



SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Shri Rawatpura Sarkar University, Raipur



Examination Scheme & Syllabus

For

Diploma in Mechanical Engineering

Semester-VI

(Effective from the session: 2022-23)



**SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING**

**Three Years Diploma Programme
Scheme of Teaching and Examination
Diploma Sixth Semester Mechanical Engineering
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the session: 2022-23)**

S.N	Course Code	Course Title	Hours per week			Credit	Examination Scheme			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1.	DENME601T	Automobile engineering	3	1	-	4	30	70	100	3
2.	DENME601P	Automobile Engineering - Lab	-	-	4	2	15	35	50	-
3.	DENME602T	Refrigeration & Air conditioning	3	1	-	4	30	70	100	3
4.	DENME602P	Refrigeration & Air Conditioning- Lab	-	-	4	2	15	35	50	-
5.	DENME603T	Power Plant Engineering	3	1	-	4	30	70	100	3
6.	DENME604T	Estimating, & Costing	3	1	-	4	30	70	100	3
7.	DENME605T	Entrepreneur & development	3	1	-	4	30	70	100	3
8.	DENME603P	Project & Seminar	-	-	8	4	25	75	100	-
						28			700	



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Course Title	AUTOMOBILE ENGINEERING			
Course Code	DENME601T			
Course Credits	L	T	P	TC
	3	1	-	4
Prerequisites	Fundamental of Automotive components and complete theory of mechanical engineering			
Course objectives	<ul style="list-style-type: none"> • The anatomy of the automobile in general location and importance of each part • The functioning of the engine and its accessories, gear box, clutch, brakes, steering, axles and wheels • Suspension, frame, springs and other connections • Emissions, ignition, controls, electrical systems and ventilation. 			
Course Contents	<p>UNIT-I Introduction & Automobile Engines Introduction to an automobile, History of the automobile, Types of automobiles, Layout of an automobile, Major components of the automobile, Functions of the automobile components, Layout of chassis and frames, classification of chassis, Types of Automobile Engines:- Petrol Engine, Diesel Engine, Gas Turbine, Rotary piston Engine Electric motor, Fuel cell (Hydro/Hydro methanol fuel cell) Engines locations - front, rear and transverse under floor with their advantages and disadvantages Engine Constructional features :- Engine block, engine heads, crank case oil pan, cylinder liners, Gasket, combustion chambers with their types, piston, piston pin, gudgeon pin, connecting rod, crank shaft, cam shaft, valve & valve mechanism. valve timing , port timing diagram, timing gears, Inlet & exhaust manifolds, Exhaust mufflers, flywheel, inlet & exhaust ports of two stroke engine, concept of firing order in multicylinder engine. Engine performance and testing – engine measurements, factors affecting engine power, engine rating and related fact</p> <p>UNIT-II Fuel System for Petrol Engine & Diesel Engine Introduction & fuel system for petrol engine, Gravity feed system, Fuel pump, Properties of air-fuel mixture, Mixture control devices, Simple carburettor & its limitations, modern carburettor like : cartor, solexcarburettor, S.U. Carburettor Concept of Petrol Injection & MPFI Petrol injection systems, [such as direct injection systems, port injection systems, throttle body injection etc, Mechanical and Electronic injection systems] Concept of supercharging & types of superchargers. Mixture requirements of diesel engine, 132 Fuel injection systems such as Common rail fuel injection system, Individual pump fuel injection system, Construction and working of</p>			



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Fuel feed pump, Fuel injection pump, Fuel injector, Distributor type, rotary fuel injection pump,

UNIT-III

Auto-Electric System & Transmission & Propeller Shaft

Main Components of the Electrical System, Starter Generator, Alternator Type Generator, Ignition System, Distributor, Ignition Coil, Ignition Timing, Ignition Advance Spark Plug, Electronic Ignition System, Operation of Electronic Ignition System, Electronic Switching Systems, Automobile Battery, Low-maintenance and Maintenance-free Batteries Need and functions of transmission system Concept of various road resistances such as wind, Gradient, Resistance, Total resistance, Tractive- effort, , Types of transmission, Types of gear boxes e.g. sliding mesh, constant mesh, synchromesh gear boxes, mathematical analysis of gear boxes, Gear shifting mechanisms. Epicyclic gear box, five speed gear box, Torque converter, Overdrive & automatic transmission (Elementary Treatment), Clutches such as Single Plate, Multiplate, Centrifugal clutches functions & types, Construction & functions of propeller shaft, Universal joints & slip joints on propeller shaft

