

JEPPIAAR ENGINEERING COLLEGE

Jeppiaar Nagar, Rajiv Gandhi Salai – 600 119

DEPARTMENT OF
MECHANICAL ENGINEERING

QUESTION BANK



V SEMESTER
ME6602 Automobile Engineering Regulation

JEPPIAAR ENGINEERING COLLEGE

Vision of Institution

To build Jeppiaar Engineering College as an institution of academic excellence in technological and management education to become a world class university.

Mission of Institution

- To excel in teaching and learning, research and innovation by promoting the principles of scientific analysis and creative thinking.
- To participate in the production, development and dissemination of knowledge and interact with national and international communities.
- To equip students with values, ethics and life skills needed to enrich their lives and enable them to meaningfully contribute to the progress of society.
- To prepare students for higher studies and lifelong learning, enrich them with the practical and entrepreneurial skills necessary to excel as future professionals and contribute to Nation's economy.

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

JEPPIAAR ENGINEERING COLLEGE

DEPARTMENT OF MECHANICAL ENGINEERING

Vision of the Department

To create excellent professionals in the field of Mechanical Engineering and to uplift the quality of technical education on par with the International Standards.

Department Mission

1. To **reinforce** the fundamentals of Science and Mathematics to **Mechanical Engineering and critically and relatively investigate complex mechanical systems and processes**.
2. To engage in the **production, expansion and practice** of **advanced engineering applications** through knowledge sharing activities by interacting with global communities and industries.
3. To **equip** students with **engineering ethics, professional roles, corporate social responsibility** and life skills and **apply** them for the betterment of society.
4. **To promote** higher studies and lifelong learning and entrepreneurial skills and **develop** excellent professionals for empowering nation's economy.

PEO's

1. To **enrich** the technical knowledge of **design, manufacturing and management of mechanical systems** and **develop creative and analytical thinking** in research.
2. To **relate, strengthen and develop** the **theoretical knowledge of the Mechanical Engineering** by exhibiting various concepts applied through diverse industrial exposures and experts' guidance.
3. **Facilitate** the students to communicate effectively on complex social, professional and engineering activities with strict adherence to ethical principles.
4. **Create awareness for independent and life long learning and develop the ability to keep abreast of modern trends and adopt them for personal technological growth of the nation.**

PSO's

1. To understand the basic concept of various mechanical engineering field such as design, manufacturing, thermal and industrial engineering.
2. To apply the knowledge in advanced mechanical system and processes by using design and analysis techniques.
3. To develop student's professional skills to meet the industry requirements and entrepreneurial skills for improving nation's economy stronger.

ME6602- AUTOMOBILE ENGINEERING

COURSE OUTCOMES

C312.1	Recognize the various parts of the automobile and their functions and materials
C312.2	Discuss the engine auxiliary systems and engine emission control
C312.3	Distinguish the working of different types of transmission systems
C312.4	Explain the steering, Brakes and suspension systems.
C312.5	Predict possible alternate sources of energy for IC engine

OBJECTIVES:

- To understand the construction and working principle of various parts of an automobile.
- To have the practice for assembling and dismantling of engine parts and transmission system

UNIT I VEHICLE STRUCTURE AND ENGINES**9**

Types of automobiles, vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –componentsfunctions and materials, variable valve timing (VVT).

UNIT II ENGINE AUXILIARY SYSTEMS**9**

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

UNIT III TRANSMISSION SYSTEMS**9**

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT IV STEERING, BRAKES AND SUSPENSION SYSTEMS**9**

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control.

