

**DIPLOMA CURRICULUM OF
AUTOMOBILE ENGINEERING
(THIRD YEAR)
(5th Semester)**

(To be implemented from 2026-27)

Prepared by;



**National Institute of Technical Teachers' Training & Research Kolkata
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Vetted by:

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PROGRAMME TITLE: AUTOMOBILE ENGINEERING

SEMESTER - V

SL. No	Category of Course	Code No	Course Title	Study Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	Programme Core	AEPC301 TH:1	Automobile Engines - II	-	3	0	0	70	30	-	-	100	3
2		AEPC303 TH:2	Automobile Component Design	-	3	0	0	70	30	-	-	100	3
3		AEPC305 PR:1	Automobile Engines-II Lab	-	0	0	4	-	-	15	35	50	2
4		AEPC307 PR:2	Automotive body shop	-	0	0	4	-	-	15	35	50	2
5	Programme Elective	AEPE301 TH:3	(A)Electric and Hybrid Vehicles (B)Heat Transfer	-	3	0	0	70	30	-	-	100	3
6		AEPE303 TH:4	(A)Automotive Electrical and Electronics system (B)Alternative Fuels	-	3	0	0	70	30	-	-	100	3
7		AEPE305 PR:3	(A)Electric and Hybrid Vehicles Laboratory (B)Heat Transfer Laboratory (C)Alternative Fuels Laboratory	-	0	0	4	-	-	15	35	50	2
8	Open Elective	OE301 (Any one) TH:5	(A)Universal Human Values (B)Leadership and Management skills (C)Professional skills	-	3	0	0	70	30	-	-	100	3
9	Summer Internship	SI301	SUMMER INTERNSHIP II*	-	0	0	0	-	-	15	35	50	2
10	Major Project	PR301 PR:4	MAJOR PROJECT	-	0	0	4	-	-	15	35	50	2
TOTAL					15	0	16	350	150	75	175	750	25

*3-4-week internship after 4th Semester ## Assessment to be done, credit to be carried over

*The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this, Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours.

SEMESTER V

TH:1- AUTOMOBILE ENGINES II

L	T	P	Total Marks: 100	Course Code: AEPC301
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite : Nil				
Credit 3				Category of Course: PC

RATIONALE:

Different parts of the engine and other systems of the automobile engine i.e., lubrication and cooling are also important for the automobile engineers. Besides these aspects, measurement of engine performance and testing of the engine is required, which is dealt in this course.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Identify the components of an automobile with their working.

CO2: Explain the concepts of cooling and lubricating systems.

CO3: Explain the concepts of Ignition and Transmission and steering systems.

CO4: Identify different suspension systems and their applications.

CO5: Differentiate the special vehicles according to the usage.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	ENGINE DETAILS - I: Cylinder block –Material, construction and manufacturing process, Failures in cylinder block, their causes, symptoms and remedies. Cylinder Head – (Material, construction and manufacturing process), Failures in cylinder head, their causes, symptoms and remedies. Crankcase-Material, construction and manufacturing process, Failures in crankcase, causes, symptoms and remedies. Oil Pan– (Material, construction and manufacturing process), Failures in Oil pan, causes, symptoms and remedies. Inlet manifold, Failures in inlet manifold, causes, symptoms and remedies. Exhaust Manifold -Material, construction and manufacturing process, Failures in Exhaust manifold, causes, symptoms and remedies. Cylinder Liners – Material, construction, manufacturing process and comparison, Failures in Cylinder Liners, causes, symptoms and remedies. Piston – Types, Functions, Construction details, Material, Typical temperature in SI and CI pistons. Heat dissipation– Slots in piston – Horizontal, vertical, inclined, Piston Failures viz. Scuffing (types), scored, Burnt land, Ring damage, Boss and Circlip groove damage. Symptoms, causes and remedies. Piston Rings- Compression rings – Rectangular, Symmetric, Barrel holed.	9
II	ENGINE DETAILS – II: Crankshaft–Construction, manufacturing, working and location), Failures in crankshaft. Flywheel - Construction, function, working and location. Engine Valves- Sleeve, poppet, disc, rotary and reed valve. Valve seats, valve guides and valve springs. Failures, symptoms, causes, remedies in valves and valves seats. Valve actuating mechanisms– Cam in block and over head cam (OHC) arrangements (Construction, working, comparison), Failures, symptoms, causes, remedies in Valves Connecting Rod– Construction, manufacturing, working and location, Failures, symptoms, causes, remedies in connecting rod. Gaskets and Seals types - Cylinder head gaskets, manifold gaskets, water body gasket, oil pan gasket, crank case of two wheeler gasket, Carburettor gaskets, and radiator gasket. Muffler- Baffle type, wave cancellation type, absorber type, reverse flow, combined resonance and observer type and acoustics tuning devices.	9

III	ENGINE LUBRICATION: Introduction of Lubrication system of engines, Functions of Lubricating Oil, Viscosity, Properties of Lubricating oil, Additives for Lubricants, Importance of Low Viscosity oil, Classification of Lubricating oil, Lubrication system in automobile engines, Crankcase ventilation.	9
IV	ENGINE COOLING: Need of engine cooling system. Air Cooling – Construction, working, advantages and limitations. Water-cooling system, Thermosiphon, Pump circulation, cooling with thermostatic regulation, pressurized water cooling and evaporative cooling, Parts of Cooling system– Water-jackets in cylinder head and block, hoses joints, water pump, thermostat, Cooling Fan and Fan Belts, Radiator (Tubular and Cellular Type), Radiator Cap, Coolant – (Types, Composition, Properties), Cooling water additives.	9
V	ENGINE TESTING: Define air-fuel ratio & calorific value of fuel. Engine performance Parameters to be tested viz. IHP, BHP, efficiency, fuel consumption, air consumption. Measurement of indicated power, Measurements of brake horsepower – Friction dynamometer, hydraulic dynamometer, electrical dynamometer (swing field and Eddy current). Define mechanical efficiency, indicated thermal efficiency, Relative Efficiency, Brake thermal efficiency, overall efficiency, Mean effective pressure & specific fuel consumption. Morse – test and preparation of heat balance sheet	9
Total		45