UNIT-IV

Final Drive & Rear Axle & Steering & Front Axle

Introduction, Function & need of differential, Types of gears used in differential, Differential trouble diagnosis, Final drive, Construction and details of rear axle and forces acting on rear axle, Types such as semi floating, fully floating, Three quarter floating, Rear axle drives such as Hotchkiss type ,torque tube type etc Function of the steering system, Steering gears & Steering mechanism used in some Indian vehicles, Steering wheel & column, Front axle-Function & construction, Steering heads & steering geometry, Wheel alignment, Adjusting the steering angles, Ackerman linkage, Power steering, Under steering & over steering, Steering lock, Turning radius, Steering trouble shooting

UNIT-V

Brakes, Suspension systems, Wheels and Tyres

Need & principle of braking system., Brake efficiency and stopping distance, Types of brakes as Mechanical brakes - drum and disc brakes, Hydraulic Brakes, Tandem Master cylinder, wheel cylinder, braking linkages, Self energized brakes, Floating-caliper brakes, Power brakes, Air brakes, Air hydraulic brakes, Emergency & Parking Brakes, Brake trouble shooting. Need for Good Suspension System, Stages in Suspension System, Elements of a Suspension System, Types of Suspension Systems, Inspection and Service of Suspension System (general), Trouble Shooting of Suspension Systems Vibration dampers Types of Automobile Wheels, Tyres& its Types, Tyre Tread, Tyre Selection, Tyre Service Parameters, Tyre Maintenance



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Course Outcomes	<ul style="list-style-type: none">• Identify the different parts of the automobile• Explain the working of various parts like engine, transmission, clutch, brakes• Describe how the steering and the suspension systems operate.• Understand the environmental implications of automobile emissions• Develop a strong base for understanding future developments in the automobile industry
Text Books	<ol style="list-style-type: none">1. Kirpalsingh, Standard publishers and distributors, New Delhi.- Automotive Engineering Vol I2. Crouse & Anglin, McGraw Hills International Pub.- Automotive Mechanics3. K.K. Jain & R. B. Asthana, TMH- Automobile Engineering
References Books	<ol style="list-style-type: none">1. Don Knowles, Reston Publishers, New Jersey.- Auto Mechanics- Understanding new technology2. Bosch, SAE (distributor)- Diesel Fuel Injection



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Course Title	REFRIGERATION & AIR CONDITIONING			
Course Code	DENME602T			
Course Credits	L	T	P	TC
	3	1	-	4
Prerequisites	Basic knowledge of Refrigeration cycle and cooling system			
Course objectives	<ul style="list-style-type: none"> • Understand the basic principles of refrigeration and air conditioning, • Analyze air refrigeration systems, vapor compression refrigeration systems, vapour absorption refrigeration systems, and steam jet refrigeration systems • Study the psychometric properties of air and utilize the principles of psychometric in the design of air conditioning equipments 			
Course Contents	<p>UNIT-I Introduction & Air Refrigeration Cycles Introduction to Refrigeration. Methods of refrigeration as Ice refrigeration, steam jet refrigeration, Concept of heat pump, Refrigerator, Concept of COP. Refrigerating effect ,Units of refrigeration . Reversed carnot cycle and its representation on PV & TS diagram. Bell Colemanm cycles its principle, components of system, ideal/actual cycle, and minimum, maximum. temperatures.(Simple numericals), Practical application of the cycle such as Air – craft refrigeration</p> <p>UNIT-II Vapour Compression & Vapour Absorption System VCC -principle , components, representation on PV, TS,& PH digrams. Wet /Dry –compression-Reasons for not using Wet /Dry compression. Actual VCC , calculation of COP , Effect of superheating & undercooling. Multistage vapour compression cycle, need for multistage compressionsystem , cascade rfrigeration& its application.Principle /components&working of Ammonia vapour absorption system,Lithium Bromide absorption system,Electrolux Refrigerators , Comparision with vapour compression system</p> <p>UNIT-III Refrigerants Vapor Compression System Components Types of refrigerants as primary / secondary.Properties of the Commonly used refrigerants such as – Co2, Ammonia So2 , Freon 11, Freon 12 , Freon 22, Freon 500 ,503 502. & ecofriendly Refrigerants. Concept of Ozone layer and its destruction. Selection of refrigerants for particular application with reasons. Construction &working of various components .such as Open type Hermetically sealed, Centrifugal, Screw type compressors, Application of the compressors. 139 Evaporators—their functions & types such as Extended surface, Plate coil type, Flooded, Dry Direct &Indirect expansion types</p>			



