

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF AUTOMOBILE ENGINEERING

V Semester

NEW COURSE STRUCTURE – To be effective for Diploma 2023-24 [3 rd Year Onwards] Based on CBCS system & OBE model Recommended scheme of study for Diploma in Automobile Engineering							
Semester of Study	Category of Course	Course Code	Subjects	Mode of delivery			Credits
				L	T	P	C
THEORY							
FIFTH	Program Core	DAE 501	Autotronics	3	0	0	3
		DAE 503	Chassis, body and Transmission	3	0	0	3
		DME 505	Theory of Machine and mechanism	3	0	0	3
	Program Elective	PE-III: DPE 552/ DPE 512/ DPE 513		3	0	0	3
	Open Elective	OE-II: DOE 551/ DOE 512		3	0	0	3
	SESSIONAL						
	Program Core	DAE 502	Driving Practice Lab	0	0	2	1
		DAE 504	Automotive Repair and Maintenance Lab -I	0	0	2	1
		DME 506	Theory of Machine Lab	0	0	2	1
		DAE 508	Automobile Engineering Lab-II	0	0	2	1
	Major Project	DPR 511	Major Project	0	0	2	1
	Summer Internship	DSI 511	Summer Internship	0	0	0	4
TOTAL CREDITS							24
Total Lectures Per Week				25			

DEPARTMENT OF AUTOMOBILE ENGINEERING

PROGRAMME ELECTIVES (PE)

SEMESTER	Code no.	Name of the PE courses	Prerequisite/ Co-requisite courses	L	T	P	C
PE-III							
SEM-V	DPE552	Energy Resources & Utilization		3	0	0	3
	DPE512	Motor Vehicle Technology		3	0	0	3
	DPE513	Heating Ventilation and Air Conditioning		3	0	0	3

OPEN ELECTIVES (OE)*

SEMESTER	Code no.	Name of the PE courses	Prerequisite/ Co-requisite courses with code	L	T	P	C
OE-II							
SEM- V	DOE551	Statistical Quality Control		3	0	0	3
	DOE512	Automobile Engine		3	0	0	3
*OPEN ELECTIVES TO BE OPTED ONLY BY OTHER DEPARTMENT STUDENTS							

FIFTH SEMESTER**UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023****COURSE (Autotronics)**

PROGRAMME: DIPLOMA (Automobile)							
COURSE CODE: DAE-501			Course Title: Autotronics				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

Course Objectives: This course envisions imparting the students to

1.	Equip students with the knowledge to understand and work with the electrical and electronic systems within automobiles,
2.	Fundamental knowledge of solar and fuel cell and its application.
3.	Studying the principles of electronic components like transistors, diodes, and microcontrollers used in automotive electronics
4.	Learning about specific automotive electrical systems like starting systems, charging systems, lighting systems, and their components.
5.	Understanding how various sensors and actuator work and interact with the vehicle's electronic systems.

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

CO1	The students should be able to familiarize on concepts of electric vehicle & performance of electric vehicles
CO2	The students should be able to gain knowledge on Electric Propulsion Systems& generators
CO3	The students should be able to acquire the knowledge on hybrid electric drive train system.
CO4	The students should be able to attain the knowledge on energy Storages, fuel Cells & solar cars and control Systems.
CO5	The students will learn the application of sensor and transducer.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Fundamentals of Automotive electronics 1.1 Current trends in automotive electronic engine management system,

	1.2 electromagnetic interference suppression, 1.3 electromagnetic, compatibility, electronic dashboard instruments, on board diagnostic system, 1.4 security and warning system. Course Outcome: CO1 Teaching Hours:8 hrs
2	Fuel cells & Solar cars 2.1 Fuel cell, construction, working, equations, possible fuel sources, 2.2 fuel reformer, maximum power point tracking, design. 2.3 Solar cars, photovoltaic cells, tracking, efficiency and cost comparison, 2.4 series and parallel hybrid electric drive train design. Course Outcome: CO2 Teaching Hours:8 hrs
3	Electric Vehicles and Hybrid Vehicles 3.1 Layout of an electric vehicle, performance of electric vehicles, 3.2 traction motor characteristics, tractive effort, transmission requirements, 3.3 vehicle performance, energy consumption, 3.4 advantage and limitations, specifications, system components, electronic control system. 3.5 Concepts of hybrid electric drive train, types, series and parallel hybrid electric drive train design. Course Outcome: CO3 Teaching Hours:8hrs
4	Motor Controllers & Energy storages 4.1 Control system principles, speed and torque control-DC motors and AC motors. 4.2 Electrochemical batteries- types of batteries, lead acid batteries, nickel-based batteries, lithium-based batteries, 4.3 electrochemical reactions, thermodynamic voltage, 4.5 specific energy, specific power, energy efficiency, ultra-capacitors. Course Outcome:CO4 Teaching Hours:8 hrs
5	Sensors and Actuators 5.1 Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, 5.2 crankshaft position, coolant temperature, exhaust temperature, 5.3 air mass flow for engine application. Solenoids, stepper motors, relay Course Outcome: CO5 Teaching Hours:8 hrs

REFERENCE BOOKS:

S. N.	Title	Author and Publication	ISBN
1.	Automotive Electrical Equipment	Young A.P. & Griffiths	B08523X4R9
2.	Automotive Electrical Equipment Tat	Kholi.P.L, McGraw-Hill Co., Ltd., New Delhi	5551234114789
3.	Automotive Hand Book", SAE	Robert Bosch, 5th Edition, 2010	9789351647782

E-REFERENCES:

1. <https://nptel.ac.in/courses/112103019/>
2. <https://www.tandfonline.com/>
3. Web links and Video Lectures (e-Resources): E-book
URL:<https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>.

