



One Week Add-on Program on “Automobile basics, advancement, modern fuels and environment sustainability”
Scheduled from 8th Feb to 13th Feb 2021
Organized by
Department of Mechanical Engineering

Certificate Course/ Add-on Course/ Value Added Course Details		
Activity	Planning	Remarks
Introduce and offer new courses across all programme.	New course-Student Development Program on Automobile basics, advancement, modern fuels and environment sustainability is planned for fourth and sixth semester students. The duration of course will be of 30 hours of theory session . This course will start in the second week of February. The slot allotted will be of 5 Hours/day .	
<p>COURSE NAME: Automobile basics, Advancement, Modern fuels and Environment Sustainability</p> <p>Teaching Scheme Theory: 05 Hours/ Day</p> <p>Examination Scheme College Assessment: 50 Marks</p>		
<p>COURSE OBJECTIVE AND EXPECTED OUTCOMES:</p> <p>To provide student with an opportunity to develop technical competency in automobile engineering. To provide specialization based program and ensure learning as per industrial requirements for modern design solutions. To create awareness among students toward modern fuels, electric vehicle development and trending technologies as per demand of environment sustainability.</p> <p>COURSE OUTCOME:</p> <p>Students will be able to –</p> <p>CO1: Understand the fundamentals and importance of engines, engine components, fuel parameters and advancement in technology. CO2: Examine the aspects of vehicle design, engine construction and system components. CO3: Compare the IC engine combustion parameters. CO4: Create moral responsibility to adapt and collaborate the demand of environmental sustainability.</p>		

COURSE SYLLABUS:

UNIT I: Structural System Fundamentals

History of automobiles

- Automobile history and development, Present scenario of automobiles in India and Abroad.

Vehicle Design

- Chassis
- Body pattern
- Aerodynamics
- Safety Considerations in automobiles

Engine Construction

- Structural components and materials
- Engine mounting- Front, Rear, Centre
- Engine types- C.I, S.I, Two stroke, Four stroke, Vertical inline, V-type

Automobile System Components

- **Transmission Systems**
Transmission- Necessity of transmission, principle
Clutch - Necessity, requirements of a clutch system, types of Clutches
Types of transmission- Sliding mesh, constant mesh, synchromesh, Transfer gear box, Gear Selector mechanism
Types of transmission- Manual, Automatic, DCT, CVT, AMT, IVT
Lubrication and control, Overdrive, Torque Converter, Propeller shaft, Universal joint, constant velocity joint, Hotchkiss drive, and torque tube drive.
Differential- Need and types, Rear Axles and Front Axles.
- **Suspension**
Types of suspension- Swing axle, Sliding pillar, Macpherson strut, Double wishbone, Multi-link suspension, Semi-trailing arm suspension, Swinging arm
- **Steering systems**
Principle of steering, Center point steering, Steering linkages, Steering geometry and Wheel alignment, Power steering, Special steering systems
- **Brakes**
Need, Types, Comparison
- **Wheels and Tyres**
Functions of wheels, Types of wheels and tyres, tyre terminology
- **Electrical systems**
Construction, operation and maintenance of Lead acid batteries, Battery charging system, Principles and Operation of cutout and regulators, Starter motor, Battery Ignition and magneto ignition systems ignition timing, alternators
- **Fuel system**
Fuel tank , Fuel pump, Fuel injection, Exhaust, Catalytic converter, Engine cooling systems, Muffler/Silencers,

UNIT II: Fuels and Combustion

IC Engines Combustion Performance Parameters

- Fuels and suitability of fuels for use in S.I. Engines
- Rating of S.I. Engines fuels
- Carburetors and carburetion
- Performance characteristics
- Direct Injection Stratified Charge engines (DISC)
- Homogeneous charge CI engines (HCCI)
- Supercharging and Turbo charging
- Digital simulation for performance prediction

Maintenance & Testing

- Maintenance
- Advanced techniques and tools used
- Maintenance documentation
- Trouble shooting and service procedures
- Overhauling
- Engine tune up
- Tools and equipment for repair and Overhaul
- Testing equipments.

