip Flop Study of flip flops: only RS (using NAND gate) & D Flip flop, symbols and truth table.</p> <p>4.3 Working principle with block/ logic diagram of encoder & decoder Working principle with block/logic diagram of Multiplexer (4:1) and demultiplexer (1:4) Working of seven segment display.</p> <p>4.4 Working principle with General block diagram of shift register & counter- elementary ideas.</p>	06
05	<p>Transducers and their application :</p> <p>5.1 Electromechanical type transducers: -Potentiometric resistances type, Inductive (LVDT), capacitive, Piezoelectric.</p> <p>5.2 Photoelectric type transducers: Photo emissive, Photovoltaic and Photoconductive.</p> <p>5.3 AC/DC Electronic timer block diagram study.</p> <p>5.4 Concept of General measurement system & difference between mechanical and electrical/electronic instruments.</p> <p>5.5 Measurement of Pressure:-</p>	08

5.6 Vacuum gauge: Pirani vacuum gauge, varying pressure measurement.	
5.7 Measurement of Flow:- Hot wire anemometer, Ultrasonic flow meter.	
5.8 Measurement of Temperature:- Working of thermocouple ,Working of Thermopiles, Thermistor.	
5.9 Measurement of Speed: - contactless electrical tachometer: - Inductive, Capacity type tachometer, Stroboscope.	
5.10 Measurement of Force: - Strain gauge load cell.	
5.11 Electrical method for moisture measurement (only concept).	

Total	32 Hrs.
Total Classes	17 weeks [51 lecture hrs]

Examination Scheme [Theoretical] :

Group	Chapter	Objective Questions			
		To be set	To be Answered	Marks per Question	Total Marks
A	1, 2	5	10 [TEN]	01 [ONE]	1 X 10 = 10
B	3,4	5			
C	5	2			

Group	Chapter	Subjective Questions			Total Marks
		To be set	To be Answered	Marks per Question	
A	1, 2	THREE	05 [five]	05 [five]	5 X 5 = 25
B	3,4	THREE			
C	5	TWO			

Learning Resources :

Text Books

Sl No.	Name of Authors	Titles of the Book	Name of Publisher
1.	A.P. Malvino	Electronic Principle	Tata McGraw-Hill
2.	Millman & Halkias	Electronic Devices & Circuits	Tata McGraw-Hill
3.	Bhargava	Basic Electronics & Linear Circuits	Tata McGraw-Hill
4.	Boylestad & Nashalsky	Electronic devices & Circuit Theory	PHI
5.	D. Chattopadhyay & P.C. Rakhshit	Electronic Fundamentals & Applications	New Age International
6.	Madhuri A Joshi	Electronic Components and Materials	Wheeler Publishers
7.	R Raja	Digital Electronics	SCITECH PUBLICATION
8	J.B. Gupta	A Course in Electronics and Electrical Measurements and Instrumentation	S.K. Kataria and sons
9	Dr. Sanjay Sharma	Electronic Devices	S.K. Kataria and sons
10	Padmanaban	Electronic Component	
11	Ramchander	Electronic Component	
12	R.G. Gupta	Electronic Measurement and system	Tata McGraw-Hill
13	David A. Bell	Electronics Instrumentation and measurements	OXFORD

Advanced strength of Materials (AE)

Name of the Course: Diploma in Automobile Engineering			
Course Code: AE/ME/PE	Semester :		Third
Duration: 17 Weeks	Maximum Marks :		50
Teaching Scheme :		Examination Scheme : Theoretical	
Theory: 02 hrs / week	Internal Examination :		10 Marks
Tutorial: Nil	T.A [Attendance, Assignment & Interaction] : 05 Marks		
Practical: Nil hrs / week	End Semester Exam :		35 Marks
Credit : 2			
Aim:			
<ul style="list-style-type: none"> • To understand & analyze various types of loads, stresses & strains. • To understand main causes of failure of machine parts. • To understand the principle of combined stress and it's effect on failure of material. • To have preliminary knowledge for understanding principles of machine design. 			
Objectives:			
<p>The Student will be able to:</p> <ul style="list-style-type: none"> ➤ Understand the fundamentals of solid mechanics. ➤ Acquire knowledge of bending stress, it's nature related to types of beam & loading. ➤ Acquire knowledge of stress & strength of shaft transmitting power. ➤ Acquire knowledge of biaxial stress applied on a body and it's corresponding concept of principle stress. 			
Pre-requisite :			
<ul style="list-style-type: none"> ✓ Elementary knowledge on types of load, stress & strain. ✓ Knowledge of moment of inertia & it's effect on the stability of the body. 			
Contents :			
Chapter	Name of the Topic	Hours	Marks
01	Strain Energy: 1.1 Concept, derivation & use of expression for Strain energy of axially loaded members of uniform cross section under gradual, sudden / impact load (simple problems). 1.2 Strain energy due to self-weight for uniform cross section member (simple problem).	03	--
02	Bending & Shear stresses: 2.1 Theory of simple bending, pure bending, equation of bending. 2.2 Assumptions in the theory of bending, moment of resistance, section Modulus, neutral axis, flexural rigidity, concept of economy section [simple problems on rectangular, circular & I-section beam]. 2.3 Shear stresses in beam & its distribution diagram over various cross section of beam under point load/udl (No problem).	06	--

03	Combination of Bending & Direct stresses: 3.1 Determination of maximum & minimum stresses for members under axial load, eccentric load along one principal axis, direct stress & bending stresses. 3.2 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, total stress variation diagrams. (Simple problems on above applications).	05	
04	Principal Planes & Principal Stresses : 4.1 Definition of principal plane & principal stresses. 4.2 Expression for normal and tangential stress, maximum shear stress. (No derivations). 4.3 Stresses on inclined planes. 4.4 Position of principal planes & planes of maximum shear. 4.5 Graphical solution using Mohr's circle of Stresses.(simple problem)	08	
05	Torsion: 5.1 Concept of Pure Torsion, Assumptions in theory of pure torsion, Torsion equation of solid and hollow circular shafts, Polar modulus, Torsional rigidity. 5.2 Power transmitted by a shaft, Comparison between Solid and Hollow Shafts. (Simple numerical only)	06	--
06	Spring : 6.1 Types of springs and uses. 6.2 Closely coiled helical spring subjected to axial load: Determination of shear stress & its distribution, deflection, stiffness, solid length, concept of mean radius of coil, strain energy stored & spring index (simple problem) 6.3 Springs are in series & parallel.	04	--
Total		32 hrs/wk	35 Marks
Total Classes		17 weeks [34 lecture hrs]	
Learning Resources :			
Text Books :			
Author	Title	Publisher	
R.S.Khurmi	Strength of Materials	S. Chand & Co	
M Chakraborty	Strength of Material	S.K. kataria	
S. Ramamrutham & R. Narayanan	Strength of Material	Dhanpat Rai & Publication	
R.K. Bansal	Strength of Materials	Laxmi Publication Pvt. Ltd	
R.K. Rajput	Strength of Material	S. Chand & Co	
B.K.Sarkar	Strength of Material	Tata McGraw Hill	
Timoshenko Young	Elements of Strength of Material	East- West Private Limited	
R.Subramanian	Strength of Material	Oxford university Press	
Examination Scheme:			

Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1, 2 & 3	6	Any ten	01	10 x 01 = 10
B	4, 5 & 6	6			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1, 2 & 3	5	Any five, at least one from each group	05	05 x 05 = 25
B	4, 5 & 6	5			

Heat Power Engineering –I

Name of the Course: Diploma in Automobile Engineering			
Course Code: A.E.	Semester :		Third
Duration: 17 Weeks	Maximum Marks :		100
Teaching Scheme	Examination Scheme :		
Theory: 3 hrs / week	Internal Examination :		20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction: 10 Marks		
Practical: Nil hrs / week	End Semester Exam :		70 Marks
Credit : 3			
Aim:			
<ul style="list-style-type: none"> • to understand the concepts of thermodynamic & the basic laws. • to understand the energy, work, heat & conversion. • to understand Air / gas cycles, properties of steam, generation of steam with boilers, steam condensers and turbines. • to understand the construction and working of compressor. • to understand that the heat transfer forms the basis for different power engineering. 			
Objectives:			
<ul style="list-style-type: none"> ➤ Know applications of thermodynamic principles and processes in various heat engines and power absorbing devices. ➤ Correlate the theoretical knowledge with practical aspects of systems of work producing and work absorbing devices like boilers, condensers, steam turbines, air compressors etc. ➤ Understand working of different pneumatic tools. ➤ Observe the performance of devices with change in parameters. 			
Pre-Requisite:			
Chapter	Name of the Topic	Hours	Marks
01	Fundamentals of thermodynamics:- 1.1 Thermodynamics, System, Surroundings, Universe, Types of Systems- closed system, open system, isolated system, flow system, non-flow system, examples. 1.2 Properties of systems- Extensive and Intensive properties with symbols and units. Thermodynamic state, Path, Process, Quasi-static process, reversible, irreversible, cycle, thermodynamic equilibrium, Point function and path function. 1.3 Pressure- Units, standard atmospheric pressure, gauge pressure, Absolute pressure. Temperature- units, Meaning of N.T.P. and S.T.P. 1.4 Energy:—Types, Thermodynamic definition of Heat and Work, Difference between heat and work, internal energy, entropy, flow work and enthalpy. 1.5 Various Thermodynamic processes: Isobaric, isochoric, Isothermal, Adiabatic, Isentropic and Polytropic with representation on P-V & T-S diagram, formula for work done, heat transfer, change in internal energy, enthalpy, entropy etc. (Derivations only for adiabatic process) (Simple numericals).	08	--
02	Properties of Gas and Laws of Thermodynamics:- 2.1 Perfect gas and real gas, Equation of state, Characteristic of gas		

	<p>constant, Mol of gas, Universal gas constant.</p> <p>2.2 Specific heats of ideal gas, relation among specific heats and Characteristic of gas constant, adiabatic index.</p> <p>2.3 Zeroth Law of Thermodynamics, First law of Thermodynamics, Mechanical equivalent of heat, General energy equations for non flow process & flow process, principle of conservation energy.</p> <p>2.4 Second law of Thermodynamics- statement (Kelvin-Planck & Claudius), C.O.P of refrigerator and heat pump. (Simple numericals).</p>	07	--
03	<p>Air cycles :</p> <p>3.1 Introduction – assumptions – classifications, efficiency of the cycle, Reversible cycle – irreversible cycle.</p> <p>3.2 Types of thermodynamic cycles – Carnot cycle – Joules cycle – Air standard Otto cycle – Air standard Diesel cycle – Dual combustion cycle, derivation – P-V & T-S diagram, their efficiencies & simple problems.</p>	08	--
04	<p>Properties of steam and steam power:</p> <p>4.1 Formation of steam: various phases like wet steam, dry saturated steam, superheated steam. Dryness fraction, degree of superheat, sensible heat, Latent heat, calculation of enthalpy, entropy etc. using steam table & Mollier chart.</p> <p>4.2 Study of boiler-Water Tube & Fire Tube boiler, boiler mounting and Accessories. [only name, location in boiler and function]</p> <p>4.3 Steam condenser: Principle, function, location in steam power Plant.</p> <p>4.4 Steam Turbine: Classification of turbine, working principle of Impulse and Reaction turbine, location in steam power plant.</p>	08	--
05	<p>Air Compressors:-</p> <p>5.1 Introduction, Classification of air compressors.</p> <p>5.2 Reciprocating air compressor: Construction and working of single stage and two stage Compressor with P-V diagram, necessity of multistaging and intercooling. Applications. (only simple numerical)</p> <p>5.3 Rotary Compressor: Construction and working of rotary Compressors.</p> <p>i) Centrifugal compressor. ii) Axial flow compressor iii) Screw compressor. Applications. (No problem).</p> <p>5.4 Air compressor terminology: - Compression ratio, Compressor capacity, Free Air Delivered, piston displacement, I.P., B.P., volumetric efficiency, Isothermal efficiency and overall Isothermal or Compressor efficiency.</p> <p>5.5 Comparison and applications of reciprocating and rotary Compressors.</p> <p>5.6 Applications of compressed air, construction and working of Pneumatic torque wrench.</p>	09	--
06	<p>Heat Transfer:-</p> <p>6.1 Modes of heat transfer--- Conduction, Convection and Radiation.</p> <p>6.2 Conduction- Fourier's law, thermal conductivity- its units. Conduction through composite walls, Thermal resistance.</p>	08	--

	6.3 Convective heat transfer – Newton’s law of cooling, Heat Transfer Co-efficient – its units, Combined conduction and convection, Heat exchanger, types & application, Overall heat transfer co-efficient. [Simple numerical].				
	6.4 Heat transfer by Radiation [for introductory concept only]: -- Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and gray bodies, Stefan-Boltzman law.				
	6.5 Application of concept of heat transfer in automobiles.				
Total		48Hrs. [Lecture]	70 Marks		
Total Classes		17 weeks [51 lecture hrs].			
Learning Resources :					
Text Books :					
Author	Title	Publisher			
Mahesh M Rathore	Thermal Engineering	Tata McGraw Hill Publication			
A R Basu	Thermal Engineering Heat Power	Dhanpat Rai and Co.(P)Ltd, New Delhi			
R. S. Khurmi and J. K. Gupta	A Text book of Thermal Engineering	S. Chand and Co. Ltd.			
P K Nag	Basic and applied thermodynamics	Tata McGraw Hill Publication			
M. L Mathur R P Sharma	A Course in Internal Combustion Engines	Dhanpat Rai and Co.(P)Ltd, New Delhi			
Learning Resources :					
Examination Scheme:					
Group	Chapter	Objective Questions		Total Marks	
		To be Set	To be Answered	Marks per Question	
A	1, 2 & 3	12	Any Twenty	01	
B	4 & 5	9			
C	6	4			
				20 x 1 = 20	
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1, 2 & 3	5	Any five	10	10 x 5 = 50
B	4 & 5	3			
C	6	2			

