

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

V SEMESTER DIPLOMA IN AUTOMOBILE ENGINEERING / MECH. ENGG.(AUTO)

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Automobile Component Design	1633501	03	03	10	20	70	100	28	40	03
2.	Advanced Automobile Engines	1633502	03	03	10	20	70	100	28	40	03
3.	Environmental Pollution and Control	1625503	03	03	10	20	70	100	28	40	03
4.	Automobile Manufacturing Process	1633504	03	03	10	20	70	100	28	40	03
5.	Basic Electrical & Electronics	1633505	03	03	10	20	70	100	28	40	03
			Total :-	15			350	500			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Advanced Automobile Engines Lab	1633506	04	03	15	35	50	20	02
7.	Basic Electrical & Electronics Lab	1633507	04	03	15	35	50	20	02
Total :-							100		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
8.	Industrial Project & Entrepreneurship Development (TW)	1625508	04	15	35	50	10	02
9.	Professional Practices-V -(TW)	1625509	03	15	35	50	10	02
10.	Automobile Component Design (TW)	1633510	03	15	35	50	20	01
Total :-						150		
Total Periods per week Each of duration One Hour					33	Total Marks = 750		24

AUTOMOBILE COMPONENT DESIGN

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633501	Theory						Credits 03
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/week	Marks
Unit -1	Basic concepts of Design:- 1.1 Introduction to design 1.2 Classification of design 1.3 Design consideration 1.4 Design procedure 1.5 Stress analysis: 1.5.1 Types of external loads 1.5.2 Types of induced stresses: tensile, compressive, shear, Crushing and bearing pressure, bending, torsion, thermal stresses, creep, proof stresses, resilience, principal stresses 1.5.3 Stress – strain diagram for ductile & brittle material & it's importance 1.5.4 Variable stresses in machine parts, fatigue & endurance limit, stress – time diagrams for variable stresses 1.5.5 Working stresses for static load, variable or fatigue load 1.5.6 Factor of safety, selection of factor of safety. 1.5.7 Stress concentration causes and remedies 1.5.8 Introduction to theories of failure –Maximum principle stress theory, Maximum shear stress theory, Distortion energy theory. 1.5.9 Selection of material and justifications for Automobile components. Advanced Materials for automotive components 1.6.1 Concept of standardization , Preferred numbers & interchangeability in design practice. 1.6.2 Common types of fasteners with their applications - Through Bolts, tap bolts, studs, cap screws , and machine screws ,designation of screw thread according to I.S., stresses in screw fasteners , Bolts of uniform strength. 1.6.3 Bearings-Classification ,location in Automobiles systems & selection of bearings 1.6.4 Post design aspects - Ergonomic aspect, Aesthetic consideration (shape, color, surface finish) for Automobile	16	14
Unit -2	Design of machine elements:- 2.1 Design of socket & spigot type cotter joint. 2.2 Design of knuckle joint 2.3 Design of Turn buckle 2.4 Applications of above machine elements in an automobile.	06	08
Unit - 3	Design of shafts, keys & Couplings:- 3.1 Conceptual understanding of shaft, axles & spindles. 3.2 Design of shaft for torsion, rigidity, bending, combined Torsion & bending. 3.3 Comparison of solid & hollow shafts. 3.4 Design of propeller shaft, whirling & critical speed. 3.5 Design of rear axle. 3.6 Types of keys, design of sunk rectangular key, woodruff key. 3.7 Effect of keyways on shaft. 3.8 Design of couplings- muff, flange, and bush pin type flexible.	10	10

Unit - 4	Design of levers:- 4.1 Types of levers 4.2 Design of 4.2.1 rocker arm, 4.2.2 bell crank lever, 4.2.3 hand lever 4.2.4 Pedals for rectangular cross-section & fulcrum pin only.	06	06
Unit - 5	Design of Chassis Component:- 5.1 Design of clutch- Single plate & Multi plate. 5.2 Teeth calculation of gears for sliding mesh/constant mesh gear box for given data. 5.3 Design of semi elliptical leaf spring , helical spring - torsion &compression	10	12
Unit - 6	Design of engine components:- 6.1 Data of engine specifications and calculations of cylinder dimensions for given power 6.2 Design of cylinder head thickness and bolts 6.3 Design of valve seat & valve lift 6.4 Design of piston crown by bending strength and thermal considerations. 6.5 Design of piston rings and skirt length 6.6 Design of piston pin for bearing, bending & shear considerations 6.7 Design of connecting rod cross -section (I section). 6.8 Design of big end, cap and bolts. 6.9 Design of overhung crank shaft.	16	20
	Total	64	70

