

Industrial Management – Common with other Branch

Workshop Organization & Vehicle Maintenance Management

Name of the Course : Diploma in Automobile Engineering					
Course Code: AE		Semester : Sixth			
Duration: 17 Weeks		Maximum Marks : 200 Marks			
Teaching Scheme :		Examination Scheme : Theoretical			
Theory: 3 hrs / week		Internal Examination : 20 Marks			
Tutorial: 01 hr./week		T.A [Attendance, Assignment & Interaction] : 10 Marks			
Practical: 6 hrs / week		End Semester Exam : 70 Marks			
Credit : 4					
Aim:					
<ul style="list-style-type: none"> • To impart knowledge of importance of maintenance at regular intervals. • To impart adequate knowledge of maintenance and maintenance methods. • To impart knowledge on how proper maintenance of the components results in good fuel economy, least environmental pollution and reliability. 					
Objectives:					
Students will be able to :					
<ul style="list-style-type: none"> ➤ Understand use of tools and equipments. ➤ Draw layout of Automobile workshop. ➤ Compare and understand types of maintenance systems. ➤ Execute dismantling of assemblies ➤ Check the parts for proper functioning. ➤ Execute various adjustments to be done for proper functioning. ➤ Execute tuning of assemblies. 					
Pre-requisite :-					
Concept of working of automobile engines, advance automobile engines, automobile transmission systems and automobile Systems					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	06	20	01	20 x 1 = 20
B	03	06			
C	04	08			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01& 02	03	Any five	10	10 x 5 = 50
B	03	03			
C	04	04			
Content [Theory] :					

Chapter	Name of the Topic	Hours	Marks
01	<p>Auto Workshop Layout & Equipments:</p> <p>1.1 General safety precautions and procedures.</p> <p>1.2 Machine tools and tools used in automobile repairing :- Shop-cutters, Pullers, Stud-extractor, Torque wrench, Piston ring expander, Piston ring groove cleaner, Wheel Balancer, Wheel Aligner, Arbor Press, Drill Press, Tyre Changer, Car Washer, Battery Charger, Valve Grinder, Honing Machine, Cylinder Boring Machine.</p> <p>1.3 Measuring and Testing Equipments: – Feeler gauge, Cylinder bore gauge, Compression gauge, Ignition timing tester, Spark plug tester, Cam angle tester, tyre inflator gauge, Micrometer, Callipers and their maintenance.</p> <p>1.4 Vehicle Service Equipments :- Air Compressor, Fuel Pump, Water Pump, Oil Sprayer, Lubricators, Voltage current and resistor tester, Coil condenser tester, Tachometer, Exhaust gas analyzer.</p> <p>1.5 Lifts and Hoists.</p> <p>1.6 Factors influence the site selection of a Service Station. Organizational setup of Service Station.</p> <p>1.7 Layout with equipments required for road side garages - Two-Wheeler, Four Wheelers- Cars and Commercial vehicles.</p> <p>1.8 Layout of modern Auto workshop for :- Specialised job work, Crankshaft Grinding, Engine (re-boring), F.I.P repairs, Crankshaft journal boring, Brake drum boring etc..</p>	12	--
02	<p>Maintenance management and record Keeping:</p> <p>2.1 Necessity of maintenance</p> <p>2.2 Types of maintenance, their applications and comparison.</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 & 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>	10	
03	<p>Part I</p> <p>3.1 Engine Maintenance :-</p> <p>3.1.1 Troubles, Causes & remedies in : Engine fuel system, Cooling system, Lubrication system & MPFI Engine.</p> <p>3.1.2 Checking and Servicing of following engine components: - Cylinder head, Cylinder block, Cylinder liners, Piston, Piston Ring, Crank-shaft, Connecting rod, Valves etc.</p> <p>3.1.3 Tuning of Engine.</p>	08	--
	<p>Part II</p> <p>3.2 Engine System Maintenance:-</p> <p>3.2.1 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>3.2.2 Lubrication system service. – Change oil filter, Check oil pump and diagnose causes for</p>	10	

		excessive oil consumption, external oil leakage and low oil pressure in an automobile engine. 3.2.3 Maintenance of cooling systems and its components - water pump, radiator, thermostat - anticorrosion and antifreeze additives.		
04	Part I 4.1	Chassis Maintenance: 4.1.1 Checking and repairing of Clutch, Adjustment of clutch and warpage of pressure plate. 4.1.2 Gearbox servicing & maintenance, checking oil seals. 4.1.3 Maintenance and servicing of Propeller shaft, Rear axle and Differential system. 4.1.7 Adjustment of hydraulic brakes – shoe clearance, brake Pedal free travel, Bleeding of hydraulic brakes and parking brake adjustment. 4.1.8 Inspection and repair of master cylinder, wheel cylinder, brake drum, brake disc, brake linings and brake pads. 4.1.9 Maintenance and servicing of suspension systems, Lubrication of leaf springs.	12	
	Part II 4.2	Chassis frame, Wheels, Tyre and Body Maintenance:- 4.2.1 Procedure of wheel alignment (after chassis height adjustment) by wheel alignment gauges and procedure of wheel balancing Troubles, Causes and remedies of steering system. 4.2.2 Care of wheels and tires, retreading of tires and vulcanizing. Tire rotation. 4.2.3 Frame repairs (cracks, loose rivets, skewness in frames) and Alignments. 4.2.4 Body repairs- denting, denting tools and equipments 4.2.5 Repainting procedure, patch work. 4.2.6 Painting defects. 4.2.7 Adjustment of doors and locks.	12	--
Total			64 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"> ▪ Select tool and equipment for vehicle maintenance. ▪ Diagnose faults and suggest remedies. ▪ Understand tuning, backlash and detonation. 			
02	Motor Skills: <ul style="list-style-type: none"> ○ Put vehicle on the ramp ○ Use diagnostic tester ○ Use diagnostic tester for Electronics fuel injection system diagnosis. ○ Use service manuals for maintenance of vehicle. 			
Examination Scheme : Practical			Maximum Marks : 100	

- **Continuous Internal Assessment:** - 50 marks.

I) Attending classes, doing practicals & submitting respective practical report in time = 40 marks.

II) End semester Viva-Voce = 10 marks

III) Total (I + II) = 50 Marks.