Automobile Engines

Name of the Course : Diploma in Automobile Engineering						
Course Code: AE		Semester :		Third		
Duration: 17 Weeks		Maximum Marks :		150 Marks		
Teaching Scheme :		Examination Scheme :				
Theory: 3 hrs / week		Internal Examination :		20 Marks		
Tutorial: Nil		Attendance, Assignment & Interaction : 10 Marks				
Practical: 4 hrs / week		End Semester Exam :		70 Marks		
Credit : 5						
Aim:						
<ul style="list-style-type: none"> ● To impart knowledge on basic concepts of Automotive Engines. ● To impart knowledge on various sub components & essential systems of engine. ● To impart knowledge on performance & testing of engine. 						
Objectives:						
Students will be able to :						
<ul style="list-style-type: none"> ➤ To understand the construction and working of petrol and diesel engines and its components. ➤ To acquire the knowledge about the lubrication and cooling systems of automotive engines. ➤ To understand the working principle of fuel feed system of petrol and diesel engines. ➤ To understand engine power calculation & analyse engine performance by testing. ➤ To understand engine specification parameters. 						
Pre-requisite :-						
<ul style="list-style-type: none"> ✓ Fundamental concept of Thermodynamics. ✓ Laws of Thermodynamics. 						
Examination Scheme:						
Group	Chapter	Objective Questions			Total Marks	
		To be Set	To be Answered	Marks per Question		
A	1 & 2	08	20	01	20 x 1 = 20	
B	3, 4 & 5	12				
C	6	05				
Group	Chapter	Subjective Questions			Total Marks	
		To be Set	To be Answered	Marks per Question		
A	1 & 2	03	Any five	10	10 x 5 = 50	
B	3, 4 & 5	05				
C	6	02				
Content [Theory] :						
Chapter	Name of the Topic				Hours	Marks
01	Engine Principles and fundamentals: 1.1 Introduction- Engines, History of development of engines, I.C. Engine & E.C. Engine, Classification of I.C. Engines, Basic engine nomenclature. 1.1 Working Principle of I.C. Engine. Concepts of 2-stroke and 4-stroke				04	--

	<p>Petrol and Diesel Engines, Comparison.</p> <p>1.3 Merits and Demerits of vertical and horizontal engines.</p> <p>Applications.</p>		
02	<p>Constructional features, function and working of automobile engine components:</p> <p>2.1 Cylinder block, cylinder liners, types of liner, function, comparison of dry and wet liner, cylinder head, Crankcase & Materials.</p> <p>2.2 Piston, Piston slap, Piston clearance, Piston material [C.I. & Al alloy], Comparison between C.I & Al alloy piston, Piston rings, types, function, Piston ring joints, arrangement of ring gap in 4-S & 2-S engines & Materials, Piston pin, types of piston pin & Materials.</p> <p>2.3 Connecting Rod, Crank shaft, Cam shaft, Materials, Types of Camshaft drives, Timing gears, Timing sprocket, Timing toothed belt, Applications.</p> <p>2.4 Valve, side valve, overhead valve (Single and Double), Valve operating mechanism, Valve clearance, Rotary valve, sleeve valve mechanism, Use of Reed Valve in the two-stroke engine,</p> <p>2.5 Valve timing and port timing diagram.</p> <p>2.6 Manifolds [Inlet and exhaust], function, Silencers, types. Working Principle of silencer, Flywheel, Dampers, working principle.</p>	10	--
03	<p>Engine Cooling System:</p> <p>3.1 Introduction - Necessity of cooling, Types of cooling systems- Air cooling system, Water-cooling system / Liquid cooling system. Components of air-cooling system, uses.</p> <p>3.2 Water-cooling system./ Liquid cooling system, layout working principle,different components of water / liquid cooling system. Thermostat valve, types, construction and working principle of Thermostat valve.Cooling pump & cooling fan – engine driven and Electric driven. Radiator-Construction and type of radiator cores. Pressure Cap- construction and working, use of expansion tank.</p> <p>3.3 Comparison between Air-cooling and water / liquid cooling system.</p> <p>3.4 Properties of coolants, Anti freeze solution, types, purpose of using, additives, Valve Cooling, Effect of Under cooling & over cooling, troubleshooting.</p>	06	--
04	<p>Engine Lubrication System:</p> <p>4.1 Introduction, Purpose of lubrication, parts to be lubricated.</p> <p>4.2 Function and Properties of engine lubricating oil, Classification of lubricants and their makes, Grading or Rating of lubricants, additives for lubricants.</p> <p>4.3 Different methods of lubrication – Petro-oil lubrication system, Wet sump lubrication [layout] and Dry sump lubrication [layout]. Splash lubrication, Semi pressure lubrication, Pressurized lubrication system, Working principle & Applications.</p> <p>4.4 Components of wet sump lubrication system like strainer, fuel pump, filter [fine & coarse], pressure gauge, Dipstick, relief valve, oil coolers.</p> <p>4.5 Causes of oil consumption and oil contamination, Crank case Ventilation, Troubleshooting.</p>	06	--