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

ADVANCED AUTOMOBILE ENGINES

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633502	Theory						Credits 03
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/ week	Marks
Unit -1	<i>Engine Selection:-</i> 1.1 Comparison of SI and CI engines on the basis Thermal efficiency and fuel consumption 1.2 Comparison of SI and CI engines on the basis of thermodynamic and operating variables. 1.3 Comparison of performance characteristics. 1.4 S.I. and C.I. Engine application- with purpose of selection. Note: - assignment on comparative study of engine specification and it rating on basis of various parameters.	04	06
Unit -2	<i>Fuels and Alternative Energy Options for Auto Engines:-</i> 2.1 Different types of fuels, calorific value 2.2 Properties of S.I. Engine fuel 2.3 Properties of C.I. Engine fuel 2.4 Fuel additives and their effects 2.5 LPG as SI engine fuel. 2.6 Alcohol as gasoline fuel blends. 2.7 Alcohol as CI engine fuel. 2.8 Natural gas as a Transport fuel. 2.9 Electric cars and hybrid vehicles.	08	14
Unit – 3	<i>Theory Of Combustion:-</i> 3.1 Ignition limits 3.2 Stages of combustion in SI engine 3.3 Effect of engine variables on Ignition lag. 3.4 Effects of engine variables on flame propagation 3.5 Abnormal combustion- Detonation, pre-ignition, surface ignition, Effects of detonation. 3.6 Control of detonation. 3.7 SI engine combustion Chambers 3.8 Stages of combustion in CI engine 3.9 Air Fuel ratio in Diesel engines 3.10 Delay period and variables affecting delay period. 3.11 Diesel knock and its control. 3.12 CI engine combustion chambers.	08	12
	<i>Computer Controlled Fuel-Injection System:-</i> Part A 4.1 Throttle body injection (TBI) system, comparison with carbureted engine fuel supply system. 4.2 Multi-Point fuel Injection system (MPFI)/ Port fuel injection (PFI) system. Types of injection- sequential, grouped and simultaneous injections. Comparison of MPFI and TBI systems. 4.3 Electronic control module (ECM) control functions. 4.4 Inputs and outputs of electronic control module (ECM). 4.5 Output control functions- Fuel Injection control, Spark advance control, Idle speed control, Exhaust gas recirculation control and other controls.		

	Part B 4.6 Construction and working of fuel Injector and fuel pump. 4.7 Electronically controlled diesel Injection pump. 4.7.1 Electronic control system 4.7.2 Fuel system 4.7.3 Glow plug circuits 4.7.4 Injection pump timing 4.7.5 Electronic Injection advance. 4.8 Common rail direct injection system.	08	12
	Fuel Economy, Air pollution and Emission Control:- 5.1 Fuel Economy standards. 5.2 Methods of improving fuel economy. 5.3 Pollutants from gasoline engines. 5.4 Effect of engine maintenance on exhaust emission 5.5 Gasoline engine emission control, Catalytic Converters. 5.6 Diesel emission, Diesel smoke and control 5.7 Exhaust-Gas recirculation (EGR) – EGR Valve and control 5.8 Early fuel evaporation system 5.9 Positive crankcase ventilation (PCV) system 5.10 Electric assist choke system 5.11 Evaporation emission control system 5.12 Euro Norms and Bharat stage Norms. Equipment for checking Exhaust emission from vehicles. 5.13 Comparison of diesel and gasoline emission	10	12
	Total	48	70

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

ENVIRONMENTAL POLLUTION & CONTROL

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625503	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	03