UNIT III: Modern Fuels and Alternatives to IC Engines

- The World's requirement of heat and power and how they are supplied
- The types of fuels which are available, their nature and properties
- Environmental Effects and Consumer Habits
- Alternative Fuels (Ethanol, Methanol, Hydrogen, LPG, CNG, Bio-gas and Bio-diesel)
- Modern Electric, Hybrid Electric and Fuel Cell Vehicles
- Comparison between traditional and modern fuel vehicles
- Discussion on future of automobile industry

TEACHING SCHEME:

Theory: 05 Hours/ Day

Mode of lecture delivery: Online- Google classroom

Use of Tools: PPT, Data from text books, published journals, specialized books on automobiles, SAE magazines, Animation Videos

EXAMINATION SCHEME

College Assessment : 50 Marks.

Total Course Duration : 30 Hours.

Teaching Duration/day : 05 Hours/Day

Student selection policy : Second and Third Year (All)

Course Coordinator : Mr. G.R. Mohite

Teaching Faculties : (In-House)

Sr. No.	Faculty Name	Number of Sessions	Hours
1	Dr. H. Bhatkulkar	1	1
2	Mr. G.R. Mohite	18	21
3	Mr. H. Akhtar	1	1
4	Mr. A. Dhawale	1	1
4	Mr. A. Shewalkar	2	2
5	Mr. H. Wagh	1	1

COURSE EVALUATION CRITERIA:

1. Continuous Assessment(x): 10 Marks {Attendance 4M, Attentiveness 3M, Observation and discussion 3M}
2. Exercise(y): 10 Marks {Objective type}
3. Case Study/Mini Project(Z): 30 Marks

NOTE:

1. Continuous assessment marks will be 10 per day, 60 for complete course
Therefore final average marks for continuous assessment, $X = (x_1+x_2+x_3+x_4+x_5+x_6)/6$
2. Exercise will carry 10 marks per day, 60 for complete course
Therefore final average marks for exercise $Y = (y_1+y_2+y_3+y_4+y_5+y_6)/6$
3. Case study/mini project will be given in group of 4 and assessment will carry 30 marks

REFERENCES:

1. Automobile engineering syllabus-
MEL422 - Automobile Engineering, VNIT, Nagpur
2. IITB Courses
Spark Ignition Engine
Combustion in Automobile
Automobile Engineering (Transmission)
Fuels and Combustion

3. Automobile book publications, journal papers

- I. Book on Environmental Effects and Consumer Habits
Michael Beliveau, James Rehberger, Jonathan Rowell, Alyssa Xarras
Worcester Polytechnic Institute
- II. Book on Automotive Systems: Principles and Practices, First Edition
G.K.Awari, V.S.Kumbhar, R.B.Tirpude, CRC press, Taylor and Francis Group
- III. Book on Modern Electric, Hybrid Electric and Fuel Cell Vehicles
Mehrdad Ehsani, Eimin Gao, Sebastien E. Gay, Ali Emadi
Power electronics and applications series, University of West Florida
- IV. Hybrid Electric Vehicle
Rushikesh Trushar Soni, Journal of Mechanical and Civil Engineering
- V. A Review on Hybrid Electric Vehicle
Yasmeen Malik, Vikas Kumar, International Journal of Advanced Research in Electrical,
Electronics and Instrumentation Engineering

APPROVED BY:

Dr. Ashwin Dhoble

Assistant Professor, V.N.I.T., Nagpur

Dr. G. K. Awari

Head of Department of Automobile Engineering, Government Polytechnic, Nagpur

Note: The Certificate Course/ Add-on Course/ Value Added Course Details (Planning Phase) offered by your institute is approved with suggested changes highlighted in the text.



Dr. G. K. Awari