05	Part-I 5.1	Fuel feed system [petrol engine]: 5.1.1 Fuel feed system in petrol engines layout], types- Gravity and Pump feed. 5.1.2 Mechanical fuel pump and Electrical fuel pump – construction, working principle & use. 5.1.3 Air cleaner- types, dry & oil bath/wet type air cleaner, Construction, working principle & use. 5.1.4 Stoichiometric air-fuel ratio, Mixture strength, A/F mixture requirement at different operating condition, working of simple carburettor, defects and remedies. 5.1.5 Carburettor used in four wheelers and two wheelers, construction and working of carburettor used in two wheelers. 5.1.6 Different circuits of carburettor [e.g. choke, ideal, accelerating circuits],	07	--
	Part-II 5.2	Fuel feed system [Compression ignition engine]: 5.2.1 Introduction - Requirement of fuel injection system. Various components of diesel fuel injection system- Fuel tank, fuel lines, fuel filters, Priming Pump, fuel injection pump (inline for single or multiple and distributor type), types of fuel injectors, and types of nozzle (single orifice, multiple orifice etc.). 5.2.2 Types of diesel fuel injection system, Individual pump, Unit injection system, Distributor system and common rail system. Layout and working principle. 5.2.3 Working principle of Mechanical Governor in Fuel Injection Pump. 5.2.3 Faults and troubleshooting.	06	--
06		Engine Performance and Testing: 7.1 Engine Performance parameters- Engine torque, Brake power Indicated power, Frictional power, Mean effective pressure [on IP & BP], Fuel Consumption, Specific fuel consumption. 7.2 Engine efficiency – indicated thermal efficiency, Brake thermal efficiency, Mechanical Efficiency, Efficiency ratio, Air standard efficiency, Volumetric Efficiency [on mass & volume], Air-Fuel ratio, relative A/F ratio. 7.3 Measurement of Indicated power with the help of Engine Indicator. Measurement of frictional power- Of single cylinder or multi cylinder engines with the help of Morse test and Motoring test. 7.4 Measurement of brake power- Dynamometer (Mechanical, Hydraulic, Electrical dynamometers). 7.5 Making a heat balance sheet. 7.6 Effect of temperature and altitude on engine power. 7.7 Performance-characteristics curves, Factor affecting the engine Performance, Engine specification. [Simple problems]	09	--
Total			48	70
Total Classes			17 weeks [51 lecture hrs]	
Practical :				
SL. No.	Skills to be developed			

01	Intellectual Skills: <ul style="list-style-type: none"> ▪ Understand working principle of S.I. / C.I. engine ▪ Select special tools used for engine disassembly / assembly. ▪ Identify components of the engine systems. ▪ Interpret results from engine power observations and calculations. 	
02	Motor Skills: <ul style="list-style-type: none"> ○ Sketch engine components and engine system components. ○ Measure performance parameters with the help of – engine test rig. ○ Adopt proper way to dismantle / assemble the engine. 	
Examination Scheme : Practical Maximum Marks : 50		
<ul style="list-style-type: none"> • Continuous Internal Assessment: - 25 marks. I) Attending classes, doing Jobs & submitting respective reports in time = 20 marks. II) Viva-Voce = 05 marks III) Total (I + II) = 25 Marks. <ul style="list-style-type: none"> • External Assessment: - 25 marks. Examiner : External Teacher.		
List of Practicals:	Total periods : 64 hrs.	
Skills to be developed : <ol style="list-style-type: none"> 01. Operate Cut Section Models of two stroke Engine to understand Engine Nomenclature, Identify and Observe Location of Various Components and explain it's operation. 02. Operate Cut Section Models of four stroke Petrol Engine to understand Engine Nomenclature, Identify and Observe Location of Various Components and explain it's operation. 03. Operate Cut Section Models of four stroke Diesel Engine to understand Engine Nomenclature, Identify and Observe Location of Various Components and explain it's operation. 04. Identifying Tools & Special Tools used for Dismantling and assembling the engine. 05. Dismantle & Assemble an Engine and practice the same. 06. Dismantle Cooling System; Identify Components and Their Functions, Draw Layout. 07. Removing the radiator from vehicle, checking it for leak, flushing the radiator and refitting. 08. Removing the thermostat valve & the pressure cap checking and refitting. 09. Dismantle Lubrication System, Identify Components. Draw Layout. 10. To study the fuel supply system of petrol & diesel engines and represent the same in sketch. 11. Removing the carburettor from the engine, identifying and checking the components, sketch of the circuit and refitting. 12. Repairing of fuel injectors of a diesel engine, identifying components and refitting. 13. Conduct Morse Test on Multi-cylinder Engine & Calculate Frictional Power, I.P & B.P. 14. Conduct engine performance testing in engine Test Rig and find other engine performance parameters, prepare heat balance sheet. 15. Draw and analyze the engine performance curves. 		
Notes: Engine practical / testing may be performed by the batch.		
Learning Resources :		
Text Books :		
Author	Title	Publisher
Dr. Kirpal Singh	Automobile Engg. Vol.-2	Standard Publishers
R.B. Gupta	Automobile Engineering	Satya Prakashan

Crouse & Angline	Automotive Mechanics	Tata McGraw Hill
Joseph Heitner	Automotive Mechanics	East West Press, New Delhi
John B. Heywood	Internal Combustion Engine Fundamentals	McGraw-Hill International Edition
Automotive Mechanics	N.K. Giri, Vol.-1	Khanna Publishers, New Delhi
K.K. Ramlingam	Automobile Engineering	Scitech Publications
Mathur & Sharma	A course in Internal Combustion Engine	Dhanpat Rai & Sons
P. S. Gill	Automobile Engineering -I	S. K. Kataria & Sons

Automotive Chassis –I

Name of the Course : Diploma in Automobile Engineering			
Course Code: AE	Semester :		Third
Duration: 17 Weeks	Maximum Marks :		150 Marks
Teaching Scheme :		Examination Scheme :	
Theory: 3 hrs / week	Internal Examination :		20 Marks
Tutorial: Nil	Attendance, Assignment & Interaction : 10 Marks		
Practical: 2 hrs / week	End Semester Exam :		70 Marks
Credit : 4			
Aims :			
<ul style="list-style-type: none"> • To impart knowledge concerned to vehicle other than engine.. • To impart knowledge concerned to control of vehicles. 			
Objectives:			
Students will be able to:			
1. Understand construction, working and functions of Automobile Chassis.			
2. Understand construction, working and functions of steering, braking and suspension.			
3. Compare the developments in body engineering, control systems and safety equipment.			
Pre-requisite :-			
Content [Theory] :			
Chapter	Name of the Topic	Hours	Marks
01	Vehicle layout and Chassis frame : 1.1 Vehicle layout <ul style="list-style-type: none"> • Definition of an automobile, layout of a vehicle. Layout of the front engine rear wheel driven vehicle, and explain location and function of major vehicle components and systems in brief. (With Sketch) • Classification & comparison of vehicle layout with respect to i) Location of engine, ii) No of live axles, iii) Arrangement of Engine, Passenger and Luggage section, iv) Application. & comparison. [Sketch of layout] 	07	--
	1.2 Chassis Frames: <ul style="list-style-type: none"> • Introduction – Necessity of frame and its functions. Loads acting on frame. Types of frames- conventional (ladder and x-member type), semi integral and integral types. Frame sections-channel, box and tubular sections, Back bone type Chassis frame, Materials of frames. Sub frame, Defects in frames. 	07	--