REFERENCE BOOKS:

1. Kirpal singh Automotive Engineering Vol I Standard publishers and distributors, New Delhi
2. Crouse and Anglin Automotive Mechanics McGraw Hills International Pub
3. K. K. Jain and R. B. Asthana Automobile Engineering TMH
4. Don Knowles Auto Mechanics-Understanding new technology Reston Publishers, New Jersey
5. Mathur and Sharma Internal Combustion Engine Dhanpat Rai and Sons, New Delhi
6. Bosch Diesel Fuel Injection SAE (distributor)
7. Anthony E. Schwaller Motor Automotive Technology Delmar Publishers, USA

TH:2- AUTOMOBILE COMPONENT DESIGN

L	T	P	Total Marks: 100	Course Code: AEPC303
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite : Nil				
Credit 3				Category of Course: PC

RATIONALE:

Different parts of the engine and other systems of the automobile engine i.e., lubrication and cooling are also important for the automobile engineers. Besides these aspects, measurement of engine performance and testing of the engine is required, which is dealt in this course.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Analyze the loads type of induced stresses resisting areas and the modes of failure.

CO2: Identity modes of failure and relevant theory for problem solving.

CO3: Analyze practical problem and make use of material, strength equations, factor of safety.

CO4: Use design data book to standardize component dimensions and select the appropriate one.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	Basic concepts of design: Introduction to design, Classification of design, Design Consideration, Design procedure, Stress analysis, Types of external loads, Types of induced stresses: tensile, compressive, shear crushing and bearing pressure, bending, torsion, thermal stresses, creep, proof stresses resilience principal stresses. Stress-strain diagram for ductile and brittle material and its importance. Variable stresses machine parts, fatigue and endurance limit, stress-time diagrams for variable stresses, Working stresses for static load, variable or fatigue load, Factor of safety, selection of factor of safety, Stress concentration causes and remedies, Introduction to theories of failure-maximum principal theory. Maximum shear stress theory, Distribution energy theory, Selection of material and justifications of automobile components, advanced materials for automotive components, Common types of fasteners with their applications-through bolts, tap bolts, top bolts, studies cap screws and machine screws, designation of screw thread, stresses in screw fasteners, bolts of uniform strength, Bearings – classification, location in automobiles systems and selection of bearings, Post design aspects ergonomic aspect aesthetic consideration (shape, colour, surface finish) for automobile.	12
II	Design of machine elements: Design of socket and spigot type cotter joint, Design of knuckle joint, Design of turnbuckle, Application of above machine elements in an automobile.	6
III	Design of shafts, keys and couplings: Conceptual understanding of shaft, axles and spindles, Design of shaft for torsion, rigidity, bending, combined bending and torsion, Compression of solid and hollow shafts, Design of propeller shaft, whirling and critical speed, Design of rear axle, Types of keys design of sunk rectangular key, woodruff key, Effect of keyways on shaft, Design of coupling-muff, flange and bush pin type flexible.	9
IV	Design of levers: Types of levers, Design of Rocker arm, Bell crank lever, Hand lever, Pedals for rectangular cross-section and fulcrum Pin.	3
V	Design of chassis component: Design of clutch- single plate and multi plate, Design of semi elliptical leaf spring, helical spring-torsion and compression.	6
VI	Design of engine components: Data of engine specifications and calculation of cylinder dimensions for given power. Design of cylinder head thickness and bolts, Design of piston crown by bending strength and thermal considerations, Design of piston rings and skirt length, Design of piston pin for bearing, bending and shear considerations, Design of connecting rod cross-section (I-section).	9
Total		45

REFERENCE BOOKS:

1. Machine Design by R.K. Jain, Khanna Publisher.
2. Machine Design by P.C. Sharma, D.K. Agrawal, S.K. Kataria and sons
3. Machine Design by R.S. Khurmi and J.K. Gupta, Eurasia Publication House.

PR:1- Automobile Engines II Lab

L	T	P	Total Marks: 50	Course Code: AEPC305	
0	0	4			
Total Contact Hours				Practical Assessment	
Practical : 60Hrs				End Term Exam 15	
				Progressive Assessment 35	
Pre-Requisite : Nil					
Credit 2				Category of Course: PC	

RATIONALE:

In automobile engine II, the different parts of the engine and other systems of the engine i.e., lubrication and cooling has been dealt. Besides these aspects, measurement of engine performance & testing of the engine and operation of valve grinding, crank & camshaft machine has also been described.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Assemble petrol and diesel engines.

CO2: Overhauling of cooling system

CO3: Test the performance of petrol and diesel engines.