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	<p>Capacity of evaporator. Frosting /Defrosting of evaporators. Condensers – types of condensers such as Evaporative type, Air cooled [forced & natural convection) Water cooled [Double tube / Shell tube / Shell coil) . Construction& working of various types of expansion devices such as – capillary tube auto expansion & thermostatic expansion valves , solenoid control valves & Low side High side valves .Refrigeration system controls – LP /HP Controls, Thermostat, Overload protectors, bellow pressure controllers, Diaphragm controllers , & Relays .</p> <p>UNIT-IV Air Conditioning & Psychrometric Processes & Cooling Load Calculation Definition, Necessity of Air conditioning. Concept of body comfort. Properties of air as DBT , WBT , DPT, Air as mixture of different gases & water vapour Daltons law of partial pressures Concept of Humidity of air, absolute humidity, relative Humidity Psychrometers and their types , Enthalpy of air, Sp. Volume of air, DPT of moist air Psychrometric charts & tables , Psychrometric processes such as sensible heating & cooling , latent heat of air , latent heating & cooling , heating & humidification , cooling & dehumidification , evaporative cooling , sensible heat factor , By-pass factor ,apparatus dew point ,[representation on psychrometric charts] Concept of heat load, Heat sources as outdoor , walls , roofs in filtration & indoor sources , types of cooling loads like—glass , walls , roofs , ventilation , people, electrical equipment, motors etc. Calculations of total heating & cooling load estimation & determination of refrigeration capacity.</p> <p>UNIT-V Air Distribution Systems & Air Conditioning Systems Elements of air distribution system such as types of Fans , Ducts , Duct system as –graduated trunk , loop perimeter , Extended Platinum , Over head trunk , over head radial duct systems Selection & Losses in duct systems. Air distribution outlets supply outlets, return outlets, sealing diffusers,grills , resistors , fixed /adjustable louvers , low /high wall outlets , floor baseboard & sealing outlets . 140 Window air conditioning units. Construction, Working, type of refrigeration system used, capacity. Split air conditioners construction , working ,Type of refrigeration system used , capacity Package / Summer / Winter & Year – round air Conditioner systems construction , working ,type of refrigeration system used capacity</p>
<p>Course Outcomes</p>	<ul style="list-style-type: none"> • To describe major design considerations of air-side, water-side, ventilation and refrigeration systems. • To evaluate applications and design calculations of HVAC &R systems.



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Text book	<ol style="list-style-type: none">1. Roy/J. Dosat, Wiley eastern- Refrigeration & Air conditioning2. P. N.Ananth ,Narayan, TMH-Practical Refrigeration & Air Conditioning3. M.Adithon& S.C. Laroia, Wiley Eastern.-Principles of Air4. Conditioning. V.Paull Lang, C.B.S - Basic Air Conditioning Vol .
References	<ol style="list-style-type: none">1. I & II Gerald Schweitzer &A.Ebling, D.B. Taraporwala- Practical2. Air Conditioning & Refrigeration Audel, D. B. Taraporwala - Refrigeration & Air Conditioning3. S.Domkundwar, Dhanpatrai& Sons -.Refrigeration & Air Conditioning