02	Body Engineering: <ul style="list-style-type: none"> Types of bodies and materials used in body construction. Protective and anticorrosive treatments, painting and repainting procedure. Effect of stream lining [aerodynamic shape] on vehicles' performance. Comparison between Integral body and Framed Construction. 	07	--
03	Front Axle : <ul style="list-style-type: none"> Types of front axle - Dead axle, live axle. Type of stub axle arrangements- Elliot, reverse Elliot, Lamoine, reverse Lamoine. Front wheel assembly. 	06	--
04	Steering system. : <ul style="list-style-type: none"> Steering linkages& Steering column. Steering geometry and its effects – Caster, camber, king pin inclination, toe in– toe out, Correct Steering angle, suspension height & it's effects on stability, steering effort & vehicle control etc. Understeering and oversteering, Turning radius & it's effects. Tilt & Telescoping steering wheels, Collapsible steering column, construction & working Principle. Construction, working and application of Steering gear box – Rack and Pinion type, Recirculating ball type, Worm and Roller type. Ackerman Principle and linkage. Defects & Troubleshooting. 	11	--
05	Power Steering : <ul style="list-style-type: none"> Principles of Power Steering. Comparison between Conventional Steering System and Power Steering System. Power Steering System Types (Hydraulic and electrical) Construction and working principle of different power steering system, Power Steering Pumps, Four Wheeled Steering. Power Steering System – Troubleshooting. 	10	--
Total		48 hrs	70 Marks
Total Classes		17 weeks [51 lecture hrs]	
Practical :			
SL. No.	Skills to be developed		
01	Intellectual Skills: <ul style="list-style-type: none"> To develop knowledge on basic concepts of Automotive Chassis. To develop knowledge on Automobile systems concerning control of vehicles. To develop knowledge on understanding and improving the performance of 		

	Automobile chassis system.				
02	<p>Motor Skills: Students will be able to:</p> <ul style="list-style-type: none"> ✓ Understand construction, working and functions of Automobile body & chassis. ✓ Understand construction, working and functions of Automobile control systems such as steering. ✓ Understand the modern trend of technological developments of chassis frame, body engineering & steering systems. 				
Examination Scheme : Practical					
Maximum Marks : 50					
<ul style="list-style-type: none"> • Continuous Internal Assessment: - 25 marks. <p>I) Attending classes, doing Jobs & submitting respective reports in time = 20 marks. II) Viva-Voce = 05 marks III) Total (I + II) = 25 Marks.</p> <ul style="list-style-type: none"> • External Assessment: - 25 marks. <p>Examiner : External Teacher.</p>					
List of Practicals:			Total Periods : 32 hrs.		
Skills to be developed :					
<ol style="list-style-type: none"> 1. Safety precautions to be followed and knowledge of first aid in an automobile workshop. 2. Identification of general tools in an automobile workshop and purposes of them. 3. Study of different types of front and rear axles and their sketches. 4. Observe the steering linkages, draw its layout. Dismantle the steering gear box, identify its type, sketch its components and assemble it. 5. Checking of wheel alignment – Suspension height, Caster, Camber, KPI, Toe-in & Toe –out. 6. Study of Tilt & Telescoping steering wheels, Collapsible steering column. 7. Visit to Automobile Body Building and Body Manufacturing Industry, Prepare a report considering following points – Layouts, Body Construction, Body Materials, Body Repairs and Painting Procedure. 					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1	08	Any twenty	01	20 x 1 = 20
B	2 & 3	05			
C	4 & 5	12			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1	3	Any five	10	10 x 5 = 50
B	2 & 3	2			

C	4 & 5	5			
Learning Resources :					
Text Books :					
Author	Title			Publisher	
Dr. Kirpal Singh	Automobile Engg. Vol.-1			Standard Publishers	
R.B. Gupta	Automobile Engineering			Satya Prakashan	
Crouse & Angline	Automotive Mechanics			Tata McGraw Hill	
Joseph Heitner	Automotive Mechanics			East West Press, New Delhi	
John B. Heywood	Internal Combustion Engine Fundamentals			McGraw-Hill International Edition	
Automotive Mechanics	N.K. Giri vol-2			Khanna Publishers, New Delhi	
K.K. Ramlingam	Automobile Engineering			Scitech Publications	
Mathur & Sharma	A course in Internal Combustion Engine			Dhanpat Rai & Sons	

Materials Science and Manufacturing Process

Name of the Course: Diploma in Automobile Engineering					
Course Code: A.E		Semester :			Third
Duration: 17 Weeks		Maximum Marks :			150 Marks
Teaching Scheme :		Examination Scheme :			
Theory: 3 hrs / week		Internal Examination :			20 Marks
Tutorial: Nil		Attendance, Assignment & Interaction :			10 Marks
Practical: 3 hrs / week		End Semester Exam :			70 Marks
Credit : 4					
Aim:					
<ul style="list-style-type: none"> • To study properties of various metals [ferrous & non ferrous] and non metals used for automobile manufacturing. • To study on how the desired properties can be obtained by heat treating metal. • The knowledge of this subject is essential as prerequisite knowledge for other higher level subjects like Automobile component design and Automobile manufacturing process. 					
Objectives:					
Students will be able to :					
<ul style="list-style-type: none"> ➤ Know various engineering materials, their properties and selection of these materials for different engineering applications. ➤ Understand the different heat treatment processes, their applications and iron-carbon phase equilibrium diagram. ➤ Understand the foundry operations and able to prepare the patterns, moulds and castings. ➤ Select and use different cutting tools in machining operation. ➤ Understand the working and operational functions of basic machine tools like lathe, drilling and milling machines. 					
Pre-Requisite:					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1 & 2	10	20	20 x 1 = 20	20
B	3	5			
C	4 & 5	10			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	1 & 2	4	Any five	10 x 05 = 50	50
B	3	2			
C	4 & 5	4			

chapter	Name of the Topic [Theory]	Hours	Marks
01	<p>Engineering Materials:</p> <p>1.1 Introduction:</p> <ul style="list-style-type: none"> • Classification of engineering materials. • Ferrous metal and their alloys: • Cast iron: types, composition and applications • Plain carbon steel: types, composition and applications • Effects of alloying elements like- Nickel, chromium, silicon, molybdenum and tungsten on the properties of steel • Alloy steels like stainless steel, Tool steels, their composition and Applications. <p>1.2 Non-ferrous metals and their alloys:</p> <ul style="list-style-type: none"> • Aluminium and its alloys: duralumin, their composition, properties and applications • Copper and its alloys: brass, bronze, gun metal, Babbitt metal their composition, properties and applications <p>1.3 Other materials:</p> <ul style="list-style-type: none"> • Polymeric materials- properties and applications- Thermoplastics-Nylons and Polypropylene. Thermosetting Plastics-Epoxy resins and Polyesters Rubber – Natural and synthetic. • Ceramic materials: Properties and application in automotive industry. • Composite materials : Properties & Applications. 	10	--
02	<p>Heat treatment :</p> <p>2.1 Introduction:</p> <ul style="list-style-type: none"> • Concept of phase and phase transformations • Iron-Iron carbide phase (Fe-Fe₃C) equilibrium diagram. <p>2.2 Common heat treatment processes and their applications.</p> <ul style="list-style-type: none"> • Annealing, Normalizing, Hardening, Tempering. • Surface hardening processes: Case carburizing, Nitriding, Cyaniding, Induction and Flame hardening. 	06	--
03	<p>Foundry:</p> <p>3.1 Introduction</p> <ul style="list-style-type: none"> • Types of Foundries • Advantages and disadvantages of foundry process. <p>3.2 Pattern Making:</p> <ul style="list-style-type: none"> • Pattern materials and their selection. • Types of pattern and their selection • Pattern Allowances. • Pattern colour coding. <p>3.3 Moulding:</p> <ul style="list-style-type: none"> • Moulding tools and flasks. • Moulding sand: Composition, Types and properties. • Classification of moulding processes. • Use of Core, core print and core boxes. <p>3.4 Casting:</p> <ul style="list-style-type: none"> • Types and processes and applications of Pressure Die casting, 	13	--