UNIT V ALTERNATIVE ENERGY SOURCES**9**

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

TOTAL: 45 PERIODS



JEPPIAAR ENGINEERING COLLEGE

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DEPARTMENT OF MECHANICAL ENGINEERING
QUESTION BANK

SUBJECT : ME6602- AUTOMOBILE ENGINEERING

YEAR /SEM: III /V

UNIT- I VEHICLE STRUCTURE AND ENGINES				
Types of automobiles, vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –componentsfunctions and materials, variable valve timing (VVT).				
PART – A				
CO Mapping : C303.1				
Q.No	Questions	BT Level	Competence	PO
1	Explain the various applications of automobiles	BTL-2	Understanding	PO1, ,PO12
2	How are automobiles classified	BTL-1	Remembering	PO1, PO12
3	How are automobiles classified based on capacity? Give examples	BTL-1	Remembering	PO1, PO12
4	What is meant by self-propelled vehicle	BTL-1	Remembering	PO1, PO12
5	What is known as unitary or monocoque construction in an automobile	BTL-1	Remembering	PO1, PO12
6	Briefly explain "offroad" vehicle with example	BTL-6	Creating	PO1, PO12
7	How automobiles are streamlined based on type of transmission used	BTL-1	Remembering	PO1, PO12
8	Mention any four requirements of an automobile.	BTL-2	Understanding	PO1, PO12
9	What is the difference between normal control and forward control in commercial vehicles?	BTL-1	Remembering	PO1, PO12
10	How does EMS operate	BTL-1	Remembering	PO1, ,PO12
11	What is chassis? How its design is related to vehicle aerodynamics	BTL-1	Remembering	PO1, PO12
12	List any four compartments of a chassis.	BTL-1	Remembering	PO1, PO12
13	Classify chassis based on number of wheels	BTL-2	Understanding	PO1, PO12
14	How chassis system is classified based on fitting engine	BTL-1	Remembering	PO1, PO12
15	List any six characteristics of a good chassis.	BTL-1	Remembering	PO1, PO12
16	List out the various materials used in the construction of chassis frames?	BTL-1	Remembering	PO1, PO12
17	Enumerate the merits and demerits of front engine rear drive chassis layout	BTL-1	Remembering	PO1, PO12
18	How does frame act	BTL-1	Remembering	PO1, PO12
19	What are the functions of frames in automobile	BTL-1	Remembering	PO1, PO12
20	State the advantages of frameless construction	BTL-1	Remembering	PO1, PO12
21	What are the defects that can appear in a chassis body?	BTL-1	Remembering	PO1, PO12
22	What are the materials used for cylinder block and oil pan	BTL-1	Remembering	PO1, PO12
23	What is double overhead camshaft engine	BTL-1	Remembering	PO1, PO12
24	Name the resistances to vehicle motion.	BTL-1	Remembering	PO1, PO12
25	Mention any four engine components along with materials.	BTL-2	Understanding	PO1, PO12

26	What is the purpose of the flywheel in an IC engine?	BTL-1	Remembering	PO1, PO12
27	What is known as valve overlap?	BTL-2	Understanding	PO1, PO12
28	Write down the firing order of 4 and 6 cylinder engine	BTL-1	Remembering	PO1, PO12
29	What are the types of VVT	BTL-1	Remembering	PO1, PO12
30	What is the need for a gearbox in an automobile	BTL-1	Remembering	PO1, PO12
31	Sketch the Layout of Front engine and rear wheel drive vehicle	BTL-6	Creating	PO1, PO12
PART – B & C				
1	What are the aspects considered in the design and construction of a body	BTL-1	Remembering	PO1, PO12
2	Draw the layout of an automobile and indicate its various components	BTL-2	Understanding	PO1, PO12
3	Draw the layout of conventional chassis with a neat diagram and explain about the various parts on it	BTL-2	Understanding	PO1, PO12
4	Explain the construction of various frames used in automobiles with neat sketch	BTL-2	Understanding	PO1, PO12
5	Write short notes on the following with respect to vehicle motion	BTL-1	Remembering	PO1, PO12
6	List the engine parts, materials, methods of manufacture and their functions.	BTL-1	Remembering	PO1, PO12
7	Explain with suitable sketches and valve timing diagram, the working of a Variable Valve Timing (VVT) system used in automobiles.	BTL-2	Understanding	PO1, PO12
8	i) Define chassis, frame, body and suspension. ii) Explain briefly about the transmission structure of passenger car with neat sketch.	BTL-1 BTL-2	Remembering Understanding	PO1, PO12
9	Explain about the various aerodynamics forces and acting its influenced moments on a fast-moving passenger car	BTL-2	Understanding	PO1, PO12
10	Discuss about the procedures followed in incorporating variable valve Timing on a conventional IC engine.	BTL-6	Creating	PO1, PO12