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Course Title	POWER PLANT ENGINEERING				
Course Code	DENME603T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Basic industrial engineering and management of Power plant.				
Course objectives	<ul style="list-style-type: none"> • Basic knowledge of Different types of Power Plants, site selection criteria of each one of them. Understanding of Thermal Power Plant Operation, turbine governing, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems. • Design of chimney in thermal power plants, knowledge of cooling tower operation, numerical on surface condenser design. 				
Course Contents	<p>UNIT-I Steam Power Plant & Steam Generators Energy conversion in Thermal Power Station, Limitation and conversion of heat into work, Direct conversion devices, Types of power station such as central power station, industrial power station, captive power station – advantages, classification of power station on the basis of prime-movers. Elements of power plant, function of each element-generating unit, Prime mover, an auxiliary equipment, and turbo generator. Revision & improvement of thermal efficiency of Rankine cycle by lowering exhaust pressure, increasing boiler pressure and superheating of steam. Simple problems on Rankine efficiency. Reheat cycle-representation on T-S and H-S Planes, flow diagram and advantages. Simple regenerating cycle – flow diagram, representation on T-S and H-S plants, bleeding and feed power heating and pumping: advantages of regenerative cycle. Steam Generators: Classification according to working pressure. Accessories – superheater, economizer, preheater and draft equipment. Superheat control methods, Pulverized fuel – necessity, storing systems. High pressure boilers in modern steam power plants such as Velox Benson, La-mont, leoffler .</p> <p>UNIT-II Steam Prime mover & Condensing Unit Steam nozzle-types, Velocity of steam at outlet, Weight of discharge, Area of cross section at throat and outlet, Critical pressure ratio, Nozzle efficiency, Concept of prime mover, Steam turbine – working principle , method of compounding and governing, losses in steam turbines, Lubrication system of steam turbines. 144 Chapter-4 Functions of Steam condenser and its types– jet and surface, Limitations and advantages of steam condenser Elements of condensing unit Cooling towers.</p>				



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UNIT-III

Steam Power Station Control and Safety , Nuclear Power Station

Effect of load variation on soft speed, steam admission, valve opening, steam flow rate, steam pressure and combustion control system. Necessity of controlling factors in load variation, Control system (area system, centralised control system) Basic elements of control system, controls and instruments located in modern control station. Control room, Records and their purpose, log sheets or log books. Nuclear reactions – fission, fusion, mass defect, binding energy, chain reaction, Types of nuclear materials – fissile materials, fertile materials, process of conversion of fertile materials, breeding, moderation. Nuclear reactor – function, elements of nuclear reactor, reactor core, moderator, thermal shielding, reflector, reactor vessel, fuel, coolant flow, control rods, biological shielding, coolant (gaseous, non-boiling liquid, boiling liquid). Liquids – Helium, CO₂, CO₂ under pressure, pressurized water (ordinary, heavy), liquid metals (Li, Si, Pb, Na) and their alloy, boiling water. Generation – fast reactors, thermal reactor, breeding reactor. Nuclear fuel – Heterogeneous, Homogeneous. Moderator – water moderator, heavy water moderator graphite moderator and beryllium moderator. Hazards in nuclear power station – units of radiations, safe and dangerous doses of radiations, safety precautions in nuclear power station Effects of nuclear materials , nuclear radiation and Nuclear waste disposal

UNIT-IV

Diesel Engine Power Plants & Gas Turbine Power Plants

Diesel power plant layout Functions & components of diesel power plant Diesel power plant systems such as -Cooling and lubrication system, fuel injection system – basic requirements, solid injection system – common rail system, individual pump system, distribution system, data recording, performance. 145 Advantages of gas turbines, Brayton or Joule Cycle, Open and close cycle, representation of cycle on P.V. and T.S. diagram. Thermal efficiency in terms of terminal temperature and pressure, effect of pressure ratio on thermal efficiency, Advantages and disadvantages of open and close cycle gas turbines, Important components of gas turbine power plant, Methods of improving thermal efficiency, Essential auxiliaries and controls of a gas turbine power plants, Fuels for gas turbines.

UNIT-V

Hydro Electric Plants Economics

Types of Hydro Electric Plants Comparison of low, medium and high head plants, Elements of hydro power plants, Governing of turbine, Performance of water turbines, Site selection. Concept of occurrence of fluctuating loads,



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	Load curve and its significance, Definition and terminology of connected load, maximum demand, demand factor, average load, load factor, diversity factor, plant capacity factor, plant use factor, effect of variable load and remedies, energy auditing.
Course Outcomes	<ul style="list-style-type: none">• Able to get the basics of Power Plants. Knowledge,• Able to get the idea about the power generation by renewable and non-renewable energy resources• Able to know about the different types of cycles and natural resources used in power plants and their applications.
Text book	<ol style="list-style-type: none">1. S.Domkundwar -. A Course in Power Plant Engineering2. T.Morse -Course in Power Plant Engineering
References Books	<ol style="list-style-type: none">1. Nagpal - A Course in Power Plant Engineering Agrawal.2. Agrawal.-A Course in Power Plant Engineering