	Shell moulding and centrifugal casting. <ul style="list-style-type: none"> • Cleaning of casting – tumbling, trimming, sand and shot blasting • Defects in casting: causes and remedies. 		
04	Fundamentals of machining: 4.1 Chip formation <ul style="list-style-type: none"> • Mechanism of chip formation. • Types of chips • Types of cutting tools: single and multi point • Orthogonal and Oblique cutting 4.2 Cutting tools and fluids <ul style="list-style-type: none"> • Types of cutting tools: single and multi-point • Cutting tool materials: Selection, Properties and types • Single point cutting Tool nomenclature and tool signature. • Cutting fluids: Properties, types 	06	--
05	Basic Machine tools: 5.1 Lathe: <ul style="list-style-type: none"> • Classification of lathes. • Major parts of Centre lathe machine with block diagram. • Lathe specifications. • Accessories used on lathe. • Operations performed on lathe – Turning, Taper turning by swiveling Compound rest, Facing, Knurling and Threading. • Cutting parameters: speed, feed & depth of cut. 5.2 Drilling: <ul style="list-style-type: none"> • Classification of drilling machines. • Major parts of bench drilling machine with block diagram. • Operations performed on drilling machines – drilling, reaming. 5.3 Milling: <ul style="list-style-type: none"> • Classification of milling machines. • Major parts of column and knee type universal milling machine. • Standard milling cutters. • Milling operations like face milling, Gang milling, Key-way milling and End milling. 	13	--
Total		48 hrs. [Lecture]	70 Marks
Total Classes		17 weeks [51 lecture hrs]	
Practical:			
SL. No.	Skills to be developed		
01	Intellectual Skills: <ul style="list-style-type: none"> • Understand the safety aspects to be followed on the shop floor. • Develop concept of pattern making, understand the different types of patterns and compare them. • Know the different types of sands used in sand moulding. • Understanding the defects & remedies of casting. 		

02	Motor Skills:	
	<ul style="list-style-type: none"> ➤ Prepare solid pattern. ➤ Use pattern for preparing moulds. ➤ Operate and control of Lathe and drilling machine. ➤ Use safety precautions and equipment on the shop floor. 	
Examination Scheme : Practical		
Maximum Marks : 50		
<ul style="list-style-type: none"> • Continuous Internal Assessment: 25 marks. <p>I) Attending classes, doing Jobs & submitting respective reports in time = 20 marks. II) Viva-Voce = 05 marks III) Total (I + II) = 25 Marks.</p> <ul style="list-style-type: none"> • External Assessment: Marks - 25 marks. <p>Examiner : External Teacher.</p>		
List of Practical's:		Total Periods = 48 hrs.
<ol style="list-style-type: none"> 1. Prepare one wooden solid pattern per student as per given drawing. 2. Develop one pattern for a given job considering all aspects of pattern making for group of 4 to 6 student. Job shall involve spit pattern with core, core print. 3. Prepare a sand mould for any one of the above patterns. Estimate the cost for the casting using the above pattern and mould. 4. Visit to a foundry and observe the moulding and casting processes and prepare a report. 5. One job for each student involving following operations: Facing, taper turning, step turning, threading, knurling operations on lathe machine and Drilling, reaming operation using drilling machine. 		
Notes:		
<ol style="list-style-type: none"> 1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by Instructor / workshop superintendent). 2] Theory behind practical is to be covered by the concerned subject teacher / workshop superintendent. 3] Workshop diary should be maintained by each student duly signed by respective shop instructors. 		
Learning Resources:		
Text Books ;		
Author	Title	Publisher
S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Elements of Workshop Technology. Vol. - I and II	Media Promoters and Publishers Pvt. Ltd.
B. S. Raghuwanshi	Workshop Technology, Vol- I, II & III	Dhanpat Rai & Co.
W. A. J. Chapman	Workshop Technology, Part- I, II & III	Viva Books Private Ltd.
Gerling	All about Machine Tools	Wiley Eastern Limited
R. K. Rajput	Material Science and Engineering	S. K. Kaaria & Sons
Degarmo, Black & Kohser	Materials and Processes in Manufacturing	Macmillan Publishing Co.
P. N. Rao	Manufacturing Technology, Vol. -I, II & III	The Mc Graw Hill Cos.
Kakani & Kakani	Material Science	New Age International Publishers

Automobile Engineering Drawing

Name of the Course : Diploma in Automobile Engineering			
Course code: AE		Semester : Third	
Duration : 17 weeks		Maximum Marks : 100 [Practical]	
Teaching Scheme :		Examination Scheme : Practical	
Theory : 01 hr./week	Continuous Internal Assessment: 50 marks.		
Tutorial: -- Nil hrs/week	External Assessment: 50 marks.		
Practical : 03 hrs/week	End Semester Exam. [theory]: Marks: Nil		
Credit: 3			
Aim:			
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.			
Objective :-			
The Student should be able to –			
<ul style="list-style-type: none"> • Interpret industrial drawings. • Interpret various symbols shown on the drawing and selection of manufacturing processes accordingly. • Use IS convention of representing various machine components. • Visualize and draw Details from Assembly drawing and vise-versa. • Know the significance & use of tolerances of size, forms & positions. 			
Pre-Requisite:-			
➤ Sound pictorial ability.			
Chapter	Name of the Topic (Theory)	Hours	Marks
01	Auxiliary views: - 1.1 Study of auxiliary planes, Projection of objects on auxiliary planes. Completing the regular views with the help of given auxiliary views. (Use first angle method of projection)	02	--
02	Conventional Representation:- 2.1. Standard convention using SP – 46 (1988) 2.2 Materials- C.I., M.S, Brass, Bronze, Aluminium, Glass and Rubber. 2.3 Long and short break in pipe, rod and shaft. 2.4 Ball and Roller bearing, cocks, valves, internal / external threads. 2.5 Various sections- Half, removed, revolved, offset, partial and aligned sections. 2.6 Knurling, serrated shafts, splined shafts, and keys and key Ways. 2.7 Springs with square and flat ends, Gears, sprocket wheel, chain wheels. 2.8 Countersunk & counter bored holes. 2.9 Tapers	04	--
03	Production Drawings : 3.1 Limits, fits and tolerances: Definitions, Introduction to ISO system of tolerancing- Unilateral & bilateral and its representation on drawing, dimensional tolerances, elements of interchangeable system, hole & shaft base systems, tolerance diagram, Selection of fit	06	--