CONTENTS: THEORY

Name of the Topic		Hrs/we	Marks
Unit -1	Introduction 1.1 Environment 1.2 Ecosystem 1.3 Classification of pollution & pollutants 1.4 Environment & pollution control acts 1.5 ISO 14000 standards, 1.6 Kyoto treaty / protocol, carbon units.	04	06
Unit -2	Air Pollution Part A 2.1 Sources & classification of air pollution 2.2 Effects of air pollution on human health 2.3 Effects of air pollution on economy 2.4 Photochemical air pollution Air pollution from major Industrial operations e.g. Fertilizer industries aluminum manufacturing plants, Acid plants, Cement industries, Coal & tar industries, paper industries, Refinery & petrochemical industries	10	14
	Part B Air pollution due to Automobiles-design and operating parameters and methods of control 2.6 Pollution due to S. I. Engines. Design & operating parameters responsible for emission and methods of pollution control. 2.7 Pollution due to C. I. Engines. Design & operating parameters responsible for emission and methods of pollution control. 2.8 Air quality & emission standards of India & Europe 2.9 Air pollution in Indian metro cities- Delhi, Mumbai, Chennai, Kolkata	14	18
Unit - 3	Water Pollution 3.1 Sources of water pollution. 3.2 Effects of water pollution. 3.3 Water pollution analysis 3.3.1 Physical examination of water 3.3.2 Chemical characteristics of water 3.3.3 Biological investigation of water 3.4 Definitions of Important terms used in water pollution – Dissolved O ₂ , Chemical O ₂ demand, Biological O ₂ demand, Theoretical O ₂ demand, Total solids, Total suspended solids, Total dissolved solids, Turbidity, Alkalinity, Acidity. 3.5 Water quality standards 3.6 Steps in Water treatment 3.7 Sampling & analysis of water pollution	06	10

Unit – 4	Noise Pollution 4.1 Definition of noise 4.2 Sources of noise 4.3 Types of noise – Impulsive & sonic noise 4.4 Effects of noise on health 4.5 Noise measurement 4.6 Noise mapping	04	08
Unit – 5	Other Types Of Pollution 5.1 Solid waste 5.1.1 Classification of solids 5.1.2 Solid waste management 5.1.3 Method of solid waste disposal 5.1.4 Reuse, Recycling & recovery of materials from refuse 5.2 Soil pollution 5.2.1 Chemistry of soil 5.2.2 Soil irrigation by effluents 5.2.3 Agricultural pollution 5.3 Radiation pollution 5.3.1 Sources & effects of radiation 5.3.2 Radiation exposure standards 5.3.3 Radiation protection 5.3.4 Treatment & disposal of radiation waste 5.4 Global pollution 5.4.1 Green house effect 5.4.2 Acid rain 5.4.3 Ozone depletion problem	10	14
	Total	48	70

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

AUTOMOBILE MANUFACTURING PROCESSES

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633504	Theory						Credits 03
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/week	Marks
Unit -1	Forging:- 1.1 Forgeable materials and forgeability. 1.2 Advantages and limitations of forging process. 1.3 Classification of forging processes. 1.4 Forging by open and close dies. 1.5 Forging sequences for connecting rods, crankshafts, camshafts, spanners and gears.	08	14
Unit -2	Press and press work:- Materials used in press work. 2.2 Classification of presses. 2.3 Major parts of mechanical press and their functions . 2.4 Drive mechanisms used on presses. 2.5 Parts of standard die set. 2.6 Operations which can be performed on presses like Punching, piercing, blanking, forming, drawing. Press components used in automobiles.	10	14
Unit – 3	Welding processes:- 3.1 Classification of welding process. 3.2 Working principle of Gas welding and types of flames. 3.3 Arc welding process like metal arc, TIG. MIG. 3.4 Resistance welding (spot, projection, seam, butt) 3.5 Alluminium and Cast iron welding. 3.6 Brazing and soldering. 3.7 Introduction to Plasma arc welding. Specific applications pertaining to auto industry.	10	14
Unit – 4	Surface Treatment and finishing processes:- 4.1 Selection and use of surface treatment and finishing process. 4.2 Surface cleaning processes: blasting, tumbling, alkaline, acid and electrolytic cleaning. 4.3 Surface coating processes : electroplating, galvanizing, Metal Spraying, painting. 4.4 Surface finishing processes : Lapping, honing, Super finishing, buffing, burnishing. (Applications from auto industry to be given).	10	14
Unit – 5	Introduction to CNC machines:- 5.1 NC and CNC machines. 5.2 Classifications of CNC machines. 5.3 Advantages and disadvantages of CNC machines. 5.4 Working principle of CNC machines. 5.5 Principle of Computer aided part programming. 5.6 Part programming – Do loop, Subroutine, Canned cycle.	10	14
	Total	48	70