CO4: Execute cylinder boring and valve refacing

CO5: Experiment Crank shaft and cam shaft grinding

LIST OF EXPERIMENTS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
1	Dismantle and Assembly of single cylinder petrol engine (two wheeler) like scooter, motorcycle etc.	4
2	Dismantle and Assembly of petrol engine & diesel engine (four wheeler)	8
3	Demonstration of lubricants chart and refilling of engine oil.	4
4	Remove the radiator from the vehicle, check it for leak, clean and reverse flush the radiator and refit . Remove the water pump & thermostatic valve, clean, inspect and refit.	8
5	Engine performance testing through load test machine .	8
6	Engine performance testing through Morse test machine.	8
7	Cylinder boring by using vertical boring bar & Fine finishing operation of cylinder bore by using cylinder honing machine.	8
8	Crank shaft grinding by using crank shaft grinding machine.	4
9	Cam shaft grinding by using cam shaft grinding machine.	4
10	Valve refacing by valve refacing machine.	4
	Total	60

REFERENCE BOOKS:

1. Kirpal singh Automotive Engineering Vol I Standard publishers and distributors, New Delhi
2. Crouse and Anglin Automotive Mechanics McGraw Hills International Pub
3. K. K. Jain and, R. B. Asthana Automobile Engineering TMH
4. Don Knowles Auto Mechanics-Understanding new technology Reston Publishers, New Jersey
5. Mathur , Sharma Internal Combustion Engine Dhanpat Rai and Sons, New Delhi
6. Bosch Diesel Fuel Injection SAE (distributor)
7. Anthony E. Schwaller Motor Automotive Technology Delmar Publishers, USA

PR:2- AUTOMOTIVE BODY SHOP

L	T	P	Total Marks: 50	Course Code: AEPC307	
0	0	4			
Total Contact Hours				Practical Assessment	
Practical : 60Hrs				End Term Exam	15
				Progressive Assessment	35
Pre-Requisite : Nil					
Credit 2				Category of Course: PC	

RATIONALE:

Most of the recent developments in auto field have taken place in the area of safety, security and comfort. Automobile body mainly contributes in all these aspects of modern requirements and developments.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Identify the role of auto body in safety, comfort and security of vehicle.

CO2: Estimate the performance of vehicle.

CO3: Assess the body layout and chassis frame for vehicles.

CO4: Construct the auto body and perform surface treatment.

COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Learning and operation of automatic car washing machine.	8
II	Identify and perform various denting and painting equipment and their functioning	8
III	Demonstrate upholstery works and observe how to built comfort system in any vehicle and collision assessment.	8
IV	Draw a body structure of a car and a bus.	8
V	Practice on body sheet metal repair techniques using spot welding, MIG/MAG welding.	8
VI	Demonstrate the use of body and fender tool kit.	4
VII	Identify and draw a neat diagram of various sections and joints used in bus body building viz. hat, Z, channel, gussets, clits etc.	4
VIII	Study and practice painting techniques in modern painting booth. (sanding, masking, priming and painting)	4
IX	Study of prevalent auto body decoration and safety components and assemblies	4
X	Study and demonstration of plastic repair techniques. (Bumper and pannel repair using plastic welding or adhesives)	4
	Tota	60

REFERENCE BOOKS:

1. Kirpal Singh Automobile Engineering Vol-I Standard Publishers New Delhi
2. Bill Tobolt Auto body repairing and repainting The Good Heart- Willcox Co. Inc, Home wood, Illinois
3. John Kendrick and Robert Macpherson Crash Assessment and repairs Mc Grow Hills Book Company (UK) Ltd., Landon
4. SAE, USA, SAE Handbook.
5. Auto body builders' viz. ACGL, Sutlug manualvi.
6. Ministry of surface transport, Govt. of India, Motor vehicle act 1988.

TH:3(A)- Electric and Hybrid Vehicles

L	T	P	Total Marks: 100	Course Code: AEPE301A
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite : Nil				
Credit 3			Category of Course: PE	

RATIONALE:

Vehicle electrification and hybridization is recognized as the most promising road transportation solutions to the global energy crisis due to depleting fossil fuels. Also, increasing requirements related to environmental protection and vehicle safety are a major concern. Emerging Electric and hybrid electric vehicles (EVs and HEVs) are complex mechatronic systems. In such a scenario, this course is much helpful for the budding engineers.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Identify the basics on vehicle development

CO2: Classify various electric vehicles and batteries available.

CO3: Describe the basic operation of electric motors.

CO4: Explain the concept of hybrid vehicles.

CO5: Identify various vehicle emission control technologies.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	Introduction: Need for electric vehicle, Problems of electric vehicles – (range and batteries, charging, lack of performance, purchase price safety and reliability), Advantage of electric vehicle, Disadvantage of electric vehicle, Major component of electric vehicle – (motor, battery charger, controller, DC converter, energy management system)	9
II	Battery: Requirement of EV batteries, selection of battery, deep cycle battery, Types of battery for EVS (lead-acid battery, lithium-ion battery and their advantages and disadvantages, Ultra capacitor and its working principle, Flywheel and its advantages and disadvantages.	9
III	Classification of EVs: Battery electric vehicle (BEV)-(advantage disadvantage, application), Hybrid Electric Vehicle (HEV)- (advantage disadvantage, application), Plug-In Hybrid Electric vehicle(PHEV) – (advantage, disadvantage, application), Energy sources (battery, ultra capacitors, flywheels ,fuel cells), Requirements of EVs energy sources.	9
IV	Electric Motor - Electric motor, Requirements of EV motor, Brushed DC motor, Brushless DC motor, Switched reluctance motor AC induction motor, Indian electric vehicle (4 wheeler, 3 wheeler, 2 wheeler).	9
V	Hybrid vehicles: Hybrid electric vehicle (HEV), Advantage and disadvantage of HEV, Components of HEV, Working of hybrid vehicle Hybridization (micro hybrid, mild hybrid, full hybrid), Fuel cell electric vehicle (FCEV) working principle, advantages and disadvantages.	9
Total		45

REFERENCE BOOKS:

1. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, John Wiley and Sons Ltd, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles Design Fundamentals, CRC Press, 2011.
3. A.K. Babu, Electric and Hybrid Vehicles, Khanna Publishing House, New Delhi, 2018.