- **External Assessment:** - 50 marks.

Examiner : External Teacher [Lecturer]

List of Practicals:

Total periods: 96 hrs.

Skills to be developed :

1. Remove multi-cylinder engine from a vehicle, dismantle, clean, inspect and repair following components :-
 - a) Cylinder head for warpage and cracks, Refacing by grinding or cutting, Straightening cylinder heads.
 - b) Cylinder block for measurement of ovality and taperedness, Cylinder boring, Honing process, Changing of liners.
 - c) Piston and piston rings for wear, appearance, Piston head for signs of deposits and detonation, oversize piston, ring groove clearance, removing and refitting rings.
 - d) Valve refacing in valve refacer machine, Valve Seat cutting, setting and grinding to match with valves. Lapping of Valves.
2. Inspection of Crank Shaft, Assessment of workability and determination of undersize condition of journals. Setting procedure of Crank Shaft of Multi cylinder Engines in Crank Shaft regrinding machine for grinding both crank pin and main Journals, Check for eccentricity of cranks.
3.
 - a) Tuning of carburetor [identifying and checking the components and refitting].
 - b) Repairing of fuel injectors of a petrol engine, identifying components and refitting.
 - c) Tuning and maintenance of diesel fuel injection system.
 - I. Testing of fuel Injectors in fuel Injector Tester.
 - II. Phasing and calibration of F.I.P
4. 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.
5. Overhauling of (dry single / multiple plates) clutch - dismantling, inspection of clutch parts – pressure plate, clutch plate, repairing, cleaning, replacement of components and reassembling of the clutch. Adjust the clutch paddle.
6. Overhauling of (two / four wheeler) Gear box- dismantling, inspection of gearbox parts- gear shaft bearing, synchromesh unit, shifting ring forks etc. repairing, cleaning, replacement of components and reassembling gear box. Adjustment of shifting mechanism.
7. Dismantle the propeller shaft, Check wear in universal joints, straightness in propeller shaft, remove bushes & bearings, cleaning and reassemble it.
8. Dismantle the differential assembly, Check the differential gears for wear, run out, backlash, adjust final drive, cleaning and reassembling.
9. Removing the radiator from vehicle, checking it for leak, repairing, flushing, cleaning the radiator and refitting. Removing the thermostat valve, checking and refitting.
10. Adjustment of mechanical, hydraulic and Pneumatic brakes:-Renewal of brake liners, repairing of master cylinder, wheel cylinder, brake chamber, Brake Valve, brake bleeding and skinning scored brake drum.
11. To remove and refit the steering gearbox and drag link. Adjust joints and track rod ends. Do the Adjustment of steering gear to take up backlash.
12. Servicing of suspension system. Leaf springs, coil springs, torsion bar & Telescopic Shock absorber.
13. Wheel Balancing :- Static and Dynamic.

14. Evacuation, charging and trouble shooting of car Air conditioner.

Notes:

✓ Practicals / testing may be performed by the small group of batches.

Learning Resources :

Text Books :

Author	Title	Publisher
Dr. Kirpal Singh	Automobile Engg. Vol.-1 & 2	Standard Publishers
R.B. Gupta	Automobile Engineering	Satya Prakashan
Crouse & Angline	Automotive Mechanics	Tata McGraw Hill
Tim Gills	Automotive Service	Delmar Publisher Inc.
Joseph Heitner	Automotive Mechanics	East West Press, New Delhi
Anthony Schwaller	Motor Automotive Technology	Delmar Publisher Inc.
Identified Experts	Santro & Accent Basic training Book	Hyundai Motors India Ltd.
S.Srinivasan	Automotive Mechanics	Tata McGraw Hill.

M.V Act & Transport Management

Name of the Course : Diploma in Automobile Engineering					
Course Code: AE		Semester : Sixth			
Duration: 17 Weeks		Maximum Marks : 100 Marks			
Teaching Scheme :		Examination Scheme : Theoretical			
Theory: 03 hrs / week		Internal Examination : 20 Marks			
Tutorial: Nil		T.A. [Attendance, Assignment & Interaction] : 10 Marks			
Practical: Nil		End Semester Exam : 70 Marks			
Credit : 3					
Aim:					
<ul style="list-style-type: none"> • To impart knowledge of motor vehicle act in order to provide quality of service, convenience of scheduling and economics • To impart knowledge of working of different transport organizations, standard methods of record keeping, use of computers etc. • To impart knowledge on valuation of vehicles and driving skills 					
Objectives:					
Students will be able to :					
<ul style="list-style-type: none"> ➤ To Study & fill up the forms required as per Motor Vehicle Act. ➤ To prepare small project reports of bus / goods transport organization enabling him to work in different organizations like CSTC, private organization. ➤ To understand, prepare the different documents used in transport organization. ➤ Enter in the business of buying and selling of old & new vehicles ➤ Create awareness of ideal driving which includes safety, legal aspects. 					
Pre-requisite :-					
<ul style="list-style-type: none"> ✓ Fundamental concept of Automobile. ✓ Fundamental concept of system of Automobile. 					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01	06	20	01	20 x 1 = 20
B	02	08			
C	03 & 04	06			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01	03	Any five	10	10 x 5 = 50
B	02	04			
C	03 & 04	03			
Content [Theory] :					