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	3	3	2
CO2	2	2	2	1	2	2	2	3	3	2
CO3	2	2	2	1	2	1	2	2	3	3
CO4	2	2	2	1	2	1	2	2	2	2
CO5	2	3	2	2	2	2	3	3	2	3

**UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023**

COURSE: DAE 503 CHASSIS, BODY AND TRANSMISSION

PROGRAMME: DIPLOMA							
COURSE CODE: DAE 503				Course Title: Chassis, Body And Transmission			
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOUR/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVE: This course envisions imparting the students to

1	To learn about the types of chassis layout, Frames and constructional details of steering.
2	To learn about the construction and working Principle of Clutches & Gear boxes.
3	To learn about the working of various components of driveline systems.
4	To learn about the rear axle drives and suspension systems.
5	To learn about the braking systems, wheels and tyres.

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

CO1	Identify and understand the various systems, parts of the automobile.
CO2	Understand about the clutch, gearbox and driveline components.
CO3	Select the appropriate rear axle for a given vehicle and know about the various types of wheels and tyres.
CO4	Realize the importance of the braking system in the vehicle and possess knowledge about various brakes.
CO5	Demonstrate safety systems for a vehicle.

COURSE CONTENT DETAILS:

Module	Topic/ Subtopic
1	Chassis, Front Axles, Steering System 1.1 Chassis: Functions of Chassis- Frames, Layout of Chassis and its Main Components 1.2 Types of Chassis Layout According to the Engine Locatio, 1.3 Types of Frames – Various Frame Sections, Types of Bodies. 1.4 Front Axle Constructions, Live Axle and Dead Axles, Stud Axles 1.5 Types. Ackerman’s Steering Mechanisms, Steering Linkage, Steering Geometry, Camber, Caster, Kingpin Inclination, Toe In & Toe Out, Turning Radius, 1.6 Functions of Steering Gear Box, 1.7 Purpose of Power Steering - Hydraulic Power Steering – Electric Power Steering. Course Outcome: CO1 Teaching Hours: 8hrs
2	Clutch & Gear Box 2.1 Requirement Of Clutch: – Functions of Clutch, Types of Clutches, 2.2 Construction & Working of Single Plate Clutch, Multiplate Clutch, 2.3 Centrifugal Clutch, Diaphragm Clutch, Fluid Coupling, Advantages & Disadvantage,

	Clutch Facing Materials. 2.4 Functions Of Gear Box- Gear Ratio, Tractive Effort, 2.5 Types of Manual Gear Boxes – Construction & Working, 2.6 Transfer Case, Automatic Gear Box, 2.7 Construction & working Of Simple epicyclic gearbox, 2.8 Continuous Variable Transmission, Torque Converters – Over Drive. Course Outcome: CO2 Teaching Hours: 8hrs
3	Universal Joints, Propeller Shaft, Final Drive, Differential, Rear Axles 3.1 Universal Joints, Purpose, Variable Velocity & Constant Velocity Joints, 3.2 Types. Propeller Shaft, Construction of propeller Shaft, Two Pieces & Three-Piece Propeller Shaft. 3.3 Final Drive, Purpose of Final Drive, Different Types of Final Drive Gears. 3.4 Differential Action, Principles of Differential, Construction & Working, 3.5 types-Differential Lock. Rear Axles, Load Acting on Drive Axles, Types of Rear axles. Course Outcome: CO3 Teaching Hours: 8hrs
4	Drives & Suspension System 4.1 Rear Axle Drives – Hotchkiss Drive & Torque Tube Drive, 4.2 Hydrostatic drives-Advantages & Disadvantages. 4.3 Need of suspension system, Types of Suspension System, Rigid Suspension & Independent Suspension, 4.5 Leaf Springs, Coil Springs -Torsion Bar, Anti Roll Bar, wishbone Suspension, 4.6 Macpherson Strut Suspension, Swinging Half Axle Suspension, Trailing Link Suspension, Shock Absorbers, 4.7 Dampers, Construction & Working of Telescopic shock absorber , 4.8 Air suspension - Construction & Working of Air Suspension System – Active Suspension System. Course Outcome: CO4 Teaching Hours: 8hrs
5	Brakes, Wheels, Tyres 5.1 Need of Brakes Stopping Distance, 5.2 Types of Brakes, Leading Shoes & Trailing Shoes, Hydraulic Brake System, 5.3 Bleeding of Brakes, Air Brake System, 5.4 Disc Brake, Servo brakes, Vacuum Assisted Servo Brakes, 5.4 Exhaust Brakes, Antilock Brake System. 5.5 Types of wheels, Disc wheel, Spoked Wheels, Cast Alloy Wheels, Split Wheels 5.6 Types of Tyres, Conventional Tubed Tyre, Tubeless Tyre –Factor Affecting Tyre Life. Course Outcome: CO5 Teaching Hours: 8hrs

Text Book:

1. R.B. Gupta, Automotive Chassis and Transmission, 2nd , Satya Prakashan, Delhi, 2021.
2. Dr.Kirpal Singh, Automobile Engineering Vol 1& 2, 14th , Standard Publisher Distributors, Delhi, 2021

REFERENCE BOOKS:

S.No	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Automotive mechanics	Crouse h. Willam anglin I. Donald	0070992150
2	Automotive Mechanics	<u>S Srinivasan</u>	0070494916

E-REFERENCES:

1. https://www.youtube.com/watch?v=ZOH_VAI0me0
2. <https://www.youtube.com/watch?v=1xLpuCooSf8>
3. <https://www.youtube.com/watch?v=H5tszemCrJY>

TEACHING METHODOLOGY:

Course Delivery Methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	2	2	3
CO2	2	2	2	2	2	2	2	2	2	3
CO3	2	3	3	2	2	2	1	2	2	3
CO4	3	1	1	2	2	2	2	2	2	3
CO5	3	3	2	2	2	2	2	2	2	3

**UNIVERSITY POLYTECHNIC
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SYLLABUS (CBCS)-2023**

COURSE (THEORY OF MACHINE AND MECHANISM)

PROGRAMME: DIPLOMA							
COURSE CODE: DME 505			Course Title: Theory Of Machine and Mechanism				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVES: Students will be able to understand about

1.	To understand the fundamental concepts of mechanisms, linkages, and kinematic chains.
2.	To analyze the motion parameters such as velocity and acceleration in planar mechanisms.
3.	To study the applications of flywheels and belts in power transmission systems.
4.	To explore the fundamental laws of gearing and analyze different types of gear trains.
5.	To understand the concepts of cam mechanisms and balancing of rotating masses in machines.
6	To develop problem-solving skills for analyzing and designing machine components.