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Course Title	ESTIMATING & COSTING			
Course Code	DENEE404T			
Course Credits	L	T	P	TC
	3	1	-	4
Prerequisites	Basic cost and details of how to manage the cost in plant fields.			
Course objectives	<ul style="list-style-type: none"> • Determination of quantities of items and labour requirement of mechanical engineering works. • Preparation of estimate of the mechanical engineering works. Preparation of specification of production items 			
Course Contents	<p>UNIT-I Elements of Costing Fundamentals of Estimating Definition Objectives Elements of Cost Components of Cost, Overhead Allocation Depreciation and Obsolescence Method of Calculation of Depreciation Definition, importance and function of estimating procedure</p> <p>UNIT-II Estimation of Material Cost & Profit and Budget Estimation of volume and weight of material Provision for scrap Simple Problems Methods of Increasing Profit, Effects of the Methods on production, make and sales. Definition of Budget Departmental Budget Purpose of Budgetary Control Advantages of Budgetary Control Limitation of Budget</p> <p>UNIT-III Machine Shop Estimation & Welding Shop Terminology used in Machine Shop Estimation Use of Standard Table to determine Time Elements for various machining process Use of formula to calculate actual machining time for different operation of machine tools Calculation of production operation time per production cycle Batch production time Estimation of Welding Cost Gas Cutting Cost Arc Welding Cost Simple Problems</p> <p>UNIT-IV Estimation in Forging Shop & Foundry Shop Hand forging, machine forging, forging operation Estimation procedure Estimation of Losses Definition of Pattern Allowances Estimation of Pattern Cost Estimation of Foundry Cost</p> <p>UNIT-V Estimation in Sheet Metal Shop & Fabrication Cost</p>			



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	Introduction, Blank Layouts Sheet Metal Operation Capacity for Power Process Simple Problems Definition Elements of Cost of Fabrication Joining Methods
Course Outcomes	<ul style="list-style-type: none">• Draft detailed specifications and work out Rate Analysis for all works related to mechanical engineering projects.• Ascertain the quantity of materials required for mechanical engineering works as per specifications. ...• Prepare cost estimate and valuation of mechanical engineering works.
Text book	<ol style="list-style-type: none">1. Banga & Sharma - Mechanical Estimating & Costing2. Shrimali& Jain-Mechanical Estimating & Costing
References	<ol style="list-style-type: none">1. N.R. Agrawal-. Mechanical Estimating & Costing



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Course Title	ENTREPRENEURSHIP DEVELOPMENT				
Course Code	DENME605T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Fully based on entrepreneurship & job basis skill knowledge				
Course Objectives	<ul style="list-style-type: none"> The purpose of the course is that the students acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities, to develop the ability of analysing and understanding business situations in which entrepreneurs act and to master the knowledge necessary to plan entrepreneurial activities. The objective of the course is, further on, that the students develop the ability of analyzing various aspects of entrepreneurship 				
Course Contents	<p>UNIT-I Entrepreneurial Development & Business Organization Definition of entrepreneurship, Characteristics of entrepreneurs, Factors influencing entrepreneurship Need for promotion of entrepreneurship and smallbusiness Entrepreneurial Environment Environmental analysis. Government policies for setting up new small enterprises Opportunities in service industries. Forms of ownership Sole Proprietorship Partnership Cooperative society Joint – stock company Private Limited Companies Public Limited Companies</p> <p>UNIT-II Institutional support to SSI Planning a SSI Institutional set up Industries centers, Industrial estates Institutional support at National level Institutional support at State level Commercial banks and financial institutions What is planning? Types of planning Importance of planning Steps in planning Steps in planning a SSI Technical dimensions for setting up an enterprise</p> <p>UNIT-III Management of Small Business Firm Project selection, Formulation & Appraisal Functional areas of small business firm Fundamentals of Management Managerial effectiveness Essential data for effective control of small business Resource management Office management Employees Welfare & safety Factory rules and Labour Laws related to SSIs Sales Tax and Income Tax laws related to SSIs Project selection & formulation Scope of project report Content & Format of Project report Need of Project Appraisal Steps of Project Appraisal</p> <p>UNIT-IV Problems of Small industries</p>				