Chapter	Name of the Topic	Hours	Marks
01	<p>Introduction to transport management:</p> <p>1.1 Motor Vehicle Act: Short titles used in MVA, Definitions, Terms regarding Vehicle.</p> <p>1.2 Licensing of Drivers of Motor Vehicle: Necessity, Age limit, Responsibility of owners, Restriction on holding a driving license, General, Preliminary test and Driving test. Grant, revocation and power of licensing authority.</p> <p>1.3 Conductor's license: Necessity, Eligibility, Documents required and rules for conductors. Grant and revocation.</p> <p>1.4 Registration of Vehicles: Necessity, Where to be made, How to be made, Temporary registration, Production of vehicle at the time of registration, Certificate of Fitness, Form and manner of display of Registration mark, Size of letters and numerals of registration mark, renewal & Transfer of Ownership of Motor Vehicle, cancellation / suspension of Ownership. Power of state govt. and central govt. to make rules.</p> <p>1.5 Control of Transport: Transport authorities, Difference between STA & RTA, Necessity of Permit, All types of Permit, Transfer of permit, Temporary permit, Tourist permit, National permit. Speed limits. Offences, penalties and procedures. Control of traffic.</p> <p>1.6 Construction of Motor Vehicle: Overall dimensions, General provision regarding construction and maintenance of motor vehicle. Power of central government to make rules.</p> <p>1.7 Road Safety: Road signs, Imposition of Penalties for violation of Act and articles, Duties of drivers, Duties of conductors, Duties of helper.</p> <p>1.8 Taxation: Objectives, Basis of taxation structure for two wheeler, three wheeler, goods and passenger vehicles. Methods of levying tax, Tax exemption.</p> <p>1.9 Insurance: Motor Vehicle Insurance, comprehensive, third party, No-fault liability, Procedure for accident claim. Furnishing of particulars of vehicles involve in accident. Duty of driver in case of accident and injury.</p>	14	--
02	<p>Transport Management:</p> <p>2.1 Terms used in transportation: Road transport service, Transport vehicle, Public Service vehicle, Goods vehicle, Public place, Depot, Route, Trip, Time table, Vehicle schedule, Fare [flat & telescopic].</p> <p>2.2 Comparison of Modes of transport-</p>	17	--

	<p>Road, water, air transport and rail transport.</p> <p>2.3 Requirements of goods and passenger transport on the basis of— Volume, type, weight of material; class of passenger.</p> <p>2.4 Basic elements in Transport Management:</p> <p>2.4.1 Market potential: Type of goods/ passengers, Period of use, Probable competition.</p> <p>2.4.2 Selection of vehicle: Type of load, Class of passenger, Type of service.</p> <p>2.4.2 Organization setup: Government, Semi Government, Private. Setup of passenger transport organization (CSTC, NBSTC, private organization etc.).</p> <p>2.4.4 Legal compliance: Documents required as per MVA, Registration.</p> <p>2.4.5 Policies of transport organization: Policies towards passenger, employees, like Long distance service, Express service, Night service and others, Role of road transport towards the growth of economic structure in India.</p> <p>2.4.6 Layout of organization: Location, elements considered in location, Passenger amenities, infrastructural facilities.</p> <p>2.4.7 Scheduling: Basic factors in bus, crew (staff) and maintenance scheduling, calculation of number of buses.</p> <p>2.4.8 Freight calculation: Time base, Distance base, Contract, per passenger, cubic feet tone method. Structure of fare, fixed cost- Maintenance cost, depreciation cost, insurance, interest on capital, variable cost, Hiring of trucks, Toll, staff wages, Miscellaneous cost.</p> <p>2.4.9 Record keeping : Log book, Trip operational sheet, Vehicle ledger, Truck history card, Monthly operational sheet, Goods consignment note, daily fuel consumption, various types of bookings, Use of Computer.</p>		
03	<p>Estimation and Valuation of Vehicle:</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>3.4 Importance of warranty system and protection of law: How to deal with defects, benefits of warranty system. Protection of law.</p> <p>3.5 Buying a new vehicle: Factors to be considered - Ex-showroom price and on road price, use of vehicle, when and where to buy, Closing the deal, Running in.</p>	10	--

	<p>inspecting the vehicle, Points to check: test drive, Controls, Bonnet, Suspension, Switches, Seat, Noise, Ventilation, Safety, Boot, Interior Storage.</p> <p>3.6 Buying a used vehicle: When & 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 & accessories, Lights, Chrome, Wiring , Steering, Hydraulic System, Structural corrosion, Floor, Test drive.</p> <p>3.7 Preparations for selling : When to sell, How to sell, Auctions, Garages, Private sale, Preparing the car, Documentation, Selling price, Safeguards.</p>		
04	<p>Automobile Industry, it's Functions & Role:</p> <p>4.1 Development of motor industry in India.(collection of data of various companies)</p> <p>4.2 Structure of automobile industry.</p> <p>4.3 Importance of Automobile Engineer.</p> <p>4.4 Working of various types of transport organization. CRRRI- Central Road Research Institute. PCRA- Petroleum Conservation Research Association. CIRT- Central Institute of Road Transport. ARAI- Automotive Research Associates Of India. VRDE- Vehicle Research Development Establishment.</p> <p>4.5 Working of Various State Transport Organizations. CSTC, SBSTC, WBSTC, NBSTC, CTC.</p>	07	--
Total		48hrs.	70Marks
Total Classes		17 weeks [51 lecture hrs]	
Learning Resources :			
Text Books :			
Author	Title	Publisher	
D.P. Malpani	The Motor Vehicles Act, 1989-	Book-N-Trade Publishers, Calcutta	
T.N. Sukla	Motor Vehicles Act		
O.P. Khanna.	Industrial Organization & Management	Dhanpat Rai & sons	
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	
	Motor Vehicle Act, 1988	Home Department (M .S.)	
	Central M. V. Rules 1989	Home Department (M .S.)	

Alternate Energy Source and Management (AE)(Elective -II)

Name of the Course : Diploma in Automobile Engineering			
Course Code: AE	Semester :		Sixth
Duration: 17 Weeks	Maximum Marks :		125 Marks
Teaching Scheme :		Examination Scheme : Theoretical	
Theory: 3 hrs / week	Internal Examination :		20 Marks
Tutorial: 1 hr / week	T.A.[Attendance & Interaction]:		10 Marks
Practical: Nil	End Semester Exam :		70 Marks
Credit : 3			
Aims :			
To understand basics of energy conversion, conservation, energy audit and waste heat recovery techniques.			
Objectives:			
Students will be able to:			
<ol style="list-style-type: none"> 1. Develop awareness for effective utilization of alternative energy sources. 2. Identify different components of solar energy and wind energy devices. 3. Identify and analyze biomass plant. 4. Identify and apply energy conservation techniques for commonly used power absorbing and generating devices. 5. Apply principles of energy conservation and energy management techniques. 			
Pre-requisite:-			
Fundamental knowledge of conventional and non – conventional source of energy.			
Content [Theory] :			
Chapter	Name of the Topic	Hours	Marks
01	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.	08	
02	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 solar concentrating collectors and their	10	