TH:3(B)- HEAT TRANSFER

L	T	P	Total Marks: 100	Course Code: AEPE301B
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite : Nil				
Credit	3			Category of Course: PE

Rationale:

This course is prepared to provide the detailed understating of various modes of heat transfer and its applications in automobile engineering. As required for diploma engineers, this course also provides the basic technical knowledge related to heat exchangers, fins etc.

Course outcomes:

At the end of the course, the student will be able to:

- CO1: Identify the concept of conduction
- CO2: Recognize the concept of fins
- CO3: Discuss the concept of convection
- CO4: Identify the concept of radiation
- CO5: Explain the basic concepts of heat exchangers

Course Content:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Conduction: Fourier law of heat conduction for isotropic material; Thermal conductivity; Derivation of the energy equation in three dimensions including transient effect; Non-dimensional thermal diffusivity and Fourier number; Types of boundary conditions (Dirchlet, Neumann, mixed type); One dimensional solution with and without heat generation; Analogy with electrical circuits.	9
II	Fins: rectangular and pin fins. Fin effectiveness and efficiency. Critical thickness of insulation. Lumped parameter approach and physical significance of time constant, Biot number, Validity of lumped parameter approach. Introduction to Heissler Chart.	8
III	Convection: Introduction, Newton's law of cooling; Momentum and energy equations in two dimensions; non-dimensionalization, importance of non-dimensional quantities and their physical significance. Velocity and thermal boundary layer thickness by integral method. Analogies between momentum, heat and mass transfer. Natural convection, effect of coupling on the conservation equations.	10
IV	Radiation: Physical mechanism of thermal radiation, laws of radiation, definition of black body, emissive power, intensity of radiation, emissivity, reflectivity, transmittivity, irradiation, radiosity. Radiation exchange between black bodies, concept of Gray-Diffuse Isotropic (GDI) surface. Radiation exchange between GDI surfaces by radiation network and radiosity matrix method. Radiation shielding.	11
V	Heat exchangers: Types of heat exchangers, parallel and counter flow types, Introduction to LMTD. Correction factors, fouling factor. NTU method for heat exchangers.	7
	Total	45

REFERENCE BOOKS:

1. Fundamentals of Heat and Mass Transfer by F. P. Incropera and D. P. Dewitt, 4th edition, John Wiley and Sons.
2. Heat Transfer- A Basic Approach by M.N. Ozisik, McGrawhill.
3. Heat Transfer by J.P. Holman, 8th edition, McGrawhill.
4. Elements of Heat and Mass Transfer by Vijay Gupta, 2nd ed. New Age International Publishers.

TH:4(A)- AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEM

L	T	P	Total Marks: 100	Course Code: AEPE303A
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite : Nil				
Credit 3				Category of Course: PE

RATIONALE:

The various automotive systems—like batteries, ignition, starting/charging, lighting, and sensors—are key to how vehicles run and perform. Different types of batteries, such as lead-acid, lithium-ion, and alkaline, each serve specific roles in powering vehicles, with proper charging and maintenance being essential for their lifespan. The ignition system starts the engine, and modern electronic systems offer more precise control. The starting/charging system, including the starter motor and alternator, keeps the engine running and the battery charged. Lighting and accessories improve safety and comfort, while sensors monitor everything from fuel and air management to engine performance and safety features. Advanced sensors, like those in driver assistance systems (ADAS), also help with things like autonomous driving. These systems work together to ensure vehicles are efficient, safe, and reliable.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- CO1: Explain the construction and testing of lead acid battery, charging of batteries and selection of battery for a vehicle.
- CO2: Identify the type of ignition system and advance and retarding of spark timing.
- CO3: Identify the type of starter motor and charging system. Selection of starter motor and alternator for a vehicle.
- CO4: Explain lighting system, various accessories and wiring system of a vehicle.
- CO5: Explain different types of sensors used in automobiles.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	Batteries: Lead acid, Lithium-ion and alkaline batteries, construction and working, battery rating, battery charging methods, testing and maintenance.	8
II	Ignition System: Construction and working of battery coil ignition systems and magneto coil ignition systems, spark advance mechanisms, electronic ignition systems -Transistorized coil ignition system, capacitor discharge ignition system and distributor less ignition system.	9
III	Starting/Charging System: Principle, construction and working of starter motor working of different starter drive units. Generator & Alternator – construction and working principle. Current Regulator, voltage Regulator & cut-out relay.	9
IV	Lighting System, Accessories and Wiring: Details of head light and side light head light dazzling and preventive methods. Automatic headlight-daytime running lamps. Electric horn and screen wiper, sun roof, defrosters. Fuel gauge, oil pressure gauge and water temperature gauge. Wiring diagram of four wheeler and two wheeler, symbols and standards.	9
V	Automotive Sensors: Overview of sensor applications in modern vehicles, Types of sensors: Analog vs Digital, Active vs Passive, Sensor signal processing and ECU interfacing. Air and Fuel Management Sensors:- Mass Air Flow (MAF) Sensor, Manifold Absolute Pressure (MAP) Sensor, Intake Air Temperature (IAT) Sensor. Engine Position and Speed Sensors: Crankshaft Position Sensor, Camshaft Position Sensor, Engine Speed Sensor. Exhaust and Emission Sensors: Oxygen(O₂) Sensors, NO_x Sensor and EGR Valve Sensor Throttle and Knock Sensors: Throttle Position Sensor (TPS), Knock Sensor Safety and Stability Sensors: Wheel Speed Sensors (ABS), Steering Angle Sensors, Airbag Sensors. Advanced Driver Assistance Sensors: Radar, LiDAR, and Ultrasonic Sensors, Lane Departure Sensors, Blind Spot Detection Sensors. Role in ADAS and autonomous vehicles Battery and Electrical Sensors in EVs: Battery Management System (BMS) Sensors.	10
Total		45

Text Books:

1. Barry Hollembeak, "Automotive Electricity and Electronics" Cengage Learning, Clifton Park, USA 2007.
2. Kholi P L, "Automotive Electrical Equipment", Tata McGraw Hill Co., Ltd., New Delhi, 2001.
3. Joseph Bell, "Diesel Engineering: Electricity and Electronics", Cengage Learning, New Delhi, 2007.
4. Robert Bosch, "Automotive Hand Book" SAE, 2018.
5. "Automotive Electrics Automotive Electronics", Robert Bosch GmbH, 2004.
6. Tom Denton, "Automobile Electrical and Electronics systems", Routledge Taylor & Francis Group London & New York, 2002.