Text / Reference Books:		
Titles of the Book	Name of Authors	Name of the Publisher
Elements of Workshop Technology. Vol. – I & II	S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Media Promoters & Publishers Pvt. Ltd. Mumbai.
Workshop Technology Vol. – I & II.	H. S. Bawa	Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
Workshop Technology Part- I, II & III	Dr. W. A. J. Chapman	ELBS & Edward Arnold (Publishers) Ltd., London.
Manufacturing Processes	B. H. Amstead, Phillip Ostwald, Myronl Begeman.	John Wiley & Sons (Eighth Edition)
CNC machines programming & applications.	Aditan, Pabla	Willey Estarn Ltd.
Production Technology	H.M.T.	H.M.T.
<p>R. Video Cassettes and CDs:</p> <p>Video cassettes developed by: -- Electronics Trades and Technology Development Corporation (A Govt. of India undertaking), Akbar Hotel Annex , Chanakyapuri , New Delhi – 110 02.</p> <p>Learning Materials – CBT Packages developed by N.I.T.T.T.R, Bhopal.</p>		
Composites for Automotives	Uday Vaidya	
Textiles in automotive engineering	Walter Fung	

BASIC ELECTRICAL & ELECTRONICS

(AUTOMOBILE ENGG.GROUP)

Subject Code 1633505	Theory						Credits 03
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	<i>Basic concepts & principles of Electrical Engineering</i> 1.1 Voltage, Current, Resistance, Ohm's law 1.2 Magnetism, Electromagnetism, Law of Electromagnetic Induction 1.3 AC fundamentals, Concept of active and reactive power 1.4 Application of measuring Instruments – volt meter, ammeter, inductive/ tongue tester and multimeters. 1.5 Principles of transformers. Ampere turns ratio. 1.6 Construction of transformer. 1.7 Core and shell type transformer. 1.8 Auto transformer-types and comparison.	12	16
Unit -2	<i>Electric Motors and Generators</i> 2.1 DC motors:-Principle, Construction, types and applications 2.2 AC motors:-Principle, Construction and applications 2.3 Stepper motor-Types of stepper motor, principle, construction, applications and specifications. 2.5 Concept and working principle of D.C. generator and alternator.	06	10
Unit - 3	<i>Wiring and Lighting Circuit</i> 3.1 Symbols of electrical circuits and wiring colour code, size, comparison of insulated & ground return system, Positive & negative return system, their comparison. 3.2 Need of wiring Harness, Wiring diagram of :- Head light, Turn indicator, Horn, Windshield wiper, Power window, Power seat, Battery ignition, Magneto ignition.	06	10
Unit -4	<i>Basic Electronics</i> 4.1 Semiconductors, 4.2 Diode :-PN junction, zener diode symbol, Characteristics and application. 4.3 Rectifier-half, full, Bridge type with filters(C,LC,Π type). 4.4 Transistor:- BJT:-NPN, PNP transistor, symbol, working. 4.5 TRIAC, DIAC, , Silicon control rectifier(SCR):-Symbol, working . Comparison between Transistor and SCR. 4.6 Amplifier:-Common emitter configuration only 4.7 Power device:-photodiode, LED, LDR, phototransistor working 4.8 TRIAC,DIAC, Silicon control rectifier(SCR):-Symbol, working 4.9 Concept of Oscillators	10	10