	(clearance, transition and interference) for engineering applications. 3.2 Geometrical tolerances : Definitions, Tolerances of form and position and its Geometric representation-tolerance frame, datum feature, magnitude of tolerance and symbol, interpretation of a given symbol on drawing, simple examples. 3.3 General welding symbols: Symbolic representation in Engineering practices and its interpretation.		
04	Details to Assembly drawing : 4.1 Introduction- Basic principles of process of assembly. 4.2 Couplings & Joint - Universal couplings & Slip Joint. 4.3 Bearing – Foot Step Bearing & Pedestal Bearing. 4.4 Screw Jack, Simple Eccentric. 4.5 Valves- Non - Return Valve 4.6 IC engine components assembly [e.g. piston, connecting rod, fuel injector etc] 4.7 Machine Vice & Pipe Vice.	02	--
05	Assembly to Details : 5.1 Introduction - basic principles of dismantling process. 5.2 Pedestal Bearing. 5.3 Drilling Jig. 5.4 Piston & connecting rod assembly, clutch, shoe brake etc. 5.5 Cross head and Stuffing box Assembly. 5.6 Hydraulic, pneumatic Valves (Not containing more than eight parts)	02	--
Total		16 hrs	Nil
Skills to be developed for Practical :			
Intellectual skill :			
<ul style="list-style-type: none"> ➤ To interpret the projection of objects on auxiliary planes. ➤ Interpret Conventional symbols as per IS code SP46. ➤ Interpret limits, fits and tolerances on a given drawing. Understand Production drawing of m/c components. ➤ Identify various components in a given assembly and find the sequence of dismantling it. ➤ Visualize details of components and determine the sequence of components assembly. 			
Motor skill :			
<ul style="list-style-type: none"> ✓ To draw the projection of objects in auxiliary planes. ✓ Assign and draw surface roughness values and symbols on a part drawing. ✓ Conventionally represent limit, fits and tolerances on a given drawing as per the functional requirements of components. To draw the production drawing of m/c components. ✓ Prepare bill of materials in assembly drawing. ✓ To dismantle machine and prepare production drawing of various components of assembly. 			

List of Practicals :		Total Practical periods = 48 hrs.
1] Auxiliary views :		- 06 hrs.
➤ One sheet containing minimum two problems.		- One sheet
2] Conventional Representation:-		- 06 hrs.
➤ Conventional Representation of machine components as per SP – 46 (1988) .		- One sheet
3] Production Drawings :		- 06 hrs.
➤ at least one component, showing---- Limit, Fit, Tolerances, geometric tolerances, Machining & welding symbols.		- one sheet
4] Details to Assembly drawing :		-12 hrs.
➤ Draw the given assembly and prepare component drawings, including conventional representation, tolerances and surface finish symbols. Prepare part list contained, name of components, quantity, material specifications and remarks. [at least one problem in each sheet]		- Two sheets.
5] Assembly to Details :		- 12 hrs.
➤ From a given drawings of components prepare an assembly with two views. Prepare a table containing name of component, quantity, material specifications and remarks, show overall dimensions of the assembly. [at least two problem]		- One sheet
6] Dismantle any machine / engine assembly & sketches:		- 06 hrs.
➤ The having assembly 6 to 10 part. Prepare the sketches in sketchbook with dimension and then draw assembly.		- One sheet
Examination Scheme : Practical		Total Marks : 100
<ul style="list-style-type: none"> Continuous Internal Sessional Assessment: - - 50 marks. I) Attending classes, doing all assigned drawings as above & submitting in time = 40 marks. II) Viva-Voce = 10 marks III) Total (I + II) = 50 Marks.		
<ul style="list-style-type: none"> External Sessional Assessment: - 50 marks. Examiner : External Teacher		
Learning Resources:		
Books:		
Name of Authors	Titles of the Book	Name of the publisher
N.D.Bhatt	Engineering Drawing	Charotkar Publishing House
R.K.Dhawan	Engineering Drawing	S.Chand & Co.
K.Venugopal	Engineering Drawing and Graphics +AutoCAD	New Age publication
Basant Agrawal & C M Agrawal	Engineering Drawing	Tata McGraw Hill Education Private Ltd.
N D Bhatt	Machine Drawing	Charotkar Publishing House
R K Dhawan	Machine Drawing	S.Chand & Co.
IS Code SP 46 (1988)	Code of practice for general engineering drawing.	Engineering Drawing Practice for School and colleges, 2005
Pal & Bhattacharya	Engineering Drawing	Viva Books
Reference Books :		
P S Gill	Engineering Drawing	SK Kataria and sons

Electrical & Electronics laboratory

Name of the Course: Diploma in Automobile Engineering	
Course Code: AE	Semester: Third
Duration: 17weeks	Maximum Marks: 50 [Practical]
Teaching Scheme :	Examination Scheme : [Practical]
Theory: hrs./week	Continuous Internal Examination : 25 Marks
Tutorial: hrs./week	End Semester External Exam.: 25 Marks
Practical: 2 hrs./week	End Semester Exam. [Theory]: Nil
Credit: 1	
Skills to be developed [Practical] :	
Intellectual Skills:	
<ul style="list-style-type: none"> • Identify various electrical parts. • Select Instruments. 	
Motor Skills:	
<ul style="list-style-type: none"> ➤ Connect the instruments properly. ➤ Take accurate readings. 	
Details of Practical :	Total Periods : 32 Hrs.
Practical : Group A [Electrical]	Total Marks : 25
List of Laboratory Experiments:	
Sl. No.	Name of the Experiments
1.	To identify the Passive Components.
2	To measure medium resistance by voltmeter ammeter method.
3	To measure insulation resistance of an electrical lighting installation by Meggar.
4	To measure voltage across R, L, C in a series RLC circuit.
5	To measure power and power factor in a single-phase R-L circuit using wattmeter and power factor meter.
Mini project: (any one)	
1	Prepare a simple electric wiring circuit comprising of 2 lamps, 2 sockets, 1 fan with a fuse & check it.
2	Study and sketching of constructional details and working principle of automobile battery
Practical : Group B [Electronics]	Total Marks 25
List of Laboratory Experiments:	
Sl. No.	Name of the Experiments
1	To be familiar with the common assembly tools.
2	To be able to identify and test the following passive and active circuit elements: Resistor, capacitor, inductor, transformer, relay, switches, batteries/cells, diode, transistors, SCR, DIAC, TRIAC, LED, LCD, photodiode, phototransistors, Ics etc.
3	To be familiar with the following basic instruments: Multimeter, oscilloscope, power supply and function generator.
4	Input & output characteristics of transistor in CE mode
5	Verify truth tables for logic gates- . NOT, AND, OR, NAND, NOR.
6	Study and observe the characteristics of LVDT and strain gauge
Mini Project (any one):	
1	To practice soldering , disordering and construct & test a battery eliminator
2	To practice soldering, disordering and construct and test a simple amplifier circuit on a Vero Board.