TH:4(B)- ALTERNATIVE FUELS

L	T	P	Total Marks: 100	Course Code: AEPE303B
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite : Nil				
Credit 3				Category of Course: PE

Rationale:

In view of fossil fuels getting depleted, energy obtained from fuels need to be conserved. Also, there is a need to search for alternative fuels as well as technologies. This course helps the budding engineering understand about various options available.

Course outcomes:

At the end of the course, the student will be able to:

- CO1: Interpret the suitable alternative fuels like CNG and LNG.
- CO2: Explain the characteristics of alcohols in SI and CI engines.
- CO3: Analyze the various gaseous alternative fuels for IC engine applications.
- CO4: Determine various properties of bio fuels and their significance in IC engines.
- CO5: Explain the concepts of Electrical vehicle, Fuel cell and solar cars.

Course Content:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Need for alternate fuel: Availability and properties of alternate fuels, general use of alcohol, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternative energy sources. Like EV, hybrid, fuel cell and solar cars.	9
II	Alcohols: Properties as engine fuel, alcohol and gasoline blends, performance in SI engine, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI and CI Engines.	9
III	Natural Gas, LPG, Hydrogen and Biogas: Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG using LPG in SI and CI engines, performance and emission of LPG, Hydrogen; storage and handling, performance and safety aspects.	9
IV	Technical Background of Diesel/Biodiesel fuels: Oil feed stocks, Transesterification-Biodiesel production from Vegetable oils and waste cooking oil-High blend levels of biodiesel-Testing, Biodiesel Oxidation stability, Performance in Engines, Properties of bio-fuels and their importance in the context of IC Engines. Vegetable Oils: Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.	12
V	Electric, Hybrid, Fuel Cell and Solar Cars: Layout of an electric vehicle, advantages and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.	6
	Total	45

REFERENCE BOOKS:

1. S.S. Thipse, Alternate Fuels, Jaico Publishing house, India, 2010.
2. G.R. Nagpal and S.C. Sharma, Power Plant Engineering, 16th Edition, Khanna Publishers, 1995.
3. Alcohols as motor fuels progress in technology, Series No. 19– SAE Publication USE–1980.

PR:3(A)- Electric and Hybrid Vehicles Lab

L	T	P	Total Marks: 50	Course Code: AEPE305A	
0	0	4			
Total Contact Hours				Practical Assessment	
Practical : 60Hrs				End Exam	15
				Progressive Assessment	35
Pre-Requisite : Nil					
Credit 2				Category of Course: PE	

RATIONALE:

Vehicle electrification and hybridization is recognized as the most promising road transportation solutions to the global energy crisis due to depleting fossil fuels. Also, increasing requirements related to environmental protection and vehicle safety are a major concern. Emerging Electric and hybrid electric vehicles (EVs and HEVs) are complex mechatronic systems. In such a scenario, this course is much helpful for the budding engineers.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Identify the block diagram of basic electric vehicle along with parts

CO2: Compare different vehicles for economic and environmental analysis.

CO3: Develop the schematic diagram of hybrid electric vehicle along with components.

CO4: Explain the concept of charging station.

CO5: Analyze various batteries after a thorough market survey.

COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Develop block diagram of Electric vehicle and identify parts	8
II	Case study- Compare minimum four vehicles for economic and environmental analysis	8
III	Develop schematic diagram of hybrid electric vehicle and identify the components fluorescent lamp.	8
IV	Prepare report on Plug in Electric vehicle by electric and solar based charging station	8
V	Inspect and install inverter of given lead acid battery	8
VI	Simulation of Battery Management system (BMS) for an Electric vehicle using java.(BMS Tester Machine)	4
VII	Collect specifications of converters and inverters used for Electric vehicles a single lamp control by two switches	4
VIII	Diagnose, repair and maintain battery used in electric vehicle	4
IX	Prepare test procedure for equipment used in Electric vehicle	4
X	List safety procedures and schedule for handling HEVs and EVs	4
	Total	60

REFERENCE BOOKS:

1. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, John Wiley and Sons Ltd, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles Design Fundamentals, CRC Press, 2011.
3. A.K. Babu, Electric and Hybrid Vehicles, Khanna Publishing House, New Delhi, 2018.

PR:3(B)- HEAT TRANSFER LAB

L	T	P	Total Marks: 50	Course Code: AEPE305B
0	0	4		
Total Contact Hours				Practical Assessment
Practical : 60Hrs				End Exam 15
				Progressive Assessment 35
Pre-Requisite : Nil				
Credit 2				Category of Course: PE

RATIONALE:

This course is prepared to the experience on testing, and analysis of various heat transfer equipment in different approaches.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Identify the temperature distribution in a metal rod

CO2: Assess the phenomena of radiation

CO3: Conduct experiments on natural and forced convective heat transfers

CO4: Calculate the performance of various heat exchangers

CO5: Find various aspects of heat transfer in condenser and kettle

COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Temperature distribution in a metal rod	8
II	Thermal Conductivity of metal rod	8
III	Radiation	8
IV	Natural convective heat transfer	8
V	Forced convective heat transfer	8
VI	Double pipe heat exchanger	4
VII	Shell and Tube Heat exchanger	4
VIII	Plate Heat Exchanger	4
IX	Condenser	4
X	Heat Transfer in Jacketed Kettle	4
	Total	60

REFERENCE BOOKS:

1. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, John Wiley and Sons Ltd, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles Design Fundamentals, CRC Press, 2011.
3. A.K. Babu, Electric and Hybrid Vehicles, Khanna Publishing House, New Delhi, 2018.