COURSE OUTCOMES: Upon successful completion of this course students will be able to understand about

CO1	Explain the fundamental kinematic concepts of links, mechanisms, and degree of freedom. Analyze different inversions of four-bar, single-slider, and double-slider crank mechanisms.
CO2	Able to Perform kinematic analysis of planar mechanisms.
CO3	Describe the function of flywheels using Turning Moment diagrams, evaluate fluctuations of energy and speed, and analyze power transmission through belts.
CO4	Understand the fundamental laws of gearing, classify different types of gears, analyze gear trains, and study gear standards in tooth forms.
CO5	Perform balancing of rotating masses in the same and different planes. Analyze cam profiles and determine displacement, velocity, and acceleration of followers graphically.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Mechanisms: 1.1 Kinematic concept of Link, 1.2 Kinematic chain, Mechanism, 1.3 Degree of freedom, 1.4 Inversions of four bar mechanism, 1.5 Single slider crank mechanism and double slider crank mechanisms. Course Outcome: CO1 Teaching Hours:8 hrs
2	Motion Analysis: 2.1 Kinematic and Dynamic 2.2 Types of motion: 2.3 Vector diagrams, 2.4 Velocity and acceleration diagram of plane mechanism. Course Outcome: CO2 Teaching Hours: 8 hrs
3	Flywheel & Belt: 3.1 Concept, function and application of flywheel with the help of Turning Moment diagram; 3.2 Fluctuation of energy and speed. 3.3 Types of belt, ratio of tension in belt, 3.4 Centrifugal tension in belt & Power transmission Course Outcome: CO3 Teaching Hours: 8hrs
4	Gears: 4.1 Fundamental laws of gearing: 4.2 classification and basic terminology, 4.3 spur gears, other types of gears standards in tooth forms. 4.4 Gear trains: Simple and, compound gear trains, epicyclic gear. Course Outcome: CO4 Teaching Hours :8 hrs
5	CAM & Balancing: 5.1 Balancing of Rotating masses by a single mass in same plane, balancing of a single rotating mass by two masses rotating in different planes, 5.3 Balancing of several masses rotating in same plane. Various types of cams, 5.4 Displacement, velocity and acceleration of followers, Graphical determination of CAM profiles with simple followers. Course Outcome: CO5 Teaching Hours : 8 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Theory of Machine	Khurmi.R.S, S chand & Company.	9788121925242
2.	Theory of Machine	S.S. Ratan, Tata Mcgraw Hill Publishing company	0074603205

E-REFERENCES:

1. <https://www.youtube.com/watch?v=25-HG471MIc>
2. <https://www.youtube.com/watch?v=7mxq1YDytDE>
3. <https://www.youtube.com/watch?v=9lse1SfDq7M>

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	3	3	2
CO2	2	2	2	1	2	2	2	3	3	2
CO3	2	2	2	1	2	1	2	2	3	3
CO4	2	2	2	1	2	1	2	2	2	2
CO5	2	3	2	2	2	2	3	3	2	3

**UNIVERSITY POLYTECHNIC
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SYLLABUS (CBCS)-2023**

COURSE: DAE 504 AUTOMOBILE REPAIR AND MAINTENANCE LAB-I

PROGRAMME: DIPLOMA							
COURSE CODE: DAE 504			Course Title: Automobile Repair And Maintenance Lab-I				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOUR/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

COURSE OBJECTIVES: Students will be able to understand about

1	To understanding of different repair and maintenance procedures and overhauling.
2	Study and identifications of different tools and machines used for servicing of automobiles.
3	To study different components of intake and exhaust systems.
4	To Study the sub systems of petrol and diesel engines.
5	Analyze the engine tuning and testing.

COURSE OUTCOME: Students will be able to understand about.

CO1	To find the faults, cause & remedies of different types of automobiles.
CO2	Apply suitable tools and equipment to use in proper way and components of automobiles.
CO3	To understanding of different types of carburetors, fuel injection systems (MPFI/SPFI), exhaust system and their impact.
CO4	To understanding of different types of cooling, lubrications and ignition systems and their impact.
CO5	Tuning and evaluate of engine and their components for improved efficiency and reduced operational costs.

EXPERIMENTS

List of Experiments	Topic
1	Study of different types of maintenance and overhauling.
2	Study and identifications of different types of tools and equipment used in automobile Lab.
3	Study and identifications of different components of frame, chassis and body of automobiles.
4	Study and identifications of different types of engines and their assembling & dismantling.
5	Study and identifications of induction (Air & fuel) system used in petrol and diesel engine.
6	Study and identifications of exhaust system used in petrol and diesel engine.

7	Study and identifications of different types of Lubrication system.
8	Study and identifications of different types of Cooling system.
9	Study and identifications of different types of ignition system.
10	Perform different tuning procedures of petrol and diesel engine
11	Perform engine testing through dynamometer.