Unit -5	Transducers/Sensors and their applications 5.1 Electromechanical type transducers: -Potentiometric resistances type, Inductive (LVDT), Capacitive, Piezoelectric. 5.2 Photoelectric type transducers: Photoemissive ,Photovoltaic, Photoconductive 5.3 AC/DC Electronic timer block diagram study 5.4 Concept of General measurement system & difference between mechanical and electrical/electronic instruments 5.5 Measurement of Pressure:- Working of thermocouple vacuum gauge, Pirani vacuum gauge, Varying pressure measurement; 5.6 Measurement of Flow:- Hot wire anemometer, Ultrasonic flow meter; 5.7 Measurement of Temperature:- Working of Thermopiles, Thermister ; 5.8 Measurement of Speed:- contactless electrical tachometer:- Inductive, Capacity type tachometer, Stroboscope; 5.9 Measurement of Force:- Strain gauge load cell; 5.10 Electrical method for moisture measurement	10	18
Unit -6	Digital Electronics 6.1 Define analog signal and digital signal 6.2 Study of logic gates(NOT,OR, NOR, AND, NAND) symbols and truth table 6.3 Study of flip flops only RS & D : symbols and truth table 6.4 Working principle with block diagram of shift register & counter 6.5 Working principle with block/ logic diagram of encoder & decoder 6.6 Working principle with block/logic diagram of multiplexer and demultiplexer 6.7 Working of seven segment LED display	04	06
	Total	48	70

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

ADVANCED AUTOMOBILE ENGINES LAB

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633506	Practical			Credits		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	ESE	:	50
	—	—	04	Internal	:	15
	—	—	—	External	:	35

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

1. Identify types of combustion chamber.
2. Locate faults in MPFI system.
3. Identify components of electronic fuel injection system (EFI).
4. Diagnose EFI system.
5. Diagnose engine condition from exhaust gas analysis. To interpret results.

Motor Skills:

- 1) Observe combustion chamber.
- 2) Observe EFI system components & their locations.
- 3) Use diagnostic tester for Electronics fuel injection system diagnosis.
- 4) Set carburetor for proper / reduced exhaust emission.
- 5) Set valve clearance by adopting proper procedure.
- 6) Draw valve-timing diagram.

Adopt recommended service manual procedure for testing EFI system & exhaust gas analyzer application.

List of Practical:

1. Cylinder Head Observation and Combustion Chamber Identification:
Remove the cylinder head of an engine. Observe the combustion chamber, location of valves, spark plug or Injector.
---Decarbonise combustion chamber. Clean and refit.
---Use any four engines: - a) Bullet, b) Luna, c) Multi cylinder Petrol Engine, d) Multi- cylinder Diesel engine, e) Scooter Engine.
---Interpret the type of combustion chamber. Sketch them and describe the construction. State the characteristics of the combustion chamber.
---Check the valve-seats for leakage. Check the condition of Spark Plug or fuel injector. Check the glow plug operation.
2. Valve Clearance Adjustment and Valve Timing Investigation:
 - Perform Tappet setting of a single cylinder four-stroke engine.
 - Perform Tappet setting of a multi cylinder engine.
 - Construct the Port timing diagram of a two- stroke engine.
 - Construct the Valve timing diagram of a four-stroke engine.
 - Electronic Fuel Injection System Diagnosis:
3. Diagnose Electronic fuel Injection system with diagnostic tester/ engine scanner.
 - Perform On-Board diagnosis.
 - Read trouble code at engine check Light/Malfunction Indicator light.
 - Use Engine scanning tool for diagnosis
 - Locate various Components of Electronic fuel injection system.
 - Identify components of EFI system.
 - Perform stand –alone diagnosis using a Multi-meter and test lamp.
- 4 Exhaust Gas Analysis:
Perform Exhaust gas analysis of an engine exhaust using 4-gas analyzer:
 - Diagnose engine condition from exhaust gas analysis.
 - Follow test cycle –modes of operation.