	<p>applications, advantages and limitations</p> <ul style="list-style-type: none"> - Space heating and cooling. - Photovoltaic electric conversion. - Solar distillation, Solar cooking and furnace. - Solar pumping and Green House. <p>Agriculture and Industrial process heat. (no derivations and numericals)</p>		
03	<p>Wind Energy:</p> <p>3.1 Basic Principle of wind energy conversion. 3.2 Power in wind, Available wind power formulation, Power coefficient, Maximum power 3.3 Main considerations in selecting a site for wind mills. 3.4 Advantages and limitations of wind energy conversion. 3.5 Classification of wind mills 3.6 Construction and working of horizontal and vertical axis wind mills, their comparison 3.7 Main applications of wind energy for power generation and pumping.</p>	08	
04	<p>Energy from Biomass:</p> <p>4.1 Common species recommended for biomass. 4.2 Methods for obtaining energy from biomass. 4.3 Thermal classification of biomass- a) Gasified, b) Fixed bed and fluidized 4.4 Application of gasifier. 4.5 Biodiesel production and application 4.6 Agriculture waste as a biomass 4.7 Biomass digester 4.8 Comparison of Biomass with conventional fuels.</p>	10	
05	<p>Energy Conservation:</p> <p>5.1 Energy conservation and Management:- 5.2 Global and Indian energy market 5.3 Energy scenario in various sectors and Indian economy 5.4 Need and importance of energy conservation and management 5.5 Concept of Payback period, Return on investment (ROI), Life cycle cost, Sankey diagrams, specific energy Consumption.</p>	08	
06	<p>Energy Conservation Techniques:</p> <p>6.1 Distribution of energy consumption 6.2 Principles of energy conservation. 6.3 Energy audit 6.4 Types of audit 6.5 Methods of energy conservation 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</p>	10	

	- Analysis of input - Reuse and recycling of waste - Energy education - Conservative technique and energy audit				
07	Economic approach of Energy Conservation: 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. 7.5 An introductory approach of energy conservation in compressed air, refrigeration, air conditioning, pumps and fans.	10			
Total		64 hrs	70 Marks		
Total Classes		17 weeks [51 lecture hrs]			
Term work :		Total Marks = 25			
Examination Scheme:					
<ul style="list-style-type: none"> • Continuous internal Sessional assessment on Term Work = 25 Marks. I. Submission of reports on assignment in time = 20 Marks. II. End semester viva-voce / viva-voce = 05 Marks. III. Total = 25 Marks. 					
List of Assignment:					
<ol style="list-style-type: none"> 1) To collect information about global and Indian energy market. 2) Write a report based on experiment of solar flat plate collector used for water heating. 3) To study & write a report on construction and working of photo voltaic cell. 4) To study & write a report on construction, working and maintenance of solar cooker. 5) Visit to plant of solar heating system for hotel/hostel/railway station etc. 6) To study & write a report on construction and working of horizontal axis wind mill or to visit a nearest wind farm. 7) To visit a biomass/ biogas plant of municipal waste or else where. 8) Perform energy audit for workshop/Office/Home/SSI unit. 9) Study & write a report on various waste heat recovery devices. 					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01, 02 & 03	08	Any twenty	01	20 x 1 = 20
B	04 & 05	06			
C	06 & 07	06			

Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01, 02 & 03	04	Any five	10	10 x 5 = 50
B	04 & 05	03			
C	06 & 07	03			

Learning Resources :

Text Books :

Author	Title	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
K. M. Mittal	Non-conventional energy source	----
Krupal Singh Jogi	Energy resource management	Sarup and sons

Websites:

- 1) Website of Bureau of Energy and Efficiency.(www.bee-india.nic.in)
- 2) Website for Akshay Urja News Bulletin. (www.mnes.nic.in)

CAD – CAM & Automation (AE)(Elective -II)

Name of the Course : Diploma in Automobile Engineering			
Course Code: AE	Semester :		Sixth
Duration: 17 Weeks	Maximum Marks :		125 Marks
Teaching Scheme :		Examination Scheme : Theoretical	
Theory: 3 hrs / week	Internal Examination :		20 Marks
Tutorial: 1 hr / week	T.A.[Attendance & Interaction]:		10 Marks
Practical: Nil	End Semester Exam :		70 Marks
Credit : 3			
Aims :			
To understand the industrial need, diploma engineer should be able to cope with CAD/CAM technology.			
Objectives:			
Students will be able to:			
<ol style="list-style-type: none"> 1. Understand the fundamentals & use CAD. 2. Conceptualize drafting and modeling in CAD. 3. Prepare CNC part programming. 4. Operate CNC machines. 5. Conceptualize automation and FMS. 			
Pre-requisite:-			
Knowledge on engineering graphics, engineering drawing & mechanical engineering drawing.			
Content [Theory] :			
Chapter	Name of the Topic	Hours	Marks
01	Introduction to CAD/CAM: 1.1 Computers in industrial manufacturing. Product Cycle, CAD/CAM. 1.2 CAD/CAM hardware:- basic structure, CPU, Memory, I/O devices, Storage devices and system configuration.	08	
02	Geometric Modeling: 2.1 Requirement of geometric modelling, Types of geometric models. 2.2 Geometric construction method-sweep, solid modeling- Primitives & Boolean operations, free formed surfaces (Classification of surface only) (No numerical treatment)	13	
03	Introduction to computer numerical Control: 3.1 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.	07	

04	Part programming: 4.1 Fundamentals, manual part programming, NC –Words, Programming format, part programming, use of subroutines and do loops, computer aided part programming (APT).	16			
05	Industrial Robotics: 5.1 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. 5.2 Application – Material transfer, machine loading, welding, Spray coating, processing operation, assembly, inspection.	12			
06	Automation: 6.1 Basic elements of automated system, advanced Automation functions, levels of automation. 6.2 Flexible manufacturing system :-Introduction, FMS equipment, FMS application, Introduction to CIM.	08			
Total		64 hrs	70 Marks		
Total Classes		17 weeks [51 lecture hrs]			
Term work :		Total Marks = 25			
Examination Scheme:					
<ul style="list-style-type: none"> • Continuous internal Sessional assessment on Term Work = 25 Marks. I. Submission of reports on assignment in time = 20 Marks. II. End semester viva-voce / viva-voce = 05 Marks. III. Total = 25 Marks. 					
List of Assignment:					
<ol style="list-style-type: none"> 1. Two assignments on CAD for 2D drafting (Using AutoCAD) 2. Two assignments on CAD for 3D Modeling. (Using any 3-D Modeling software like CATIA, ProE, Solidworks etc.) 3. One assignment of programming on 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 industry having CNC machine (may be on visit). 6. Report writing on industry having robot Application (may be on visit). 7. Report writing on Industry having Automation in manufacturing (may be on visit). 					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	06			