TEXT BOOKS:

1. Crouse H. Willam | Anglin L. Donald. Automotive Mechanics
2. Gilles Tim. Automotive Service Inspection Maintenance Repair

REFERENCE BOOKS:

S.No	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Automotive mechanics	Crouse h. Willam anglin l. Donald	0070992150
2	Automotive service inspection maintenance repair	Gilles tim.	0827373546

E-REFERENCES:

4. <https://www.youtube.com/watch?v=25-HG471MIc>
5. <https://www.youtube.com/watch?v=7mxqlYDytDE>
6. <https://www.youtube.com/watch?v=9lse1SfDq7M>

TEACHING METHODOLOGY

Course Delivery Methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	
CD3	Seminars	
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	2	2	3
CO2	2	2	2	2	2	2	2	2	2	3
CO3	2	3	3	2	2	2	1	2	2	3
CO4	3	1	1	2	2	2	2	2	2	3
CO5	3	3	2	2	2	2	2	2	2	3

UNIVERSITY POLYTECHNIC
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SYLLABUS (CBCS)-2023
COURSE (Theory of Machine Lab)

PROGRAMME: DIPLOMA							
COURSE CODE: DME 506			Course Title: Theory Of Machine Lab				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	40	60	100

COURSE OBJECTIVES: Students will be able to understand about

1.	To provide hands-on experience in the analysis of various mechanisms used in machines.
2.	To develop skills in measuring and analyzing kinematic parameters such as velocity, acceleration, and displacement.
3.	To study the motion characteristics of different linkages, cams, and other machine elements.
4.	To enhance understanding of the working principles of governors, gyroscopes, and other dynamic machine components.
5.	To familiarize students with experimental techniques and practical application of kinematics-related machine element.

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

CO1	Demonstrate the working of various mechanisms and analyze their motion characteristics.
CO2	Perform experiments to determine velocity and acceleration using graphical and analytical methods.
CO3	Analyze the stability and behavior of governors and gyroscopic devices.
CO4	Evaluate the performance of different gear trains, cams, and followers & Vibration analysis.
CO5	Apply theoretical concepts of kinematics to practical applications in machine.

COURSE CONTENT DETAILS: LIST OF EXPERIMENTS

Sl. No.	Experiments	CO
1	1. Introduction to Kinematics and Mechanisms - Study of kinematic pairs and chains - Types of mechanisms (four-bar, slider-crank, etc.)	CO1 & CO2
2	Experiments on Simple Mechanisms - Study and demonstration of four-bar mechanism - Study and demonstration of slider-crank mechanism - Study of inversions of slider-crank and four-bar mechanisms	
3	Cam and Follower Experiments - Cam profile generation for different follower motions (uniform velocity, SHM, uniform acceleration and retardation) - Study of different types of cams and followers	CO4
4	Governors and Flywheels - Study and performance analysis of Watt, Porter, Proell, and Hartnell governors - Determination of governor effort and power - Study of flywheel and its role in energy storage	CO3
5	Gyroscope and Gyroscopic Effect - Experimental study of gyroscopic couple - Verification of the gyroscopic effect in a rotating disc	
6	Balancing of Rotating and Reciprocating Masses - Static and dynamic balancing of rotating masses - Balancing of reciprocating masses in engines	CO4 & CO 5
7	Vibration Analysis of Machine Elements - Study of free and forced vibrations - Determination of natural frequency of different vibrating systems	

REFERENCE BOOKS:

S. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Theory of Machine	Khurmi.R.S, S chand& Compony.	9788121925242

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

1- Low 2- Medium 3- High
Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	3	2	2
CO2	2	2	2	1	2	2	3	3	2	2
CO3	2	2	5	1	2	1	3	2	1	3
CO4	2	2	2	1	2	1	2	2	1	2
CO5	2	3	2	2	2	2	3	3	1	3

UNIVERSITY POLYTECHNIC
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SYLLABUS (CBCS)-2023
COURSE (DAE 502 DRIVING PRACTICE LAB)

PROGRAMME: DIPLOMA							
COURSE CODE: DAE 502				Course Title: Driving Practice Lab			
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOUR/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

Course Objectives: Students will be able to understand about

1	To understanding of different simulators.
2	Study and identifications of different vehicles.
3	To study different types of traffic signs and rules.
4	To Study different precautions in driving.
5	Analyze the driving ability.

Course Outcome: Students will be able to understand about.

CO1	To understanding of different types of driving simulators.
CO2	To understanding of different types of driving vehicles.
CO3	To understanding of different types of traffic signs and motor vehicle rules.
CO4	To understanding of different types of driving techniques i.e. forward, reverse, corner etc.
CO5	To perform complete precautions used in driving.

EXPERIMENTS

List of Experiments	Topic
1	Study and identifications of driving simulators and their performance.
2	Study and identifications of driving Vehicles and their performance.
3	Study of different types of motor vehicle act and regulations.
4	Study of different types of traffic signs.
5	Study of to do checklist before driving.
6	Study of different precautions used in different driving conditions.
7	Perform ABC pattern of driving.
8	Perform forward, reverse and corner driving.

TEXT BOOKS:

1. John Wells and Margaret Stacey. Learn-To-Drive-In-10-Easy-Stages
2. Kannan and N Vijayaraghavan. Motor Vehicle Laws

REFERENCE BOOKS:

S.No	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Learn-to-drive-in-10-easy-stages	John Wells and Margaret Stacey.	978 0 7494 5303 9
2	Motor Vehicle Laws	Kannan and N Vijayaraghavan.	9788196241049

E-REFERENCES:

1. <https://www.youtube.com/watch?v=gvim3YjvRp8>
2. https://www.youtube.com/watch?v=eoJF_VtSMKE
3. <https://www.youtube.com/watch?v=ll-PyF0g7EM>

Course Delivery Methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	
CD3	Seminars	
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	2	2	3
CO2	2	2	2	2	2	2	2	2	2	3
CO3	2	3	3	2	2	2	1	2	2	3
CO4	3	1	1	2	2	2	2	2	2	3
CO5	3	3	2	2	2	2	2	2	2	3

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023
COURSE (AUTOMOBILE ENGINE LAB -II)

PROGRAMME: DIPLOMA							
COURSE CODE: DAE 508			Course Title: Automobile Engine Lab -II				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

Course Objectives:

1.	To provide hands-on experience in testing and analyzing the performance of petrol and diesel engines.
2.	To familiarize students with modern fuel injection systems such as MPFI and SPFI.
3.	To study and evaluate engine efficiency through heat balance and energy auditing.
4.	To understand the impact of exhaust emissions and explore emission control techniques
5.	To develop skills in assembling and disassembling multi-cylinder diesel engines for practical understanding.