EXAMINATION SCHEME (SESSIONAL) :

- 1. Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Third Semester.

Distribution of marks:

I) Attending classes, doing Jobs & submitting respective reports in time = 20 marks.

II) Viva-Voce = 05 marks

III) Total (I + II) = 25 Marks.

- 2. External Assessment of 25 marks** shall be held at the end of the Third Semester on the entire syllabus. Preferably one Experiment per student from one of the above experiment is to be performed. Experiment may be set by lottery system.

Professional Practice –I [AE]

Name of the Course : Diploma in Automobile Engineering	
Course code: A.E.	Semester : Third
Duration : 17 weeks	Maximum Marks : 50
Teaching Scheme :	Examination Scheme : Practical
Theory : Nil	Internal Practical Assessment: 50 Marks
Tutorial: -- Nil	External Assessment: Nil
Practical : Nil	End Semester Exam. [theory]: N.A
Credit: 02	
Aim:	
To develop general confidence, ability to communicate and develop positive attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion..	
Objectives :	
Student will be able to: <ul style="list-style-type: none"> ➤ Acquire information from different sources. ➤ Prepare notes for given topic. ➤ Present given topic in a seminar. ➤ Interact with peers to share thoughts. ➤ Prepare a report on industrial visit, expert lecture. 	
Activities	Hrs.
Individual Assignments : Any two assignments from the list suggested based on the subjects in the 3 rd semester (Or any other suitable assignments may be chosen) <ol style="list-style-type: none"> A. Write material specifications for any two composite jobs. B. Select 5 different plain carbon steels / carbon steels & alloy steels used for manufacturing Machine components / Automobile components & specify heat treatment processes if necessary to improve material properties. C. List the various properties & applications of following materials. <ol style="list-style-type: none"> a) Fiber reinforcement plastics b) Thermo setting plastics c) Rubber d) Ceramics. D. Process sequence of any two machine components. E. Preparing models using development of surfaces. F. Any two problems on bending moment diagram, shear force diagram, deflection of beams & torsion -----topics of strength of materials. G. Any two problems on finding principal stresses by using Mohr's circle, finding magnitude & position of maximum shear stresses. H. Prepare a questionnaire for conducting interview of a successful entrepreneur & conduct the interview. 	04
Industrial Visits : <ul style="list-style-type: none"> ▪ Structured industrial visits are arranged and report of the same be submitted by the individual student to form a part of the term work. ▪ No of visits – at least one. ▪ Scale of industry – Small scale unit, medium scale unit ▪ Report 2 to 5 pages or as may be instructed by subject teacher/teachers. Following types of industries may be visited or any industrial units existing in the area or nearby areas. <ol style="list-style-type: none"> 1. Manufacturing organizations for observing various manufacturing processes 	

<p>including heat treatment.</p> <ol style="list-style-type: none"> 2. Any process industry/cotton/grain processing industry/dairy /Rice Mill etc. 3. Service stations - Auto repairs work shop / garage, farm implements. 4. ST workshop / city transport workshops. 5. Plastic material processing unit. 6. Material testing laboratories in industries or reputed organizations. 	06
<p>2 – D Design using software [AUTOCAD]:</p> <p>1: Introduction to Computer Aided Drafting:</p> <ol style="list-style-type: none"> 1.1 Introduction to Computer Aided Drafting (CAD)- Applications, Various Software’s for Computer Aided Drafting. 1.2 Co-ordinate system- Cartesian & Polar-Absolute, Relative mode. 1.3 CAD initial settings commands - Snap, grid, ortho, osnap, limits, units, filters, itscale, Mbuttonpan. 1.4 Object Selection methods – picking, window, crossing, fence, last, previous etc. <p>2: Draw and Enquiry commands:</p> <ol style="list-style-type: none"> 2.1 Draw Command - Line, arc, circle, rectangle, polygon, ellipse, spline, block, hatch. 2.2 Enquiry commands – distance, area. <p>3: Edit and Modify commands:</p> <ol style="list-style-type: none"> 3.1 Modify Command - Erase, oops, break, trim, copy, move, mirror, offset, fillet, chamfer, Array, extend, rotate, scale, lengthen stretch, measure, divide, explode, and align. 3.2 Grips editing- Move, Copy, Stretch. <p>4: Zoom and formatting Commands:</p> <ol style="list-style-type: none"> 4.1 Zoom Commands – all, previous, out, in, extent, realtime, dynamic, window, pan. 4.2 Formatting commands - Layers, block, linetype, lineweight, color. <p>5: Dimensioning, Text and Plot Commands:</p> <ol style="list-style-type: none"> 5.1 Dimensioning commands - Dimension styles, Dimensional Tolerances and Geometrical Tolerances. 5.2 Text commands - dtext, mtext command. 5.3 Plotting a drawing - paper space, model space, creating table, plot commands. <p>The Student should draw – different machine/engine components (including sections) after learning the contents as above, plotting of drawings will be on A2 size sheet. (Minimum two sheets and each containing at least two problems)</p>	24
Total periods	34hrs
Practical	Total Marks = 50
<p>Examination Scheme:</p> <ul style="list-style-type: none"> • Continuous internal Sessional assessment = 25 Marks. <ol style="list-style-type: none"> I. Submission of reports on individual assignment in time = 05 Marks. II. Submission of reports on seminar & it’s presentation in time = 05 Marks. III. Practice of CAD software (2-D) & submission drawings in time = 10 Marks. IV. Reports on Industrial visit in time = 05 Marks. V. Total = 25 Marks. 	

- **End semester External Sessional assessment = 25 Marks.**

- **Examiner** – External [Lecturer].

I. Submission of signed reports = 05 Marks.

II. On spot assessment of CAD drawing = 15 Marks.

III. Viva-voce = 05 Marks.

Total = 25 Marks.

Learning Resources:**Books:**

Author	Title	Publisher
Robert M. Thomas	Advanced AutoCAD	Sybex BPD
<u>R Cheryl</u>	Beginning AutoCAD 2011- Exercise Book (W/2 DVDs)	BPB Publication
Donnie Gladfelter	AutoCAD 2014 and AutoCAD LT 2014	Wiley India Pvt. Ltd.