B	03 & 04	07	Any twenty	01	20 x 1 = 20
C	05 & 06	07			
Group					
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	03	Any five	10	10 x 5 = 50
B	03 & 04	03			
C	05 & 06	03			
Learning Resources :					
Text Books :					
Author	Title			Publisher	
P. N. Rao	CAD/CAM Principles and Appl.			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	

Automobile Air Conditioning (AE)(Elective-II)

Name of the Course : Diploma in Automobile Engineering			
Course Code: AE	Semester : Sixth		
Duration: 17 Weeks	Maximum Marks : 125 Marks		
Teaching Scheme :		Examination Scheme : Theoretical	
Theory: 3 hrs / week	Internal Examination :		20 Marks
Tutorial: 1 hr / week	T.A.[Attendance & Interaction]:		10 Marks
Practical: Nil	End Semester Exam :		70 Marks
Credit : 3			
Aims :			
To understand & apply the knowledge in servicing various systems & subsystems of HVAC.			
Objectives:			
Students will be able to:			
1. Identify various HVAC systems and sub systems.			
2. Explain working & construction of HVAC Systems and sub systems.			
3. Carry out repair and maintenance of HVAC Systems and sub systems.			
4. Carry out retrofitting and alteration of HVAC Systems.			
5. Know environmental aspects related to HVAC Systems.			
Pre-requisite:-			
Fundamental knowledge on Heat Power engineering & Hydraulics & Pneumatics.			
Content [Theory] :			
Chapter	Name of the Topic	Hours	Marks
01	Introduction:	08	--
	1.1 Environmental & safety aspects in heating, ventilation & air conditioning systems.		
	1.2 Human comfort control - comfort zone, air movement, wind chill factor, odour problems & effects of humidity.		
	1.3 Heat transfer fundamentals- forced & natural convection, radiation, evaporation & conduction.		
	1.4 Requirements of heating, ventilation & air conditioning in cars, multi utility vehicles, vans, safari, heavy passenger vehicles, coaches, cargo vehicle cabin, vehicle carrying perishable commodities & cryogenic substances.		
	1.5 Controlled & uncontrolled ventilation - working, application & comparison.		
02	Case & Duct System:	08	
	2.1 Construction & working of Air intake section, core section & distribution section.		
	2.2 Construction & working of Downstream, upstream, split & hybrid.		
	2.3 Construction & working of rear heating & cooling system.		
03	Air Conditioning System:	08	

	Part I 3.1	<p>3.1.1 General layout of Air conditioning system.</p> <p>3.1.2 Construction & working of following refrigeration sub systems – thermostatic expansion valve, fixed orifice tube & rotary vane air cycle system.</p> <p>3.1.3 Construction & working of evaporator, condenser, accumulator.</p> <p>3.1.4 Receiver driers & accumulator- Types, construction & Working.</p> <p>3.1.5 Construction & working of reciprocating, scroll & rotary vane compressors. Drive systems for compressors.</p>		
	Part II 3.2	<p>3.2.1 Construction & working of electromagnetic clutch</p> <p>3.2.2 Metering devices- comparison of thermostatic expansion valve & fixed orifice tube.</p> <p>3.2.3 Types working & comparison of thermostatic expansion Valves i.e. H valve, block type, internally equalized & Externally equalized.</p> <p>3.2.4 Functions of thermostatic expansion valve i.e. Throttling action, modulating action & controlling action.</p> <p>3.2.5 Construction & working of remote bulb.</p>	08	
04		<p>System Control Devices & Electrical Circuits:</p> <p>4.1 System controls – Construction & working of typical vacuum system & electronic temperature control system.</p> <p>4.2 Construction & working of vacuum operated devices i.e. vacuum reserve tank, vacuum restrictor, vacuum motor, check valve & check relays.</p> <p>4.3 Switches – Construction & working of high side temperature switch, low-side temperature switch, high pressure switch, low- pressure switch, pressure regulator, ambient switch & superheat switch.</p> <p>4.4 Sensors- Construction & working of sun load sensor, outside temperature sensor & in car temperature sensors.</p> <p>4.5 Construction & working of Aspirator.</p> <p>4.6 Construction & 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 & Electronic climate control system, their electrical circuits & working.</p>	15	
05		<p>Repairs & maintenance of Air Conditioning system:</p> <p>5.1 Visual & acoustic check, side glass, leak test, temperature test, Procedure of charging & discharging. Moisture removal procedure.</p> <p>5.2 Service equipments & tools – Vacuum pump, Manifold & gauge i.e. Low side & high side, gauge calibration, recovery unit & recycling unit, Halide (2reon) & Fluorescent leak detector, nitrogen leak test.</p> <p>5.3 Compressor service – Symptoms, faults, cause & remedy.</p> <p>5.4 Electromagnetic clutch service – Symptoms, faults, cause & remedy.</p>	12	

	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. 5.8 Hoses & connectors – construction of system hoses, charging hose with shutoff valve & connectors. 5.9 Retrofitting from CFC- R12 to HFC- 134 A – need, Procedure & Precautions.				
06	Comfort Heating System: Function, construction, working, maintenance, general faults and their remedies of Comfort Heating System.	05			
Total		64 hrs	70 Marks		
Total Classes		17 weeks [51 lecture hrs]			
Term work :		Total Marks = 25			
Examination Scheme:					
<ul style="list-style-type: none"> • Continuous internal Sessional assessment on Term Work = 25 Marks. I. Submission of reports on assignment in time = 20 Marks. II. End semester viva-voce / viva-voce = 05 Marks. III. Total = 25 Marks. 					
List of Assignment:					
<ol style="list-style-type: none"> 1) Study of all parts of all subsystems & assembly & disassembly of three different types of compressors. 2) Prepare a list & mention the use of tools, gauges & equipment for servicing. 3) Procedure of leakage testing using soap solution & other techniques. 4) Procedure of charging & evacuation of refrigerant from system. 5) Procedure of lubrication of A C system & servicing of heating system. 6) Prepare a list of possible electrical systems faults. 7) Prepare a list of possible control systems faults. 8) Prepare a list of possible various running faults in car HVA C. 					
Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01, 02 & 03	11	Any twenty	01	20 x 1 = 20
B	04	04			
C	05 & 06	05			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01, 02 & 03	05			