BASIC ELECTRICAL & ELECTRONICS LAB

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633507	Practical			Full Marks			Credits
	No. of Periods Per Week			:	:	25	
	L	T	P/S	ESE	:	25	
	—	—	04	Internal	:	07	
	—	—	—	External	:	18	02

CONTENTS: PRACTICAL

Skills to be developed:

Intellectual Skills:

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

Motor Skills:

- To draw circuits.
- To measure various parameters.

List of Practical:

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

INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT -TW
(MECHANICAL ENGINEERING GROUP)

Subject Code 1625508	Term Work						Credits 02
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

CONTENTS: TERM WORK

Name of the Topic		Hrs/week
Unit -1	1.1 Entrepreneurship, Creativity & Opportunities Concept, Classification & Characteristics of Entrepreneur 1.2) Creativity and Risk taking. 1.2.1) Concept of Creativity & Qualities of Creative person. 1.2.2) Risk Situation, Types of risk & risk takers. 1.3) Business Reforms. 1.3.1) Process of Liberalization. 1.3.2) Reform Policies. 1.3.3) Impact of Liberalization. 1.3.4) Emerging high growth areas. 1.4) Business Idea - Methods and techniques to generate business idea. 1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea & Feasibility of opportunity SWOT Analysis	03
Unit -2	Information And Support Systems 2.1) Information Needed and Their Sources. Information related to project, Information related to support system, Information related to procedures and formalities 2.2) SUPPORT SYSTEMS R. Small Scale Business Planning, Requirements. R. Govt. & Institutional Agencies, Formalities Statutory Requirements and Agencies.	03
Unit -3	Market Assessment 3.1) Marketing –Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	02
Unit -4	Business Finance & Accounts Business Finance 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance Business Account 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,	03

Unit -5	Business Plan & Project Report 5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2) Project Report 1) Meaning and Importance 2) Components of project report/profile (Give list) 5.3) Project Appraisal	03
Unit -6	Enterprise Management And Modern Trends 6.1) Enterprise Management: - 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	02
	Total	16
Contents (PART A) Industrial Project)		Hrs/week
Following activities related to project are required to be dealt with, during this semester		
Unit -1	<ul style="list-style-type: none"> Form project batches & allot project guide to each batch. (Max. 4 students per batch). 	
Unit -2	<ul style="list-style-type: none"> Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department. 	
Unit – 3	<ul style="list-style-type: none"> Each project batch should prepare action plan of project activities & submit the same to respective guide. 	
Unit – 4	<ul style="list-style-type: none"> At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project. 	
Unit – 5	<ul style="list-style-type: none"> Action Plan should be part of the project report. 	
Part B: Entrepreneurship Development		Hrs/week
OBJECTIVES: Students will be able to		
Unit – 1	<ul style="list-style-type: none"> Identify entrepreneurship opportunity. 	
Unit – 2	<ul style="list-style-type: none"> Acquire entrepreneurial values and attitude. 	
Unit – 3	<ul style="list-style-type: none"> Use the information to prepare project report for business venture. 	
Unit – 4	<ul style="list-style-type: none"> Develop awareness about enterprise management 	

Text/ Reference Books:		
Titles of the Book	Name of Authors	Name of the Publisher
Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing. Mumbai
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. Ltd. New Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O.
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi	Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in / olpe@ediindia.org Website : http://www.ediindia.org
National Derectory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar	
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta	
A Handbook of New Entrepreneurs	P.C.Jain	
Evaluation of Enterpreneurship Development Programmes	D.N.Awasthi , Jose Sebeastian	
The Seven Business Crisis & How to Beat Them.	V.G.Patel	
Poornima M. Charantimath	Entrepreneurship Development of Small Business Enterprises	Pearson Education, New Delhi
Special Edition for MSBTE	Entrepreneurship Development	McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi
Entrepreneurship Development		NTTTI, Bhopal / Chandigarh
Development Banking In India	Kaushal Kumar Arora	
Entrepreneurship Development	S Anil Kumar	
<u>2) VIDEO CASSETTES</u>		
Subject		Source
Five success Stories of First Generation Entrepreneurs		EDI STUDY MATERIAL Ahmedabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail :
Assessing Entrepreneurial Competencies		
Business Opportunity Selection and Guidance		
Planning for completion & Growth		
Problem solving-An Entrepreneur skill		

GLOSSARY:**INDUSTRIAL TERMS**

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

Components of Project Report:

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

Assignment:- Prepare a project report and study its feasibility.