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	Power shortages Project planning Finance Raw material Production constraints Marketing Personal constraints Regulations UNIT-V Entrepreneurial Motivation Training Achievement Motivation Creative thinking Risk taking abilities
Course Outcomes	<ul style="list-style-type: none">• Have the ability to discern distinct entrepreneurial traits• Know the parameters to assess opportunities and constraints for new business ideas• Understand the systematic process to select and screen a business idea• Design strategies for successful implementation of ideas 5. write a business plan
Text book	1. Abrams Grant Pass, Oregon: Oasis Press-Entrepreneurship : Strategies & Resources 2. David H. Bangs Upstart Publishing Company, In Chicago- The Business Planning Guide
References books	1. Dr. C.B. Gupta Dr. N.P. Srinivasan Sultan Chand & Sons -Entrepreneurship development in India



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Course Title	AUTOMOBILE ENGINEERING-LAB				
Course Code	DENME601P				
Prerequisites	Basic automobile knowledge and practice				
Course objectives	<ul style="list-style-type: none"> • Basic knowledge and practice. • Basic knowledge of engine parts and components. 				
Course Credits	L	T	P	TC	
	-	-	4	2	
Course Contents	<p>LIST OF PRACTICALS / TUTORIALS:-</p> <ul style="list-style-type: none"> • Dismantling & assembly of 4 stroke petrol engine (Jeep/Car) • Dismantling & assembly of 4 stroke diesel engine.(Jeep/Car) • Dismantling and assembly of 2 stroke engine like Scooter/Moped/Motorcycle engine. • Disassembly and assembly of following carburettors with their correct tuning. (1) SolaxCarburettor (2) Scooter Carburettor, (3) 4 stroke motor cycle carburettor. • Disassembly and assembly of plunger type of fuel pump, rotary fuel pump & fuel injector with their correct tuning. • Study of Air & water-cooling systems of a motorcycle and car engine. • Dismantling & assembly of battery ignition system. • Study of Alternator, dynamo and Startor Bendix drive by dismantling & assembly. • Study of Gear box by dismantling & assembling of Sliding mesh, constant mesh & Synchromesh gear boxes. • Dismantling & assembling of single plate clutch, Diaphragm clutch, Centrifugal Clutch. • Dismantling assembly of steering gear of rack and pinion type of Maruti Car. • Study hydraulic braking system of Car / truck. • Study Air Braking system of truck. • Study of front axle and steering system of a car • Study independent & conventional Suspension system (Maruti/Jeep/Indica) • To balance wheels on Dynamic wheel balancing machine. • Conduct trial on petrol & diesel gas Analyzer & analyze results. • Tune up petrol & diesel engine for minimum Emission level 				
Course outcomes	<ul style="list-style-type: none"> • Identify the different parts of the automobile • Explain the working of various parts like engine, transmission, clutch, brakes • Describe how the steering and the suspension systems operate. 				



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Lab apparatus /instruments /machine/co mponents	<ul style="list-style-type: none">• Diesel engine model• Petrol engine model• Machine parts• Car/bike components• Brake system• Suspension system etc
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Course Title	REFRIGERATION & AIR CONDITIONING-LAB				
Course Code	DENME602P				
Prerequisites	Basic knowledge and practice				
Course objectives	<ul style="list-style-type: none"> • Basic knowledge and practice. • Basic knowledge of refrigeration & air conditioning. 				
Course Credits	L	T	P	TC	
	-	-	4	2	
Course Contents	<p style="text-align: center;">LIST OF PRACTICALS / TUTORIALS:-</p> <ol style="list-style-type: none"> 1. Trial on vapour compression test rig for calculation of COP, Work done per cycle, Refrigerating effect. Representation on P-H diagram. 2. Identification and location of refrigeration system and components in various application systems as Air conditioner, Household refrigerator, Water coolers Etc. 3. Study & analysis of vapour absorption system in a typical application 4. Study of Electrolux Refrigerator. 5. Physical properties of following Refrigerants. -Freon 12, - Freon22, - Freon 503 - Ammonia, - One type of Eco friendly refrigerant. 6. Dismantling & assembling of open type of compressor in view of following— -Identification of parts & their functions & Free hand sketching of parts. -Writing of specification of compressors. - Collection of information of compressor manufactures & their models. 7. Dismantling & assembling of Hermetic type of compressor in view of the above 8. Analysis & study of typical Evaporator and condensers 9. Study of following controls and valves used in Refrigeration systems. (i)Thermostatic switch (ii) LP & HP cut outs (iii)solenoid valve (iv)Service valves (v)Overload Protector 10. Demonstration & study of various tools used in refrigeration system such as – Tube cutter , Bending tools , Flaring tool [block & yoke type] , Swaging tool , Brazing tools , Blow lamps etc 11. Study of water cooler 12. Study of Air ducts & Air distribution systems in typical Air conditioned space in view of (1)Layout& type of air duct system .(2)Types of outlets (3)Identification of refrigeration equipment & cycle .(4)Type of blower , fans used & capacity of the unit . 13. Study various types of insulating materials used in refrigeration and air conditioning applications with their properties. 14. Study of window / split & package type of air conditioner [