PR:3(C)- ALTERNATIVE FUELS LAB

L	T	P	Total Marks: 50	Course Code: AEPE305C
0	0	4		
Total Contact Hours				Practical Assessment
Practical : 60Hrs				End Exam 15
				Progressive Assessment 35
Pre-Requisite : Nil				
Credit 2				Category of Course: PE

RATIONALE:

The alternative fuels laboratory is focused on the performance evaluation of internal combustion engines using alternative gaseous fuels and associated mixtures. The effect of various operating parameters, such as fuel compositions, pressure, temperature, spark timing, on performance, efficiency and operational limits is investigated through experimental and analytical modeling and simulation techniques.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1: Calculate the calorific value of a fuel using Bomb Calorimeter

CO2: Calculate the flash and fire points of a fuel using Bomb Calorimeter

CO3: Apply transesterification for the preparation of biodiesel

CO4: Test solar and fuel cells in cars

CO5: Conduct studies on the use of CNG/ Ethanol/ Methanol or blends in automobiles

COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Calorific value of a fuel using Bomb Calorimeter	8
II	Flash and Fire point of a fuel	8
III	Measurement of viscosity using Redwood Viscometer	8
IV	Use of Transesterification for preparation of Biodiesel	8
V	Biodiesel from vegetable oils and analyzing its properties	8
VI	Testing of fuel cell and fuel car design	4
VII	Testing of solar PV cells and solar car design	4
VIII	Case study on CNG auto	4
IX	Trial of Ethanol or Methanol or blends in automobiles	4
X	Case study on the use of hydrogen car	4
	Total	60

REFERENCE BOOKS:

1. S.S. Thipse, Alternate Fuels, Jaico Publishing house, India, 2010.
2. G.R. Nagpal and S.C. Sharma, Power Plant Engineering, 16th Edition, Khanna Publishers, 1995.
3. Alcohols as motor fuels progress in technology, Series No. 19– SAE Publication USE–1980.

TH:5(A)- UNIVERSAL HUMAN VALUES

L	T	P	Total Marks: 100	Course Code: OE 301A
3	0	0		Theory Assessment
Total Contact Hours				End Term Exam 70
Theory : 45Hrs				Progressive Assessment 30
Pre-Requisite : Nil				
Credit : 3				Category of Course: OE

RATIONALE:

The Universal Human Values (UHV) course aims to help diploma students develop a strong ethical foundation, nurturing responsible individuals who contribute positively to society. In an era driven by rapid technological advancements, it is crucial for students not only to gain technical expertise but also to cultivate values that promote harmony, respect, and sustainability.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Identify fundamental human aspirations such as happiness and prosperity.
- Differentiate between the self and the body and understand their respective needs.
- Practice self-reflection to improve decision-making, emotional balance, and personal growth.
- Develop respectful and trustworthy relationships within family, friends, and society.
- Explain the role of values like trust, respect, and love in building strong social bonds.
- Promote cooperation and harmony within communities through ethical practices.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Introduction to Value Education and Human Values - Concept and Need for Value Education - Understanding the importance of value education in personal and professional life, Differentiating between values and skills. Basic Human Aspirations - Exploring fundamental human aspirations: happiness and prosperity, Methods to achieve these aspirations through right understanding and relationships.	8
II	Harmony in the Human Being - Understanding the Self - Differentiating between the 'Self' (I) and the Body, Understanding the needs of the Self and the Body, Harmony of the Self with the Body - Ensuring the harmony of 'I' with the Body, Practices for mental and physical well-being.	8
III	Harmony in the Family and Society - Family as the Basic Unit of Society - Understanding values in human relationships, Trust and respect as the foundational values in relationships, Harmony in Society - The concept of an undivided society, Universal human order and world family.	8
IV	Harmony in Nature and Existence - Interconnectedness in Nature -Understanding the four orders of nature: material, plant, animal, and human, Mutual fulfillment among these orders, Co-existence in Existence - Holistic perception of harmony in existence, Role of human beings in maintaining environmental balance.	8
V	Professional Ethics - Ethical Human Conduct - Integrating values into professional life, Concept of professional ethics and accountability, Case Studies in Professional Ethics - Analyzing real-life scenarios to understand ethical dilemmas, Developing solutions based on universal human values.	8
VI	Personal Development and Social Responsibility - Self-Reflection and Self Exploration - Techniques for self-assessment and personal growth, Setting personal goals aligned with universal values, Social Responsibility - Understanding one's role in society, Participating in community service and social initiatives.	5

REFERENCES:

1.	R. R. Gaur, R. Asthana, G. P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
2.	R. R. Gaur, R. Asthana, G. P. Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
3.	A. Nagraj, JeevanVidya: EkParichaya, Amarkantak, 1999.
4.	A. N. Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004.
5.	Moral Thinking: An Introduction To Values And Ethics, Vineet Sahu, IIT Kanpur: https://onlinecourses.nptel.ac.in/noc23_hs89/preview

TH:5(B)- LEADERSHIP AND MANAGEMENT SKILLS

L	T	P	Total Marks: 100	Course Code: OE301B
3	0	0		
Total Contact Hours				Theory Assessment
Theory : 45Hrs				End Term Exam 70
				Progressive Assessment 30
Pre-Requisite: Nil				
Credit: 3				Category of Course: OE

RATIONALE:

This course/subject on Leadership and Management Skills for students undergoing Diploma programmes is an exploration in leading and managing people, majorly in education based on sound and acceptable principles and theories for effective leadership. The leadership skills will enable them to take initiative, guide team efforts, motivate peers, and ensure effective collaboration. They'll learn how to delegate tasks, resolve conflicts, and foster a positive team environment. The management skills will help them in organizing tasks, setting timelines, and ensuring efficient workflow within a team.