B	04	02	Any five	10	10 x 5 = 50
C	05 & 06	02			
Learning Resources :					
Text Books :					
Author	Title		Publisher		
Boyce H. Dwigins	Automobile Air Conditioning		Thomson Learning		
-----	Service Manual		Subros Company		
-----	Service Manual		Sanden Company		
-----	Service Manual		Baher Company		
K.K.Jain	Automotive Engineering				
Stevan Daley	Automotive Air conditioning & climate control system				
C.D. on various Topics of Automobile Engineering By SAE Publisher.					

Special Purpose Vehicles (AE)(Elective - II)

Name of the Course : Diploma in Automobile Engineering			
Course Code: AE	Semester :		Sixth
Duration: 17 Weeks	Maximum Marks :		125 Marks
Teaching Scheme :		Examination Scheme :	
Theory: 3 hrs / week	Internal Examination :		20 Marks
Tutorial: 1 hr / week	T.A. [Attendance & Interaction] :		10 Marks
Practical: Nil	End Semester Exam :		70 Marks
Credit : 3			
Aims :			
<ul style="list-style-type: none"> ▪ To impart full knowledge of tractor or agricultural machinery. ▪ To understand & apply the knowledge about various system & subsystems for servicing of these vehicles. 			
Objectives:			
Students will be able to:			
<ol style="list-style-type: none"> 1. Know importance of earth moving machines & agricultural machines in India. 2. Identify various systems & subsystems of earth moving machines & agricultural machines 3. Explain working & construction of various systems & subsystems in earth moving machines & agricultural machines 4. Carry out preventive maintenance of earth moving machines & agricultural machines. 			
Pre-requisite:-			
Knowledge of working principle of various system of automobile.			
Content [Theory] :			
Chapter	Name of the Topic	Hours	Marks
01	Earth Moving Machines – Introduction	13	--
	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: a) Traveling Speed b) Working conditions c) Power output & power variations d) Controls e) Torque & torque variations. f) Steering g) Suspension h) Fuel & fuel consumption i) Hydraulics j) Power take offs k) Clutch l) Brakes m) Driving license		

	<p>n) RTO registration</p> <p>1.4 Implications of earth moving machines on economy & infrastructure development:</p> <p>I. Next five year plan</p> <p>II. Role of earth moving machine in road laying, bridge construction, building construction, tunnel, mining & in disaster management.</p>		
02	<p>Tractor Dozer:</p> <p>2.1 Tractor dozer- types, layout , power train & bucket swing. Applications i.e. ripping, blasting Vs ripping.</p> <p>2.2 Rippers – types i.e. hinge & parallelogram, their application & comparison.</p> <p>1.6 Ripper tip selection.</p> <p>1.7 Dozing & 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 & working.</p> <p>2.7 Under carriage maintenance.</p> <p>2.8 Safety precautions for Dozer operations.</p>	10	
03	<p>Dragline (Rope Operated Excavator):</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 & grading.(simple sketches only)</p> <p>3.3 Clamshell-application, capacity, bucket, construction & size</p> <p>3.4 Hoe and Cranes - their working & Application.</p>	08	
04	<p>Loaders & Excavators:</p> <p>4.1 Crawler loader – working & attachments i.e. standard bucket, bulk handling bucket, fork lift attachment, crane attachment Stability & safety of crawler loader operations.</p> <p>4.2 Wheeled loader –types i.e. back hoe & front hoe, working, capacity & output.</p> <p>4.3 Hydraulic Excavator: Application, block diagram, types of buckets & 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 Scraper: Block diagram, types – Towed & self-propeller.</p> <p>4.5 Motor Grader – Block diagram, constructions, application, stability & safety, capacity & outputs.</p>	12	
05	<p>Tractor:</p> <p>5.1 Comparison of tractor with an automobile</p>	12	

	5.2 Indian tractor industry 5.3 General Layout of a tractor 5.4 Power train & transmission layout of a tractor 5.5 Tractor Power take off its working & construction 5.6 Tractor tyres construction & selection 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.		
06	Forklift Truck , tipper & road roller: 6.1 Forklift Truck- Types, layout, lifting mechanism, Counter weight & 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.	09	
Total		64 hrs	70 Marks
Total Classes		17 weeks [51 lecture hrs]	
Term work :		Total Marks = 25	
Examination Scheme:			
<ul style="list-style-type: none"> • Continuous internal Sessional assessment on Term Work = 25 Marks. I. Submission of reports on assignment in time = 20 Marks. II. End semester viva-voce / viva-voce = 05 Marks. III. Total = 25 Marks. 			
List of Assignment:			
<ol style="list-style-type: none"> 1. Write a report on various mechanisms used, service procedure adopted, cost of equipment and Other financial aspects, on data /information collected from a service center of Tractor or Dozer or Excavator or Fork lift or Road roller 2. Write a report on various operations of Earth Moving Machines using to a mine/ construction site. 3. Write a report on specifications and features like hydraulic circuit, control systems of any one earth moving machine, 4. Write a report on specifications and capacities of any one dozer. Draw the sketches of various dozer blades stating their applications. 5. Write a report on applications of any one Rope operated excavator/ fork lift. 6. Write a report on working of crawler loader and its attachments/ road roller types and operations. 			
Note: More similar types of assignments on relevant field may be selected by the subject teacher.			

Examination Scheme:					
Group	Chapter	Objective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	07	Any twenty	01	20 x 1 = 20
B	03 & 04	07			
C	05 & 06	06			
Group	Chapter	Subjective Questions			Total Marks
		To be Set	To be Answered	Marks per Question	
A	01 & 02	03	Any five	10	10 x 5 = 50
B	03 & 04	03			
C	05 & 06	03			
Learning Resources :					
Text Books :					
Author	Title			Publisher	
Jagman Singh	Art of earth moving				
Radichev	Tractors and automobile				
Burge	Tractors and their power units				
Trucker	Earth moving plant				
C.Ds on various Topics of Automobile Engineering by SAE Publiser.					