UNIT- II ENGINE AUXILIARY SYSTEMS				
Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).				
PART – A				
CO Mapping : C303.2				
Q.No	Questions	BT Level	Competence	PO
1	What are the factors that affect fuel vaporization?	BTL-1	Remembering	PO1, PO12
2	What is carburetor?	BTL-1	Remembering	PO1, PO12
3	What is meant by carburetion?	BTL-1	Remembering	PO1, PO12
4	List out the major drawbacks of using Carburetor in multi cylinder engines.	BTL-1	Remembering	PO1, PO12
5	Define the terms vaporization and atomization.	BTL-1	Remembering	PO1, PO12

6	What are the functions of carburetor?	BTL-1	Remembering	PO1, PO12
7	Classify carburetor.	BTL-2	Understanding	PO1, PO12
8	What does the mixing chamber do?	BTL-1	Remembering	PO1, PO12
9	What is a variable jet carburetor?	BTL-1	Remembering	PO1, PO12
10	List the various defects occurred in a simple Carburetor	BTL-1	Remembering	PO1, PO12
11	What is meant by compensation?	BTL-1	Remembering	PO1, PO12
12	Mention the different circuits involved in solex carburetor	BTL-1	Remembering	PO1, PO12
13	State the important units of electronic fuel injection system.	BTL-1	Remembering	PO1, PO12
14	State the purpose of turbocharger.	BTL-1	Remembering	PO1, PO12
15	What do you understand by monopoint and multipoint injection system?	BTL-1	Remembering	PO1, PO12
16	Write the main requirements of an injector nozzle.	BTL-1	Remembering	PO1, PO12
17	What are the various types of fuel injection nozzle?	BTL-1	Remembering	PO1, PO12
18	Give the requirements of air fuel ratio in SI engine.	BTL-1	Remembering	PO1, PO12
19	What are the classifications of an ignition system?	BTL-1	Remembering	PO1, PO12
20	Name the component of Battery Coil ignition, system used in vehicles	BTL-1	Remembering	PO1, PO12
21	State the advantages of transistorised ignition system.	BTL-1	Remembering	PO1, PO12
22	What is supercharging?	BTL-1	Remembering	PO1, PO12
23	What is meant by turbocharging in automotive engines?	BTL-1	Remembering	PO1, PO12
24	What is the use of turbo charger?	BTL-1	Remembering	PO1, PO12
25	How does a turbo charger work?	BTL-1	Remembering	PO1, PO12
26	State how turbo charging is different from supercharging.	BTL-1	Remembering	PO1, PO12
27	What do you understand by the term DTS-I?	BTL-1	Remembering	PO1, PO12
28	What is meant by air pollution? What are the pollutants emitted by an automobile?	BTL-1	Remembering	PO1, PO12
29	What is EGR?	BTL-1	Remembering	PO1, PO12
30	What is a catalytic converter?	BTL-1	Remembering	PO1, PO12
31	Define "Intermittent injection" of petrol engine.	BTL-1	Remembering	PO1, PO12
32	Differentiate between Bharat Stage III and Bharat Stage IV emission norms.	BTL-1	Remembering	PO1, PO12