COURSE OUTCOMES: Students will be able to understand about

CO1	Students will be able to conduct and interpret engine performance tests effectively.
CO2	They will gain knowledge of modern fuel injection and supercharging systems.
CO3	They will understand energy auditing and its role in improving engine efficiency.
CO4	They will be able to assess exhaust emissions and suggest ways to minimize pollution.
CO5	They will develop hands-on expertise in assembling and disassembling automobile engines.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Performance Study of Morse Test on an MPFI petrol engine.
2	Heat Balance Test on a diesel engine.
3	Energy Auditing on a computerized setup of a Maruti Zen petrol engine.
4	Exhaust Emission Test on an S.I. (Spark Ignition) engine.
5	Study of Supercharging and its effects on engine performance.
6	Study of MPFI (Multi-Point Fuel Injection) and SPFI (Single-Point Fuel Injection) Systems.
7	Assembling and Disassembling of a 6-cylinder diesel engine.

Text Books:

1. Automotive Engines S. Srinivasan
- Automobile Engineering K.M. Gupta
- Automobile Engineering K.K. Ramalingam

2
3.

References Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Automobile Engineering Vol.-I & II	Kirpal Singh.	81-86308-01-6
2.	Automobile Engineering	G.B.S. Narang.	
3.	Automobile Engineering	K K Jain, K B Asthana (Tata Magraw Hill)	0-07-044529-X
4.	Automobile Engineering	K K Ramalingam	81 8842 9481 1
5	Automobile Engineering Vol. I & II	K M gupta	81-88114-220-0
6.	Internal Combustion Engines	Agrawal Shyam K.	81-2241-782-5, 978-81-224-1782-1

E REFERENCE:

1. <https://nptel.ac.in/courses/112103019/>
2. <https://www.tandfonline.com/>
3. Web links and Video Lectures (e-Resources): E-book
URL:<https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>

TEACHING METHODOLOGY

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

1- Low 2- Medium 3- High

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	1	1	3	3	3
CO2	3	3	2	2	3	1	1	3	3	3
CO3	2	3	3	3	2	1	1	3	3	3
CO4	2	2	3	3	2	3	3	3	3	3
CO5	3	2	2	2	3	1	1	3	3	3

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023
COURSE ENERGY RESOURCES AND UTILIZATION

PROGRAMME: DIPLOMA							
COURSE CODE: DPE 511			Course Title: Energy Resources And Utilization				
COMPULSARY / OPTIONAL: OPTIONAL							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVES: Students will be able to understand about

1.	Differentiate between renewable and non-renewable energy sources and their significance in the global and Indian energy scenario.
2.	Study the principles, conversion methods, applications, advantages, and limitations of solar, wind, and biomass energy.
3.	Analyze energy consumption patterns, conservation techniques, and economic aspects like payback period and return on investment.
4.	Understand energy audits, cogeneration, waste recycling, and efficiency improvement methods in different industries.
5.	Learn utility costing, thermal insulation, waste heat recovery, and other cost-effective strategies for energy conservation.

Course Outcomes: Students will be able to understand about

CO1	Identify and Classify Energy Sources
CO2	Analyze Solar, Wind, and Biomass Energy Systems
CO3	Apply Energy Conservation Strategies
CO4	Evaluate Economic Aspects of Energy Management
CO5	Develop Sustainable Energy Solutions

Course Content Details:

MODULE	TOPICS/SUBTOPICS
1	Solar and Wind Power 1.1 Introduction to Energy Sources: classification, importance, and Global and Indian Energy Scenario. 1.2 Solar Energy Conversion: -Principle of Solar Energy Conversion into Heat and Electricity, Solar Radiation at Earth's Surface, Solar Angles: Declination, Hour Angle, Altitude Angle, Incident Angle, Zenith Angle, Solar Azimuth Angle 1.3 Applications of Solar Energy: Flat Plate Collectors: Construction, Working, and Applications, Solar Concentrating Collectors: Types, Construction, Working, and Applications, Advantages and Limitations of Solar Energy. 1.4 Wind Energy Conversion: -Basic Principle of Wind Energy Conversion, Wind Power Formula and Power Coefficient, Maximum Power Extraction (Betz

	Limit) 1.5 Wind Mill Classification and Site Selection: Main Considerations for Selecting a Wind Mill Site, Limitations of Wind Energy Conversion, Types of Wind Mills: Horizontal and Vertical Axis, Wind, Turbines, Construction and Working of Wind Mills Course Outcome: CO1 Teaching Hours: 10 hrs
2	Energy from Biomass. 2.1 Common Species Recommended for Biomass 2.2 Methods for Obtaining Energy from Biomass 2.3 Thermal Classification of Biomass. 2.4 Biomass Gasification and Its Applications 2.5 Bio-diesel Production and Application Course Outcome: CO2 Teaching Hours: 10 hrs
3	TTLE: Energy Conservation & Management 3.1 Global and Indian Energy Market 3.2 Energy Scenario in Various Sectors & Indian Economy 3.3 Need & Importance of Energy Conservation and Management 3.4 Economic Aspects of Energy Conservation 3.5 Energy Analysis Tools Course Outcome: CO3 Teaching Hours: 8hrs
4	Energy Conservation Techniques 4.1 Distribution of Energy Consumption 4.2 Principles of Energy Conservation 4.3 Energy Audit, Definition & Importance. 4.4 Methods of Energy Conservation. 4.5 Co-generation and Its Application Course Outcome: CO4 Teaching Hours: 6hrs
5	Economic approach of Energy Conservation 5.1 Costing of Utilities 5.2 Ways of Improving Boiler Efficiency 5.3 Thermal Insulation & Critical Thickness 5.4 Waste Heat Recovery Systems & Applications 5.5 Energy Conservation in Compressed Air Systems. Course Outcome: CO4 Teaching Hours :6 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Non-Conventional Energy Resources	KhanB.H, Mc Graw Hill Education India	9780070142763
2.	Non- Conventional Energy Sources	Non-Conventional Energy Sources, Khanna Publishers,6th	978-81-7409-073-7
3.	Industrial Energy Conservation:	RayD.A., Pergamon Press	978-0080208671