PROJECT (AE)

Name of the Course : Diploma in Automobile Engineering	
Course Code: AE	Semester : Sixth
Duration: 17 Weeks	Maximum Marks : 100 Marks
Teaching Scheme :	Examination Scheme : Practical
Theory: Nil	Internal Examination : Nil
Tutorial: Nil	Attendance, Assignment & Interaction : Nil
Practical: 06hrs / week	End Semester Exam : Nil
Credit : 3	
Aims :	
<ul style="list-style-type: none"> • To cultivate the systematic methodology for problem solving using acquired technical knowledge & skills • To enhance the generic skills & professional skills. 	
Objectives:	
<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Identify, analyze & define the problem. 2. Generate alternative solutions to the problem identified. 3. Compare & select feasible solutions from alternatives generated. 4. Design, develop, manufacture & operate equipment/Program. 5. Acquire higher-level technical knowledge by studying recent development in mechanical engineering field. 6. Compare machines/devices/apparatus for performance practices. 7. Work effectively in team. 	
Skills To Be Developed	
<p>Intellectual Skills:</p> <ol style="list-style-type: none"> 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. 	
<p>Motors skills:</p> <ol style="list-style-type: none"> 1. Use of skills learnt in workshop practical. 2. Assemble parts or components to form machine or mechanisms. 3. Classify & analyze the information collected. 4. Implement the solution of problem effectively. 	
Project :-	
<ol style="list-style-type: none"> I. Part – A [Project work] = 80 marks II. Part – B [Seminar] =20 marks 	Total Marks =100
Project Work:-	
Total Marks =80	
Part - A	

A batch of maximum [4 – 6] students will select a problem and then plan, organize & execute the project work of solving the problem in a specified duration. Students are expected to apply the knowledge & skills acquired.

Batch may select any one problem / project work from following categories :-

- a) Fabrication of small machine / devices/ test rigs/ material handling devices/ jig & fixtures / demonstration models / engine etc. Report involving aspects of drawing, process sheets, costing, Installation, commissioning & testing should be prepared and submitted.
- b) Design & fabrication of mechanisms, machines, Devices, etc. Report involving aspects of designing & fabricating should be prepared & submitted.
- c) Development of computer program for designing and /or drawing of machine components, Simulation of movement & operation, 3D modeling, pick & place robots etc.
- d) 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.
- e) Literature survey based projects: Project related with collection tabulation, classification, analysis & presentation of the information. Topic selected must be related with latest technological developments in mechanical or Mechatronics field, and should not be a part of diploma curriculum. Report should be of min 60 pages.
- f) 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.
- g) 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.
- i) Low cost automation projects: Project based on hydraulic/pneumatic circuits resulting into low cost automated equipment useful in the identified areas.
- j) 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.
- k) 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.
- l) 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.

Notes:

- 1) Project group size: Maximum 4 -6 students.
- 2) Project report will be of minimum 40 pages unless otherwise specified.
- 3) Project diary should be maintained by each student.

Seminar:- **Total Marks = 20**

PART-B :

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.

1. Selection of topic for the seminar should be finalized in consultation with teacher guide allotted for the batch to which student belongs.
2. Seminar report should be of min.10 & max. 20 pages & it should be certified by guide teacher and head of the department.
3. 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) Internal Evaluation of seminar
 - 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 work selected by batch.

Examination Scheme: **Total Marks = 100**

Internal Evaluation – Part – A & Part – B. **Total Marks = 40 + 10 =50**

External Evaluation - Part – A & Part – B. **Total Marks = 40 + 10 =50**

- **Continuous Internal practical Evaluation:** - - 40 + 10 = 50 marks.

Part – A :- Project Work

- I. Regular, active participation & reporting work of progress of Project Work = 10 Marks.
- II. Completion of Project work & Submission of Project Report in time = 20 Marks.
- III. Presentation of Project Work = 10 Marks.
- IV. Total Marks = 40.

Part – B :- Seminar

- I. Presentation & the use of Audio Visual aids : 08 marks
- II. Question /answer: 02 marks
- III. Total: 10 marks

- **External Practical Evaluation:** – 40 + 10 = 50 marks.

Examiner : External Teacher [H.O.D / Sr. Lect.]

Evaluation area:-

Submission of signed reports both on project work & seminar must be submitted.

Submission of project work.

Viva-voce on project work & seminar presentation.

Learning Resources :		
Text Books :		
Author	Title	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.		

Professional Practice –IV [AE]

Name of the Course : Diploma in Automobile Engineering	
Course code: A.E.	Semester : Sixth
Duration : 17 weeks	Maximum Marks : 50
Teaching Scheme :	Examination Scheme : Practical
Theory : Nil	Continuous Internal Assessment: Nil
Tutorial: -- Nil	External Assessment: Nil
Practical : 03 hrs./week	End Semester Exam. [theory]: N.A
Credit: 02	
Aim:	
<ul style="list-style-type: none"> • 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. • To help in broadening technology base of students beyond curriculum. • To develop creatively and innovatively and inculcating habit of working with their own hands. 	
Objectives :	
Student will be able to:	
<ul style="list-style-type: none"> ➤ Acquire information from different sources. ➤ Work in a team and develop team spirit. ➤ Present seminar using power projection system. ➤ Interact with peers to share thoughts. ➤ Prepare a report on industrial visit, expert lecture. 	
Intellectual Skill:	
Student will be able to-	
<ul style="list-style-type: none"> ➤ Search information from various resources. ➤ Prepare notes on selected topics. ➤ Participate in group discussions. 	
Motor Skills:	
<ul style="list-style-type: none"> ✓ Observe industrial practices during visits. ✓ Prepare slides / charts for presentation in seminar. ✓ Develop a model. 	
Content:	
Topic & Content	Hrs
<ul style="list-style-type: none"> ➤ Industrial Visits <p>Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work.</p> <p>One 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.</p> <p>i) Auto / Electronic equipment manufacturing industry.</p> <p>ii) Modern service station or garage (understanding of latest scanning & testing equipments, auto air-conditioning)</p> <p>iii) Earth Moving Equipment Maintenance Shop.</p>	