PART – B & C

1	Explain working principle of electronic fuel injection system	BTL-2	Understanding	PO1, PO12
2	Briefly explain the electronic diesel injection system with necessary controls.	BTL-2	Understanding	PO1, PO12
3	Explain CDI ignition system with a suitable diagram.	BTL-2	Understanding	PO1, PO12
4	Explain the following with suitable sketches: a) Rotary distributor type b) common rail direct injection system.	BTL-2	Understanding	PO1, PO12
5	Explain a turbocharger with a neat sketch	BTL-2	Understanding	PO1, PO12
6	Discuss the construction and working principle of 3-way Catalytic controller	BTL-2	Understanding	PO1, PO12
7	What are the main functions of ECU Describe the construction details of distributor type Diesel fuel injection pump with sketch.	BTL-1	Remembering	PO1, PO12
8	What are the types of electronic ignition systems used in S.I. engine Draw and explain the circuit diagram of electronic ignition system using a magnetic pick up method	BTL-1	Remembering	PO1, PO12
9	Explain the working principle of electronic ignition system.	BTL-2	Understanding	PO1, PO12
10	Describe the working of a common Rail Diesel Injection system with a neat sketch	BTL-2	Understanding	PO1, PO12
11	Explain about any one of after treatment methods adapted to	BTL-2	Understanding	PO1, PO12

	minimize the engine pollutants			
UNIT III TRANSMISSION SYSTEMS				
Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints ,Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.				
PART – A				
CO Mapping : C303.3				
Q.No	Questions	BT Level	Competence	PO
1	State the functions of transmission on systems.	BTL-1	Remembering	PO1, PO12
2	What is a clutch?	BTL-1	Remembering	PO1, PO12
3	Mention the function of a clutch.	BTL-1	Remembering	PO1, PO12
4	Name the types of clutches.	BTL-1	Remembering	PO1, PO12
5	What are the features of a good quality clutch?	BTL-1	Remembering	PO1, PO12
6	What are the advantages of a single plate clutch?	BTL-1	Remembering	PO1, PO12
7	What are the Advantages multi-plate clutch.	BTL-1	Remembering	PO1, PO12
8	What is known as one way clutch?	BTL-1	Remembering	PO1, PO12
9	What do you mean by fluid flywheel?	BTL-1	Remembering	PO1, PO12
10	What is the function of a flywheel?	BTL-1	Remembering	PO1, PO12
11	What are the merits and demerits of using fluid flywheel?	BTL-1	Remembering	PO1, PO12
12	What is 4WD and AWD?	BTL-1	Remembering	PO1, PO12
13	What is the necessity of transmission?	BTL-1	Remembering	PO1, PO12
14	What is known as selective transmission?	BTL-1	Remembering	PO1, PO12
15	Classify gearbox.	BTL-1	Remembering	PO1, PO12
16	What is meant by 'double declutching' in constant mesh gear box?	BTL-1	Remembering	PO1, PO12
17	What is a synchronizer? Why synchromesh device is usually not employed for the reverse gem?	BTL-1	Remembering	PO1, PO12
18	Why synchronizer is required in the automotive transmission system?	BTL-1	Remembering	PO1, PO12
19	What is the function of synchromesh unit in a gear box?	BTL-1	Remembering	PO1, PO12
20	What is the function of a synchronizer in a gearbox?	BTL-1	Remembering	PO1, PO12
21	Why epicyclic gears are used in overdrive units?	BTL-1	Remembering	PO1, PO12
22	What is the use of Torque converter?	BTL-1	Remembering	PO1, PO12
23	What is a free wheel? what is the importance of free wheel in the transmission of an automobile?	BTL-1	Remembering	PO1, PO12
24	What do you know about over drive?	BTL-1	Remembering	PO1, PO12
25	Why overdrive is used in some vehicles?	BTL-1	Remembering	PO1, PO12
26	What are the advantages of overdrives?	BTL-1	Remembering	PO1, PO12
27	Mention the functions of an overdrive	BTL-1	Remembering	PO1, PO12
28	State the various functions of propeller shaft.	BTL-1	Remembering	PO1, PO12
29	What is the function of universal joint in a propeller shaft?	BTL-1	Remembering	PO1, PO12
30	What do you understand by Hotchkiss drive?	BTL-1	Remembering	PO1, PO12
31	List out the types of dry type clutches.	BTL-1	Remembering	PO1, PO12
32	What is the use of slip joint?	BTL-1	Remembering	PO1, PO12
33	Mention the function of transfer case box used in all wheel drive vehicle	BTL-1	Remembering	PO1, PO12
34	Enumerate the forces acting on rear (live) axle of a vehicle.	BTL-1	Remembering	PO1, PO12
PART – B & C				
1	What are the features of a good quality clutch? Explain the working of multi plate clutch with a neat sketch	BTL-1	Remembering	PO1, PO12
2	Explain types of gear boxes in detail with neat sketches	BTL-2	Understanding	PO1, PO12
3	Explain in detail the automatic transmission system. Also describe in detail various types of gear selector	BTL-1	Remembering	PO1, PO12