E-REFERENCES:

1. <https://nptel.ac.in/courses/112103019/>
2. <https://www.tandfonline.com/>
3. Web links and Video Lectures (e-Resources): E-book
URL:<https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>

TEACHING METHODOLOGY

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

1.Low 2- Medium 3- High
Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	2	1	3
CO2	2	2	2	1	2	2	2	1	1	2
CO3	2	2	2	1	2	1	2	1	1	2
CO4	2	2	2	1	2	1	2	2	2	2
CO5	2	3	2	2	2	2	3	0	1	2

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023
COURSE: MOTOR VEHICLE TECHNOLOGY

PROGRAMME: DIPLOMA							
COURSE CODE: DPE 512				Course Title: Motor Vehicle Technology			
COMPULSARY / OPTIONAL: OPTIONAL							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOUR/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVE: This course envisions imparting the students to

1	To understand the transmission and Drive systems.
2	Various working principles and Mechanism of the Automobile components systems
3	Introduction & study of front axle assemblies and Electronic controlled systems.
4	Familiarisation of Manual and Automatic control and Driving systems.
5	Knowledge Automobile Electrical Components, charging system and possible defects and remedies.

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

CO1	Students will be able to understand the transmission and gain knowledge in Drive systems.
CO2	Grab knowledge on various working principles and Mechanism of the Automobile components systems.
CO3	Students will be introduced to front axle assemblies and Electronic controlled systems & will briefly study the above.
CO4	Students will be given knowledge on Manual and Automatic control and Driving systems with all precautions.
CO5	Brief idea on Automobile Electrical Components, charging system and possible defects and remedies.

COURSE CONTENT DETAILS:

Module	Topic/ Subtopic
1	Clutch: 1.1 Principle, torque transmission, 1.2 types of clutches, lining, friction and bonding material, 1.3 single plate clutch, multiple spring single plate clutch, 1.4 driven plate, multiple plate clutch, 1.5 automatic clutch action, fluid flywheel. CO1 Teaching Hours:8 hrs
2	Gear Box, Propeller and Differential Shaft: 2.1 Function, working of selective gear box - sliding mesh type, constant mesh type, synchronous type,

	2.2 torque converter and overdrive, propeller shaft and rear axle, 2.3 universal joint, differential, automatic transmission. 2.4 Function of propeller shaft, 2.5 Types of propeller joints: - Universal, Hooks, Balls & Trunnion Joints. 2.6 Necessity & function of final drive CO2 Teaching Hours:8 hrs
3	Transmission System: 3.1 Requirements, live axle transmission, 3.2 rear engine with live axle, dead axle and axle less transmission, 3.3 four-wheel drive and all-wheel drive transmission, drive line operation. 3.4 Principle & necessity of suspension systems, 3.5 Types of springs (leaf, Coil, Torsion Bar), Front suspension, Stabilizer bar, Rear Suspension, 3.6 Air Suspension, Shock Absorber, Automatic Lever Control, 3.7 Introduction of electronic controlled suspension systems CO3 Teaching Hours:8 hrs
4	Front Axle & Steering: 4.1 Introduction & study of front axle assemblies. 4.2 Types of front Axle: - Dead, Live, Elliot & Lamoine front wheel assembly, Correct steering angle, 4.3 Steering gearbox, Worm, Wheel Worm & Roller, Rack & Pinion type, 4.4 Ackerman linkage, Power Steering, and Electronic controlled Power Steering System. CO-4 Teaching Hours:8 hrs
5	Miscellaneous Automobile System: 5.1 Automobile Electrical Components, charging system, starting system, lighting system. 5.2 Speedometer, fuel gauge, Temperature gauge, RPM meter, Horn circuits, power door and windows, 5.3 Introduction, Chassis lubrication, Types of body, constructional details, 5.4 types of frames & frameless, materials of frames, load consideration, possible defects and remedies, 5.5 Types of lubricants, their uses, properties different lubricants used in various automobile components. CO5 Teaching Hours:8 hrs

Text Book:

1. Automobile Engineering Vol.-I & II By Kirpal Singh.
2. Automobile Engineering By G.B.S. Narang.
3. Automotive Mechanics By W.H. Crouse.
4. Harbans Singh Rayat.

E-REFERENCES:

1. <https://youtu.be/gPaBULgRRuM?si=KQx2k1BJBOJRpjzF>
2. <https://youtu.be/KgQyuCrOKoU?si=iDg0pItHvcFoql36>
3. https://youtu.be/YXP_jNhtDI?si=BdSek6RaGcJIBasd

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Automobile Engineering Vol.-I & II	Kirpal Singh.	81-86308-01-6
2.	Automobile Engineering	G.B.S. Narang.	
3.	Automobile Engineering	K K Jain, K B Asthana (Tata Magraw Hill)	0-07-044529-X

TEACHING METHODOLOGY:

Course Delivery Methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	1	3	3
CO2	2	2	2	2	2	2	2	1	1	3
CO3	2	3	3	2	2	2	1	2	2	2
CO4	3	1	1	2	2	2	2	2	2	2
CO5	3	3	2	2	2	2	2	1	2	3

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023

COURSE (Heating and Ventilation and Air Conditioning)