iv) Transport organization (records of transport , transport management)	
<p>Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any of the following areas (4lectures of 2 hrs duration each):</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 & actuators g) Motor vehicle rules h) Transport management i) Estimation & valuation of a vehicle j) Buying a new / used vehicle k) Driving skills l) Motor industry m) Maintenance management & record keeping n) Engine / chassis / body maintenance o) Air conditioning & 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&D, call centers ,CAD, NDT, Railways, Defense, Aeronautics, Marine, Software development, Information Technology w) Continuing education / Open universities programmes for diploma holders.</p>	
<p>➤ Information Search :</p> <p>Search information on any TWO of the following suggested topics and write a report (Group size – 3-5 students, Report – upto10 pages).</p> <p>Collection of information related to :</p> <p>a) Buying of a new / old vehicle (cost, make, model etc.). b) Road signs, signals & traffic regulation. c) Motor vehicle taxes/ insurance. d) Elements of transport. e) Automotive batteries – Construction, features & specifications. f) Automotive electrical / electronic accessories. g) Starting & charging system. h) Maintenance management & record keeping. i) Chassis & body maintenance. j) A Special purpose vehicle. k) Maintenance of Automobile air-conditioning systems.</p>	
<p>➤ Group Discussion:</p> <p>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> <p>i) Solar Vehicles / Electric Vehicles. ii) Vehicles – Comparison. iii) Two stroke versus Four stroke automobile engines iv) Tribological aspects in automobiles v) Energy Conservation In Institutes vi) Creativity and Innovativeness. vii) Attributes of Product Design</p>	

<p>➤ Student Activities : 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. Activity : i) Collecting Failure data for automobile / machines / equipments. ii) Study of Hydraulic Circuit of any one system/machine tool like –dumpers, Earth moving equipment and Auto service station.</p>		
Total periods		48 Hrs.
Examination Scheme : Practical		Total Marks = 50
<ul style="list-style-type: none"> • Continuous Internal Sessional Assessment: - - 25 marks. I) Industrial visit & submitting respective report in time = 05 marks. II) Submitting reports on Information Search, students' activity & presenting Seminar in time = 10 marks. III) Participating in Group discussion = 05 marks. IV) End sem. viva-voce = 05 marks V) Total (I + II + III + IV) = 25 Marks. • External Sessional Assessment: - 25 marks. <p>Examiner : External Teacher [Lect.]</p>		
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.
How things works encyclopedia	DK Publishing	DK Publishing
Trott	Innovation mgmt.& new product development	Pearson Education
<p>1. Web sites www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com</p>		

Driving Practice

Name of the Course: Diploma in Automobile Engineering	
Course Code: AE	Semester: Sixth
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: 4 hrs./week	End Semester Exam. [Theory]: Nil
Credit: 2	
Skills to be developed [Practical] :	
Intellectual Skills:	
<ul style="list-style-type: none"> • Identify different Traffic signals & symbol. • Understand the rules to avoid accidents. 	
Motor Skills:	
<ul style="list-style-type: none"> ➤ Observe instructions in driving of vehicle. ➤ Observe Traffic rules. ➤ To keep fit during driving. 	
Examination Scheme : Practical	
Total Marks : 50	
<ul style="list-style-type: none"> • Continuous Internal Evolution: - 25 marks. I. Attending practical classes, driving skill & submission report. in time = 20 Marks. II. Viva-voce = 05 Marks • External Assessment: – 25 marks. 	
Note: In assessment of the students by both external & internal will be judged on their driving sense, driving skill and awareness regarding driving rules & regulations and road signs & symbols.	
List of Practical :	
Total Periods : 64 Hrs.	
Sl. No.	Name of the topics / Practical
01	Driving skills: 1.1 Instructions in driving of motor vehicle : Driving theory, traffic education, light vehicle driving practice, Vehicle Mechanism & repair, Public relations for drivers, Fire hazards, vehicle maintenance and first aid. 1.2 Traffic signs: Mandatory signs, Cautionary signs, Informatory signs, Traffic signals. Causes of accident and remedies. 1.3 Measures to avoid accidents 1.4 Defensive driving : 1.5 Rain and flood, fog and mist, snow and ice. 1.6 Fitness to drive : Driving and age, stress due to traffic jam, night driving.
02	Study of Traffic Rules as per State & central Government specification.
03	Driving Practice— a) Any standard two wheelers (e.g. bike, scooter, etc.) b) Any standard four wheelers (L.M.V.)
Note:-	
<ul style="list-style-type: none"> ✓ Special care should be taken to incorporate good driving attitudes among the students, so that they would become conscious about road safety and fuel economy. ✓ The students should prepare and maintain a hand book about road signs & symbols as well as driving rules as per norms. 	

Grand Viva-Voce

Name of the Course: Diploma in Automobile Engineering			
Course Code:	AE	Semester:	Sixth
Duration:	N.A	Maximum Marks:	100
Teaching Scheme :	N.A	Examination Scheme :	viva-voce
Theory:	Nil	Continuous Internal Examination :	Nil
Tutorial:	Nil	End Semester Exam.:	Nil
Practical:	Nil	End Semester Examination (viva-voce):	100 Marks
Credit:	3		
Aim :			
The object of conducting Grand viva-voce is to assess out going students on their general understanding of all subjects (Theory, practical, laboratory etc.) taught and also on expected technical sense / ability developed being an engineer during this periods.			
Examination Scheme (at semester end): Grand Viva-voce		Total Marks : 100	
<ul style="list-style-type: none"> • End Semester Examination (viva-voce): - 100 marks. Examiner - Internal Lecturers & Jr. Lecturers (if necessary)			
Guidelines of conducting Grand viva -			
I. Constitute three / four groups of teachers like Gr. A to Gr. D. depending on strength of the faculties in each department.			
II. Each group will take care of certain sphere of that branch of engg., [e.g. Gr. A -Thermal & Fluid Engg. or Gr. B- Materials & Manufacturing system etc.], so as to cover entire field.			
III. Each group will have equal marks out of total marks.			
IV. Avg. /summation of the marks of three or four groups of the department will be total marks of Grand viva.			
Note: Team of internal examiners of different subjects will be formed & headed by H.O.D / Sr. most Lect..			