	mechanisms used in automobiles. Discuss also the advantages and disadvantages of each and state what the modern trend is			
4	Explain the working principle of fluid flywheel, torque converter ,propeller shaft with neat sketch.	BTL-1	Remembering	PO1, PO12
5	Give the short notes on slip joint with a neat sketch,universal joints used in automobiles.	BTL-2	Understanding	PO1, PO12
6	Explain the principle and working of a differential with a neat sketch.	BTL-2	Understanding	PO1, PO12
7	Discuss the following with simple sketch of Torque tube drive, Hotchkiss drive, Transfer box	BTL-2	Understanding	PO1, PO12
8	What are the functions of the transmission system?	BTL-1	Remembering	PO1, PO12
9	Describe the line diagram of Synchromesh unit and mention the component (spring with ball type system)	BTL-2	Understanding	PO1, PO12

UNIT IV STEERING, BRAKES AND SUSPENSION SYSTEMS

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control..

PART – A

CO Mapping : C303.4

Q.No	Questions	BT Level	Competence	PO
1	What are the requirements of steering system?	BTL-1	Remembering	PO1, PO12
2	How does a steering wheel take t right turn?	BTL-1	Remembering	PO1, PO12
3	What is Ackermann steering principle	BTL-1	Remembering	PO1, PO12
4	Define camber, castor and toe-in	BTL-1	Remembering	PO1, PO12
5	Define the terms toe-out.	BTL-1	Remembering	PO1, PO12
6	Why is camber angle provided in steering system?	BTL-1	Remembering	PO1, PO12
7	What is meant by wander?	BTL-1	Remembering	PO1, PO12
8	Note down the effects of castor.	BTL-1	Remembering	PO1, PO12
9	List out the dffierent types of steering gear system.	BTL-1	Remembering	PO1, PO12
10	List out the types of front axle	BTL-1	Remembering	PO1, PO12
11	Name the types of stub axles	BTL-1	Remembering	PO1, PO12
12	Define 'bouncing' and 'pitching'.	BTL-1	Remembering	PO1, PO12
13	Define 'Rolling'.	BTL-1	Remembering	PO1, PO12
14	Define Yawing'.	BTL-1	Remembering	PO1, PO12
15	How are leaf springs lubricated?	BTL-1	Remembering	PO1, PO12
16	Define master leaf.	BTL-1	Remembering	PO1, PO12
17	Define shackle pin.	BTL-1	Remembering	PO1, PO12
18	What is meant by torsion bar?	BTL-1	Remembering	PO1, PO12
19	State the advantages of a torsion bar.	BTL-1	Remembering	PO1, PO12
20	State the advantages and disadvantages of a torsion bar	BTL-1	Remembering	PO1, PO12
21	Define cornering force and cornering power.	BTL-1	Remembering	PO1, PO12
22	What is the disadvantage of having rigid axle suspension	BTL-1	Remembering	PO1, PO12
23	Give a brief note on damper	BTL-1	Remembering	PO1, PO12
24	What are the different types of damper used in shock absorber?	BTL-1	Remembering	PO1, PO12
25	Define anti-roll bar.	BTL-1	Remembering	PO1, PO12
26	What causes vapour lock in a braking system?	BTL-1	Remembering	PO1, PO12
27	List the different types of brakes available.	BTL-1	Remembering	PO1, PO12
28	What is brakes compensation?	BTL-1	Remembering	PO1, PO12
29	What is the need of antilock braking system?	BTL-1	Remembering	PO1, PO12