PROGRAMME: DIPLOMA (Automobile)							
COURSE CODE: DPE- 513			Course Title: Heating Ventilation and Air Conditioning				
COMPULSARY / OPTIONAL: OPTIONAL							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

Course Objectives: This course envisions imparting the students to

1.	Learn the basic concepts and principles of air conditioning and Refrigeration.
2.	Learn the fundamental analysis methodology of air conditioning and Refrigeration
3.	Apply the course knowledge to do a design project of HVAC system.
4.	Identify the routine preventive maintenance tasks to be performed on HVAC units.
5.	Describe the common problems and their causes for HVAC unit

COURSE OUTCOMES: Students will be able to understand about

CO1	Gain the knowledge of installing air conditioning system
CO2	Demonstrate how to read temperature/pressure charts and diagnose problems within the system
CO3	Identify and recognize standard symbols and abbreviations and Gain knowledge of the air conditioning system to repair problems
CO4	Demonstrate a proper Load Calculation of a structure and estimate the cooling load, duct size and energy conservation techniques of air-conditioner.
CO5	HVAC application, industrial usages and its remedies.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Title: Introduction 1.1 Thermodynamic state of a pure substance -Modes of heat transfer, 1.2 laws of heat transfer, Mechanisms of Production of cold -Unit of Refrigeration, 1.3 Types of Refrigeration Reversed Carnot cycle, 1.4 C.O.P of Heat Engine, Heat pump and Refrigerating Machine, Compressor, 1.5 Condensers, Cooling towers, Vapour Compression Refrigeration systems and Vapour Absorption, Refrigeration systems. Course Outcome: CO1 Teaching Hours:8 hrs
2	Title: Psychometrics 2.1 Psychometric Properties, Psychometric Chart and its uses, 2.2 Sensible heating and cooling, Humidifying and Dehumidifying and Cooling 2.3 Sensible heat factor, Bypass factor, 2.4 Adiabatic mixing, Evaporative cooling, Problems on Psychometric Charts. Course Outcome: CO2 Teaching Hours:8 hrs
3	Title: Air Conditioning

	3.1 Air conditioning, Factors controlled in Air-Conditioning, 3.2 Types: Window type, AC-Split, Refrigerants and Brine, Centralized AC plant, 3.4 Air handling units, overload protector, Relay types, high pressure and low pressure cut out. Course Outcome: CO3 Teaching Hours:8hrs
4	TITLE: HVAC 4.1 Introduction to HVAC- Introduction to Codes & Standards, 4.2 Heating Ventilation and Air-Conditioning:), Ducts and its types, 4.3 Vane's dampers and their importance, 4.4 Duct designing methods (manual calculations) using Equal friction/Velocity reduction method Pipe sizing methods, 4.5 Chilled water pipe sizing, Pump size. Course Outcome:CO4 Teaching Hours:8 hrs
5	Title: Heating Load Calculation 5.1 Heat Load Calculations- Equipment Selection, 5.2 Air Distribution System, Ventilation & Exhaust Systems, 5.3 Piping-Static Pressure Calculations and Pump Head Calculation, 5.4 Air Conditioning Duct system, distribution system, Course Outcome: CO5 Teaching Hours:8 hrs

REFERENCE BOOKS:

S. N.	Title	Author	ISBN
1.	HVAC Fundamentals	Samuel C. Sugarman	0849336651
2.	HVAC System Design	N.C Gupta	8130930307
3.	A Textbook of Refrigeration & Air Condition	R.S Khurmi	9788121927819

E-REFERENCES:

1. <https://nptel.ac.in/courses/112103019/>
2. <https://www.tandfonline.com/>
3. Web links and Video Lectures (e-Resources): E-book URL:<https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>.

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

1- Low 2- Medium 3- High

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	3	3	2
CO2	2	2	2	1	2	2	2	3	3	2
CO3	2	2	2	1	2	1	2	2	3	3
CO4	2	2	2	1	2	1	2	2	2	2
CO5	2	3	2	2	2	2	3	3	2	3

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023
COURSE: STATISTICAL QUALITY CONTROL

PROGRAMME: DIPLOMA							
COURSE CODE: DOE 551			Course Title: Statistical Quality Control				
COMPULSARY / OPTIONAL: OPTIONAL							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

Course Objectives: This course envisions imparting the students to

1.	Understand the concept of quality improvement and the use of statistics in quality control.
2.	Understand the basic concept of probability, reliability and failure
3.	Understand the concept of process capability analysis. and use various control charts for attributes and variables.
4.	Understand the concept of acceptance sampling, OC curves and preparation of acceptance sampling plans for attributes.
5.	Understand the concept of total quality management and ISO 9000.

COURSE OUTCOMES: Students will be able to understand about

CO1	Understand the philosophy of quality improvement and the basic concepts of statistical quality control
CO2	Able to discuss different statistical approaches.
CO3	Design, use, and interpret control charts and perform analysis of process capability.
CO4	Prepare and analyze sampling plans for attribute and variable data.
CO5	Understand the concept of total quality management, ISO-9000 quality system.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	Basic Concept of Quality 1.1: Definition of quality, Quality of Design, Quality of Conformance 1.2 Quality Function, Quality Characteristic, Cost of Quality 1.3 Quality control, Objectives of quality control, Value of Quality 1.4 Quality Control & Inspection 1.5 Statistical quality Control & its advantages Course Outcome: CO1 Teaching Hours: 8 hrs
2	Statistical concepts and Reliability 2.1 Definition of probability, laws of probability 2.2 Normal and Binomial probability distributions. 2.3 Definition of Reliability, basic concept 2.4 Failure patterns for complex product 2.5 designing for reliability, System reliability Course Outcome: CO2 Teaching Hours: 8 hrs