It is expected that the students will be able to handle projects with better project outcomes and earn a more productive learning experience. This will benefit their academic journey, future careers, and overall professional development:

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain the principles of management
- Collaborate across cultures for effective team work
- Communicate with people for a positive work culture
- Demonstrate personal dispositions, skills & abilities of a leader
- Undertake the process of change management
- Design training for staff development
- Adapt suitable leadership style for improved work efficiency.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Leadership & Management, concept, principles. • Definition of leadership, management • Leadership theories • Leadership characteristics • Principles of management • Managerial functions • Leader v/s Manager, Leader/Manager traits and character □ Leadership Styles	10
II	Human Resource Management in Organizations • Human Resource Management: Meaning, Nature, Objectives, Scope □ Job & Job analysis. • Staff Development: Need and Objectives of Staff Development, Approaches • Training & development • Organizational Development: Components of OD process. • Learning organization	10
III	Personal disposition, skills & abilities of leaders • Self-awareness • Leadership characteristics, traits • Leadership skills & abilities • Emotional intelligence & its components, importance in leadership • Communication skills for effective leadership, barriers to effective communication, Active Listening, Mindful listening. • Leading & Mentorship – Influencing & mentoring	09
IV	Leader's role in Motivating, Inspiring and Transformative leadership, nurturing team-work • Goal setting & leadership • Transformative Leadership, vision & envisioning • Motivational role of leader in people management • Group & team • Team dynamics • Conflict management, strategies in managing conflicts	08
V	Change Management & Leadership • Models of change • Forces driving change • Change Management – process, goal, importance • The process of change happening in an organization • Key aspects of leadership in change management – responsibilities of a change leader.	08

SUGGESTED ACTIVITIES:

- Group/individual presentation on the basic principles of leadership and management, Discussion on readings - Individual or group presentation of assigned topics in class on leadership and management principles and theories.
- Activities on Envisioning, Goal setting
- ACTION PLAN to be prepared

REFERENCES:

1.	Theories of Educational Leadership and Management (3rd ed.), by Bush, Tony (2003). SAGE Publications, Ltd.
2.	The inspiring leader: unlocking the secrets of how extraordinary leaders motivate. By Zenger, John, Joseph Folkman, and Scott Edinger (2009). New York: McGraw Hill Press.
3.	Knowing yourself. On becoming a leader: the leadership classic. By Bennis, Warren (2009). New York: Basic Books.
4.	Leading Change. By P. Kotter, Harvard Business, 2012.
5.	The Fifth Discipline. By Peter M. Senge, Crwon Currency, 2006.
6.	The Leadership Sutra: An Indian Approach to Power. By Devdutt Pattanaik, – Penguin Random House, 2017.
7.	Leadership and Management. By Dr. A. Chandra Mohan. Himalaya Publishing House, 2010.

TH:5(C)- PROFESSIONAL SKILLS

L	T	P	Total Marks: 100	Course Code: OE301C
3	0	0		Theory Assessment
Total Contact Hours				End Term Exam : 70
Theory : 45Hrs				Progressive Assessment : 30
Pre-Requisite: Nil				
Credit: 3				Category of Course: OE

RATIONALE:

The term, “Professional skills” carries significant weight in the job market and career development. This open elective course explores various types of professional skills, their significance, and how they can be cultivated and harnessed for career progression. By understanding the landscape of professional skills, student can better position himself or herself for success in the competitive job market. It is crucial to continuously update and adapt the professional skills to stay ahead in a rapidly changing work environment. By investing in professional development, one can enhance employability and open doors to new opportunities.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Demonstrate Self-competency and Confidence
- Practice Emotional Competency
- Work in a team work or in collaboration
- Demonstrate problem solving and decision-making skills
- Apply time management strategies and techniques effectively
- Apply professional ethics and integrity in professional and personal life

DETAILED COURSE CONTENT:

UNIT NO.	CONTENT	ALLOTTED TIME (HOURS)
I Communication Skills:	• Active listening • Verbal and non-verbal communication • Written communication • Presentation skills • Conflict resolution	08
II Teamwork and Collaboration:	• Building trust within a team • Effective collaboration strategies • Role delegation and responsibility sharing • Conflict resolution within a team	08
III Problem-Solving:	• Identifying root causes of issues • Generating solutions and evaluating options	08
	• Decision-making under pressure • Critical thinking skills • Triple constraint issues	
IV Time Management:	• Prioritization and task management • Setting realistic deadlines • Effective time planning and organization	06
V Emotional Intelligence:	• Self-awareness and emotional regulation • Empathy and understanding others' emotions • Managing interpersonal relationships • Motivation • Social skills • Emotional Intelligence (EQ) • Stress management	08
VI Professional Ethics and Integrity:	• Workplace ethics and code of conduct • Confidentiality and data privacy • Professional accountability- • Important Considerations:	05

REFERENCES:

1. Dr. Vitthal Gore: Professional Skills for 21st Century: A Key to Success: Blue Rose- ACADEMIC
2. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: PEARSON
3. The essence of Leadership: S. Manikutty: Bloomsbury

SUMMER INTERNSHIP – II

L	T	P	Total Marks: 50	Course Code: SI301
0	0	0		
Total Contact Hours				Internship Assessment
Internship : 3-4 weeks				End Term Exam 15
				Progressive Assessment 35
Pre-Requisite : Nil				
Credit 2				Category of Course: SI

Duration: 3-4 weeks after 4th Semester.