30	List down the components of ABS system.	BTL-1	Remembering	PO1, PO12
31	Name any four types of suspension spring.	BTL-1	Remembering	PO1, PO12
32	Describe the advantages of steering Geometry.	BTL-1	Remembering	PO1, PO12
33	What are the objectives of suspension system ?	BTL-1	Remembering	PO1, PO12
34	Express a relation satisfying the condition for true rolling condition of a vehicle.	BTL-1	Remembering	PO1, PO12
35	With a neat Block Diagram, list the components of a typical traction control system used in modern passenger car.	BTL-1	Remembering	PO1, PO12
36	Name any four types of stub axle	BTL-1	Remembering	PO1, PO12
PART – B & C				
1	Explain the steering principle, its need, functions in detail with proper sketches and mention the parts of steering system	BTL-2	Understanding	PO1, PO12
2	Illustrate the types of front axle.	BTL-2	Understanding	PO1, PO12
3	Explain the operation of a telescopic type shock absorber with a sketch.	BTL-2	Understanding	PO1, PO12
4	Explain the operation of hydraulic braking system with neat sketch.	BTL-2	Understanding	PO1, PO12
5	With neat sketch explain the working principle of pneumatic braking system.	BTL-1	Remembering	PO1, PO12
6	What is the working principle of antilock braking system? Explain with neat sketch.[Anna univ	BTL-1	Remembering	PO1, PO12
7	Discuss in detail working method of steering linkage system with suitable sketches.	BTL-2	Understanding	PO1, PO12
8	(i) What are the requirements of a good braking system? (ii) Explain the merits of independent suspension system.	BTL-1 BTL-2	Remembering Understanding	PO1, PO12
9	Sketch and explain various steering geometries	BTL-1	Remembering	PO1, PO12
10	i) Explain the Ackerman principle of steering with neat sketch. ii) Explain the working of air suspension system with neat sketch.	BTL-2	Understanding	PO1, PO12
11	Draw the layout of a typical steering system used in a vehicle fitted with rigid suspension configuration and briefly discuss about the function of its constituent members.	BTL-2	Understanding	PO1, PO12
12	With relevant block diagrams, analyze the working of 4 channel 4 sensor type ABS system used in passenger cars.	BTL-1	Remembering	PO1, PO12

UNIT – V – ALTERNATIVE ENERGY SOURCES

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell

PART – A

CO Mapping : C303.5

Q.No	Questions	BT Level	Competence	PO
1	What are the different alternative fuels suitable for automobiles?	BTL-1	Remembering	PO1, PO12
2	List down the properties of alternate fuels.	BTL-1	Remembering	PO1, PO12
3	Define energy intensity.	BTL-1	Remembering	PO1, PO12
4	Define volatility.	BTL-1	Remembering	PO1, PO12