3	Control Charts for Variables and Attributes 3.1 General theory of control chart, introduction, objectives, control limits, Process Capability 3.2 Control chart for variable 3.3 Control Chart for attribute Course Outcome: CO3 Teaching Hours: 8 hrs
4	Acceptance Sampling. 4.1 Concepts of acceptance sampling, advantages and limitations 4.2 Sampling methods, single, double and-multiple sampling plans 4.3 operating characteristic curves 4.4 Comparison between single, double and multiple sampling plan 4.5 Characteristic of good acceptance plan Course Outcome: CO4 Teaching Hours: 8 hrs
5	Total Quality Management and ISO 9000 Quality System 5.1 Concept of Total quality management, Dimensions of TQM, 5.2 Principle objectives of TQM, zero defect concept 5.3 Implementation of TQM, Benefits of TQM 5.4 Need of quality system, History of ISO: 9000 series of standards series in general 5.5 Benefits by becoming an ISO: 9000 company, Outstanding features of ISO:9000 series of standards, Steps to registration Course Outcome: CO5 Teaching Hours: 8 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Quality Control	P. Mahazan	

E-REFERENCES:

1. <https://youtu.be/gPaBULgRRuM?si=KQx2k1BJBOJRpjzF>
2. <https://youtu.be/KgQyuCrOKoU?si=iDg0pltHvcFoql36>
3. https://youtu.be/YXP_jNhtDI?si=BdSek6RaGcJIBasd
- 4.

Course Delivery methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes

[illegible]

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)
SYLLABUS (CBCS)-2023
COURSE: AUTOMOBILE ENGINE

PROGRAMME: DIPLOMA							
COURSE CODE: DOE 512				Course Title: Automobile Engine			
COMPULSARY / OPTIONAL: OPTIONAL							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOUR/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVE: The student should be able to

1	To understand the various concept and basic principles of the Engine.
2	To understand the basics components and their working principles of the Engine
3	Combustion of S.I and CI Engine and their mechanism of the combustion process
4	Students will enable to understand the air- fuel ratio and ignition systems
5	Modern trends and technological trends in the Automobile sector

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

CO1	To understand the various concept and basic principles of the Engine and know working strokes of the engine.
CO2	The students are to know the different parts of the engine components.
CO3	To know Combustion of S.I and CI Engine and their mechanism of the combustion process and improvement of the performance engine.
CO4	Students will enable to understand the air- fuel ratio and ignition systems and the modern types of fuel injection system.
CO5	To understand the requirements of cooling and lubricating in automotive engine and their properties.

COURSE DETAILS:

Module	Topic /sub-Topic
1	Introduction: 1.1 Basic units, major components of engine, 1.2 mechanism of operation, Four- Stroke and two – Stroke Petrol and diesel engine, their applications, 1.3 specification of Auto – engines, classification of automobile engine CO1 Teaching Hours: 8 hrs
2	Constructional details of automotive engine: 2.1 Introduction, multi-valve overhead cam system, 2.2 Crank case, Cylinder liner, piston, rings, Connecting rod, crank shaft, 2.3 Main bearing, Cam shaft, Valves, Valves seats, 2.4 Valve mechanism, Valve timing gears, 2.5 balancing, flywheel, Vibration damper, timing order. CO2 Teaching Hours: 8 hrs
3	Combustion Phenomenon: 3.1 Characteristics of petrol and diesel engine fuels, additives, 3.2 Combustion in S.I. and C.I. engines,

	3.4 flame propagation, Detonation, 3.5 Pre-ignition and diesel knock, 3.6 Combustion chamber of S.I. and C.I. engines, 3.7 HUCR, octane and cetane number, E.G.R. system. CO3 Teaching Hours: 8 hrs
4	Fuel Feed System Engine: 4.1 Petrol fuel feed system, Petrol pumps, carburettors, 4.2 Air fuel ratio of combustion, electronic control of A / F ratios, 4.3 Petrol injection, M.P.F.I. system, injection timing, Air cleaners, 4.4 manifold, exhaust pipe, Muffler, 4.5 supercharging, Turbo charger. Fuel feed system, fuel injection pump, 4.6 fuel filters, devices for cold starting, emission control CO4 Teaching Hours: 8 hrs
5	Cooling systems & lubricating system: 5.1 Significance, types of cooling systems and their description, 5.2 water pump, fan, radiator, cooling system, 5.3 anti – freeze solution. Oil strainer, 5.4 Oil filter, Oil cooler, Oil seal, Crank case ventilation, 5.5 Oil pressure gauge, Oil level indicator, 5.6 properties of lubricating oil, and trouble shooting of lubrication system. CO5 Teaching Hours: 8 hrs

Text Books:

1. Automotive Engines S. Srinivasan
2. Automobile Engineering K.M. Gupta
3. Automobile Engineering K.K. Ramalingam

References Books:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Automobile Engineering Vol.-I & II	Kirpal Singh.	81-86308-01-6
2.	Automobile Engineering	G.B.S. Narang.	
3.	Automobile Engineering	K K Jain, K B Asthana (Tata Magraw Hill)	0-07-044529-X
4.	Automobile Engineering	K K Ramalingam	81 8842 9481 1
5	Automobile Engineering Vol. I & II	K M gupta	81-88114-220-0
6.	Internal Combustion Engines	Agrawal Shyam K.	81-2241-782-5, 978-81-224-1782-1

E REFERENCE:

1. <https://nptel.ac.in/courses/112103019/>
2. <https://www.tandfonline.com/>
3. Web links and Video Lectures (e-Resources): E-book URL: <https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>

TEACHING METHODOLOGY:

Course Delivery Methods	TEACHING METHODOLOGY	
CD1	Lecture by use of boards/LCD projectors	√
CD2	Tutorials/Assignments	√
CD3	Seminars	√
CD4	Industrial/guest lectures	
CD5	Self- learning such as use of NPTEL materials and internet	√

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	3		3
3CO2	2	2	2	2	2	2	2	2	3	3
CO3	2	3	3	2	2	2	1	3	3	3
CO4	3	1	1	2	2	2	2	3	3	3
CO5	3	3	2	2	2	2	2	3	3	3