Summer Internship - II is to offer a structured and practical learning experience that prepares individuals for their future careers, helps them make informed career choices, and equips them with the skills and knowledge necessary to succeed in their chosen field. This course provides opportunities to students for hands-on industry experience.

LEARNING OUTCOMES

After completion of the course, the students will be able to:

- Apply theoretical knowledge gained in their academic coursework to real-world situations.
- Enhance specific skills relevant to their field.
- Gain hands-on experience in a professional network by interacting with mentors and industry professionals.
- Manage time effectively.
- Clarify career goals.

DETAILED COURSE CONTENTS

SUGGESTED ACTIVITIES:

I Orientation:

- Introduction to the organization's mission, values, and culture.
- Familiarization with workplace policies, procedures, and safety guidelines.
- Orientation to the team and organizational structure.

II Project-Based Learning:

- Description of the main project or tasks the intern will be working on during the internship.
- Detailed project goals and objectives.
- Training and guidance on project-specific tools, technologies, or methodologies.

III Technical and Skill Development:

- Training sessions or workshops to enhance technical skills relevant to the internship role (e.g., programming languages, software tools, laboratory techniques).
- Soft skills development, including communication, teamwork, problem solving, and time management

- IV Mentorship and Supervision:
 - Regular meetings with a designated mentor or supervisor for guidance, feedback, and support.
 - Mentorship objectives and expectations.
- V Professional Development:
 - Sessions on professional etiquette, networking, and building a personal brand
 - Resume writing and interview preparation workshops.
- VI Industry and Field-Specific Knowledge:
 - Lectures, seminars, or presentations on industry trends, best practices, and emerging technologies.
 - Guest speakers from the field to share insights and experiences.
 - Field visit for practical exposures.
- VII Reporting and Documentation:
 - Training on how to document project progress, results, and findings.
 - Practice in creating reports, presentations, or other deliverables.
- VIII Ethics and Professionalism:
 - Discussions on ethical considerations within the field.
 - Scenarios and case studies related to ethical decision-making
- IX Feedback and Evaluation:
 - Regular performance evaluations and feedback sessions.
 - Self-assessment and goal-setting exercises.
- X Networking and Industry Exposure:
 - Opportunities to attend industry conferences, webinars, or networking events.
 - Encouragement to connect with professionals in the field.

NOTE

As per AICTE guidelines, in Summer Internship-I, students are required to be involved in Inter/ Intra Institutional Activities viz;

- Training with higher Institutions; □
- Soft skill training organized by Training and Placement Cell of the respective institutions; □
- contribution at incubation/ innovation /entrepreneurship cell of the institute; □
- participation in conferences/ workshops/ competitions etc.; □ □
- Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop; □
- Working for consultancy/ research project within the institutes and
- Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc. □

PR:4- MAJOR PROJECT

L	T	P	Total Mark: 50	Course Code: PR301
0	0	4		
Total Contact Hours				Project Assessment
60Hrs				End Term Exam : 15
				Progressive Assessment : 35
Pre-Requisite : Nil				
Credit : 2				Category of Course: Project

RATIONALE:

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mining Operation and practices in real life situations, so as to participate and manage a large organization and projects, in future.

Entire Project shall spread over 5th and 6th Semester. Part of the Project covered in 5th Semester shall be named as Project Decertation-I and the balance portion to be covered in 6th Semester shall be named as Project Decertation-II.

LEARNING OUTCOMES:

After the completion of the course, the student shall be able to

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- Achieve real life experience in Project design.
- Develop the skill of writing Project Report

STUDENTS' ACTIVITY

Students will do their project work as guidance from their guide (faculty member).

Guidelines:

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective departments may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be an individual assignment or a group assignment. Preferably there should not be more than 5 students if the project work is given to a group. The project work identified in collaboration with industry/organization should be preferred.

Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters (5th and 6th semester). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5th semester under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Requirements specification and Preliminary work of the system have to be completed in Phase-I. Project Milestones are to be set so that progress can be tracked. In Phase-II Detailed work, Documentation has to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alterations in the components of Task and schedule.

At the end of Project Phase-I in the 5th semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in the table below:

Sl. No.	Performance Criteria	
1.	Selection of project assignment	
2.	Planning and execution of considerations	
3.	Quality of performance	
4.	Providing solution of the problems or production of final product	
5.	Sense of responsibility	
6.	Self-expression/ communication/ Presentation skills	
7.	Interpersonal skills/human relations	
8.	Report writing skills	

9	Viva voce	
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The teachers are free to evolve other criteria of assessment, depending upon the type of project work. It is proposed that the institute should organize an annual exhibition of the project work done by the

students and invite leading Industrial organizations of area of subject to such an exhibition.

ORGANIZATION OF PROJECT REPORT 1.

Cover page:

It should contain the following (in order)

- I. Title of the Project
- II. “Submitted in partial fulfillment of the requirements for the Diploma in <Branch Name>” III.
By Name of the Student(s)
- IV. Logo of the Institution
- V. Branch Name/Depart Name and Institution Name with Address VI.
Academic Year

2. 1st Inner page Certificate:

It should contain the following

“This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>” during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s). Seal and signature of the Supervisor/Guide with date

3. 2nd Inner Page

Acknowledgement by the Student(s)

4. Contents.

5. Chapter wise arrangement of Reports

6. Last Chapter: Conclusion

It should contain

- I. Conclusion
- II. Limitations
- III. Scope for further Improvement

7. References