PROFESSIONAL PRACTICES V-TW
(MECHANICAL ENGINEERING GROUP)

Subject Code 1625509	Term Work						Credits 02
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

CONTENTS: TERM WORK

	Activity	Hrs/week
Unit -1	Industrial Visits Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work (2 visits). Following are the suggested type of Industries/ Fields - i) A modern garage with engine scanning facility (diagnosis of electronic fuel injection systems). ii) A vehicle manufacturing company (Exhaust gas analysis, vehicle testing). iii) Central Institute of Road Transport, Pune. iv) Vehicle Research, Development & Establishment, A'nagar. v) Automotive Research Association of India, Pune. vi) Hydroelectric power plant / sub-station. vii) Vehicle body building workshop. viii) A refuse, recycling / reclamation site. ix) Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc. x) Wheel Balancing unit for light and/or heavy motor vehicles.	
Unit -2	The Guest Lectures from field/industry experts , professionals to be arranged (2 Hrs duration), minimum 3 nos. from the following or alike topics. A brief report, on the guest lectures, is to be submitted by each student as a part of Term work. a) Electronic fuel injection systems. b) Exhaust gas analysis. c) Vehicle testing. d) Computer aided drafting. e) Electric motors & generators. f) Automotive wiring & lighting. g) Transducer application in automobiles. h) Environmental pollution & control. i) Vehicle aerodynamics & design. j) Earth moving machines. k) Automobile pollution, norms of pollution control.	

Unit - 3	Information Search :- Search information on Any Two of the following suggested topics and write a report (group size – 3 to 5 students, report – up to 10 pages) a) Common rail direct injection system / MPFI / TBI system. b) LPG conversion kit. c) CNG conversion kit. d) Vehicle pollution norms & pollution control methods. e) Alternative fuels & energy options. f) Vehicle / Engine tuning. (Tappet clearance values, injection timing, ignition timing, injector opening pressure, spark plug gap, trouble code of MPFI / CRDI system, Idling RPM, Clutch lining thickness, various clearances in clutches, differential backlash, brake lining thickness, various clearances in brakes, steering backlash). g) Vehicle aerodynamics & design. h) Vehicle testing. i) Laboratory testing of vehicle subsystems As per IS/SAE norms) j) Bio-diesel	
Unit - 4	Group Discussion : 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 faculty members may select ANY TWO topics for group discussion. Some of the suggested topics are - I) CNG versus LPG as a fuel. II) Petrol versus Diesel as a fuel for cars. III) Trends in automobile market. IV) Load shading and remedial measures. V) Rain water harvesting. VI) Trends in energy. VII) Disaster management. VIII) Safety in day-to-day life. IX) Energy Saving in Institute. X) Nano technology.	
Unit - 5	Seminar : Seminar topic should be related to the subjects of fifth semester / topics from information search & guest lectures given above. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	
Unit - 6	Mini Project : Any other equivalent/Similar topics (any one) . 1) Design / Drawing of engine component in a group of 4 students. 2) Prepare Models of Fuel injection pump components using suitable material. 3) Preparing preventive maintenance schedule for an automobile. <p style="text-align: center;">OR</p> Modular Courses on ANY One of the suggested or alikerelevant topic be undertaken by a group of students (Min 10): a) LPG/CNG conversion of vehicles b) Advance features in CAD. Two Assignments be completed on the course work as a part of the Term Work.	
Text / Reference Books:-		
Titles of the Book	Name of Authors	Name of the Publisher
Architects essentials of ownership transitions	Peter Piven	

AUTOMOBILE COMPONENT DESIGN -TW

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633510	Term work						Credits 01
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

CONTENTS: TERM WORK

Skills to be developed:

Intellectual Skills:

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

Motor Skills:

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

List of Term Work :

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

DESIGN PROJECT

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

NOTES:

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