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	introduction of parts ,path of refrigerant, refrigeration cycle capacity , assembling & dismantling installation 15. Study of Air conditioning system of bus/car.
Course outcomes	<ul style="list-style-type: none">• To describe major design considerations of air-side, water-side, ventilation and refrigeration systems.• To evaluate applications and design calculations of HVAC &R systems.
Lab apparatus /instruments/ machine/com ponents	<ul style="list-style-type: none">• Refrigerator• Cooling system• Vapour absorption system• Vapourcompression system• Water cooler• Ac etc



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Course Title	PROJECT & SEMINAR			
Course Code	DENME603P			
Prerequisites	Basic practical knowledge on field.			
Course objectives	<ul style="list-style-type: none"> • Basic knowledge of working field. • Basic knowledge of on duty based when the after diploma course get completed. 			
Course Credits	L	T	P	TC
	-	-	4	2
Course Contents	<p style="text-align: center;">BASICS OF PROJECT</p> <ol style="list-style-type: none"> 1. The project shall be executed in the following basic steps Project idea generation Literature survey for project. Design & Fabrication. Working & result analysis. The student should use following LISTED AREAS as the guidelines for basic project idea generation 2. Study & maintenance of different equipment which work on compressed air such as Pneumatic Impact wrenches, Air motors, Air blowers, Air spray gun, grease gun etc 3. Study & Maintenance of various conveyors such as roller conveyors belt conveyors, over head hanger conveyors used for material handling. 4. Study & maintenance of compressed air pipe lines, gas pipe lines and water pipe lines. 5. Study and maintenance of fork lifts used for material handling. Sample list of projects that can be taken by the group of 4 to 5 students 6. Repair and maintenance of machines such as lathe milling m/c, drilling m/c, shaper, planer, grinder etc 7. To fabricate work benches for two wheeler maintenance 8. To manufacture some attachments for existing machines such as spherical turning attachment, taper turning attachment to lathe, lapping attachment to lathe etc 9. To design and manufacture small material handling equipment required in the institute such as hydraulic trolleys, wheeled pallets etc 10. Design & manufacturing of jigs and fixtures 11. Design & manufacturing of attachment to machines 12. Manufacturing of dies 13. Simple automation in existing machines using hydraulic & pneumatic systems 14. Quality study in the industry 			



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	<p>15. To develop simple computer programs for various industrial applications.</p> <p>16. To study and manufacture innovative simple mechanisms from popular mechanics magazine or Invention intelligence magazine.</p> <p>17. Any research work.</p> <p>18. Suggested Implementation Strategy :-</p> <p>19. The student should review various literature and various industrial situations and applications before starting the project in order to generate the ideas.</p> <p>20. • Following modus operandi is to be used for execution of project.</p> <ul style="list-style-type: none">o In the first two weeks the students are given the idea about the project work that they will do along with the observations of other things mentioned in the syllabus.o The students will be going to such industries where they will get exposure to almost all contents in the syllabus. He will work simultaneously on his project selected by him. The student and institute should try to get permission/ sponsorship to enable students to work in the industry.o For one month i.e. 4 weeks he will spend in industry and in the remaining weeks, he will work on his selected project work may be in industry or in the institute work shop.
Course outcomes	<ul style="list-style-type: none">• The student will undertake one project which will consist of problem related to design and fabrication, repair and maintenance, fault finding of actual situations and thereby plan organize and execute the project actually.