5	What is meant by octane number?	BTL-1	Remembering	PO1, PO12
6	Define flame speed.	BTL-1	Remembering	PO1, PO12
7	Define auto-ignition temperature of fuels.	BTL-1	Remembering	PO1, PO12
8	Define flash point.	BTL-1	Remembering	PO1, PO12
9	What is the composition of natural gas	BTL-1	Remembering	PO1, PO12
10	List out the various forms of natural gas.	BTL-1	Remembering	PO1, PO12
11	State the advantages of methane as fuels in automobiles.	BTL-1	Remembering	PO1, PO12
12	Write down the advantages and disadvantages of propane gas. Advantages of propane as fuels in automobiles:	BTL-1	Remembering	PO1, PO12
13	What is the composition of LPG?	BTL-1	Remembering	PO1, PO12
14	What is LPG? What are the advantages and disadvantages of using it in automobiles?	BTL-1	Remembering	PO1, PO12
15	What are the advantages of using compressed natural gas	BTL-1	Remembering	PO1, PO12
16	Give any four advantages of biodiesel.	BTL-1	Remembering	PO1, PO12
17	Define transesterification process	BTL-1	Remembering	PO1, PO12
18	What are the advantages and limitations of alcohols as engine fuel?	BTL-1	Remembering	PO1, PO12
19	Compare the properties of alcohols and gasoline as engine fuels-	BTL-2	Understanding	PO1, PO12
20	Why is hydrogen called as secondary energy source?	BTL-1	Remembering	PO1, PO12
21	What are the methods for using hydrogen	BTL-1	Remembering	PO1, PO12
22	Enumerate the limitations of electric vehicle.	BTL-1	Remembering	PO1, PO12
23	What is fuel cell?	BTL-1	Remembering	PO1, PO12
24	Briefly explain fuel cell.	BTL-2	Understanding	PO1, PO12
25	Define a hybrid vehicle.	BTL-1	Remembering	PO1, PO12
26	Mention the classification of Hybrid vehicles?	BTL-1	Remembering	PO1, PO12
27	What are the components of a hybrid vehicle	BTL-1	Remembering	PO1, PO12
28	What is meant by a fuel cell and how it works?	BTL-1	Remembering	PO1, PO12
29	Mention any four types of fuel cell.	BTL-1	Remembering	PO1, PO12
30	What is the difference between various fuel cells?	BTL-1	Remembering	PO1, PO12
31	Differentiate between bio-fuel and bio-diesel.	BTL-2	Understanding	PO1, PO12
32	Sketch the layout of a series configured electric vehicle.	BTL-1	Remembering	PO1, PO12
33	Define the term biodiesel.	BTL-1	Remembering	PO1, PO12

PART B & C

1	Explain the reasons for looking for alternate fuels for IC engines.	BTL-2	Understanding	PO1, PO12
2	Draw and explain the operation of liquefied petroleum gas system	BTL-2	Understanding	PO1, PO12
3	Explain briefly about the history, current uses, process of utilization and advantages of biomass as a fuel	BTL-2	Understanding	PO1, PO12
4	a) Enumerate the advantages and disadvantages of using alcohol as a fuel. b) Explain the two methods by which hydrogen can be used in CI engine	BTL-1 BTL-2	Remembering Understanding	PO1, PO12
5	Explain the modification required in SI and CI engines to employ alternate fuels to produce on par performance, combustion and emission characteristics of conventional engines.	BTL-2	Understanding	PO1, PO12
6	Explain in detail about the electrical vehicle system with a block diagram.	BTL-2	Understanding	PO1, PO12
7	With a layout diagram, explain the working features of hybrid vehicles.	BTL-2	Understanding	PO1, PO12
8	Explain fuel cell with a neat sketch. Give their disadvantages and advantages	BTL-2	Understanding	PO1, PO12
9	What are the engine modifications to be undertaken in the S.I engine for Alcohols or Ethanol as alternate fuel?	BTL-1	Remembering	PO1, PO12
10	What are the advantages of Hybrid electric vehicle?	BTL-1	Remembering	PO1, PO12
11	Explain the construction and working of the PEM fuel cell with sketch	BTL-2	Understanding	PO1, PO12
12	Discuss the salient properties of hydrogen as a fuel and explain the methods to use hydrogen as fuel in automobiles.	BTL-2	Understanding	PO1, PO12
13	Enumerate the various methods to use alcohol fuels in C.I. engine and state advantages and disadvantages of alcohol as	BTL-1	Remembering	PO1, PO12

	fuel.			
14	i) List any 2 methods of hydrogen production. ii) Explain about anyone of thermo chemical production process of Hydrogen.	BTL-1 BTL-2	Remembering Understanding	PO1, PO12