

# VALLIAMMAI ENGINEERING COLLEGE

## DEPARTMENT OF MECHANICAL ENGINEERING

### ME6602 AUTOMOBILE ENGINEERING

#### UNIT I: VEHICLE STRUCTURE AND ENGINES

##### PART-A

1. List major types of automobiles according to the fuel used. (BT1)
2. List any four components of a chassis. (BT1)
3. Express any two requirement of an automobile. (BT2)
4. List any four characteristics of a good chassis. (BT1)
5. Point out any two requirement of good frame. (BT4)
6. Describe about cross wind force. (BT2)
7. List few layout of the vehicle. (BT1)
8. Describe the purpose of IC engines. (BT2)
9. Name any four air pollutants. (BT1)
10. Define Electronic Engine Management system? (BT1)
11. Illustrate the functions of a frame? (BT3)
12. Express the type of loads coming to axle? (BT2)
13. Illustrate the various loads are acting on the frame? (BT3)
14. Describe the various components used in an IC Engines? (BT2)
15. Describe the various types of frames? (BT3)
16. Point out the stresses to which the frame members are subjected to? (BT4)
17. Point out the materials used in an IC engines? (BT4)
18. Express about Vehicle Aerodynamics? (BT2)

19. Explain Catalyst? (BT4)

20. Illustrate the parameter Variable Valve Timing. (BT3)

### **PART-B**

01. Describe the construction of various frames used in automobiles with neat sketch. (16) (BT2)

02. Describe the Construction and layout of Automobiles. (16) (BT2)

03. Describe the following terms: (BT2)

i) Load distribution in frames.

ii) Frame types with neat sketch

iii) Frame materials.

iv) Frame testing. (16)

04. i) Explain the operation of the typical turbocharger with sketch. (8) (BT4)

ii) Explain the principle of operation of a four stroke cycle S.I. Engine with a neat Sketch. (8)  
(BT4)

05. Explain in detail about the construction and working of different engine components with the help of neat sketch? (16) (BT4)

06. Explain the followings. (BT6)

i) Functions of a cooling system? (2)

ii) Different types of lubrication systems used in automotive engines. (14)

07. Illustrate the followings. (BT3)

i) Emission norms. (7)

ii) Operational features of electronics engine management system with neat sketch. 9)

08. Explain in details about Variable Valve Timing. (8) (BT4)

09. Explain in details about Vehicle Aerodynamics. (16) (BT6)

10. Explain with neat sketch the various types of chassis and discuss their advantages & disadvantages. (BT6)

## UNIT II ENGINE AUXILIARY SYSTEMS

### PART-A

1. Describe the functions of Carburetor? (BT1)
2. List the requirements of a Spark plug? (BT1)
3. List out the main functions of a battery. (BT1)
4. Discuss the functions of Variable Jet Carburetor? (BT2)
5. Discuss the function of ORC in a starting motor? (BT2)
6. Discuss the significance of gasoline injection system. (BT2)
7. Illustrate the purpose of Cut-out relay? (BT3)
8. Illustrate the important units used in electronic fuel injection system? (BT3)
9. Illustrate the two ways of determining the charge. (BT3)
10. Explain the functions of Unit Injector systems? (BT4)
11. Explain the functions of common rail direct injection system? (BT4)
12. Explain the functions of Electronic ignition system? (BT4)
13. Explain the functions of rotary distributor? (BT6)
14. Explain the function of Transistorized coil ignition system? (BT6)
15. Explain the functions of Turbo chargers? (BT6)
16. Explain the advantages of electronic fuel injection system over conventional injection? (BT6)
17. Discuss the functions of three way catalytic converter system? (BT2)
18. Discuss the function of capacitive discharge ignition system? (BT2)
19. Discuss the emission of automobile? (BT2)
20. Define CRDI? (BT1)

### PART-B

1. Describe the functions of carburetor? (BT1)
2. Describe the construction and operation of a Simple Carburetor. (BT1)

3. Discuss with neat sketch the working of electronically controlled gasoline injection system for SI engines. (BT2)
4. Illustrate with a sketch the working of aUnit injector system. (BT3)
5. Illustrate the working of Rotary distributor type injection system with its neat sketch. (BT3)
6. Explain about a Transistorized coil ignition system. (BT4)
7. Explain the Capacitive discharge ignition system. (BT4)
8. Explain the following of an injector of a common rail diesel injection system. (BT6)
9. Explain about the Engine emission control by threeway catalytic converter system. (BT6)
10. Explain about Emission norms (Euro and BS). (BT6)

### **UNIT – III (TRANSMISSION SYSTEM)**

#### **PART-A**

1. List out the functions of clutch? (BT1)
2. List out the functions of Synchronesh unit in a gear box? (BT1)
3. Summarize the functions of differential unit. (BT2)
4. Discuss the functions of universal joint? (BT2)
5. List out the functions of a propeller shaft. (BT1)
6. Demonstrate the use of epicyclic gears in overdrive units? (BT3)
7. Give types of gear box. (BT2)
8. Discuss the double clutching technique? (BT2)
9. Illustrate the difference between torque converter gearbox and fluid flywheel? (BT3)
10. Demonstrate the phenomenon of torque multiplication. (BT3)
11. Define a clutch? (BT1)
12. Generalize the meaning of fluid fly wheel? (BT6)
13. Define traction effort? (BT1)
14. Assess the functions of synchronesh unit in a gear box? (BT5)

15. Classify the types of clutches? (BT4)
16. Compare Hotchkiss drive and Torque Tube drive? (BT4)
17. Explain the functions of a slip joint. (BT4)
18. Explain differential lock? (BT5)
19. Explain transfer box and its uses? (BT5)
20. Analyze the use of Synchronizer in the automotive transmission system? (BT4)

### **PART-B**

1. Define clutch and describe the requirements. (BT1)
2. Describe the working of a single plate clutch with a diagram. (BT1)
3. Describe the working principle of fluid fly wheel with the help of a sketch. (BT1)
4. Discuss about fluid coupling and torque converter? (BT2)
5. Compare a fluid coupling and torque converter? (BT5)
6. Explain the sliding mesh gearbox with a suitable sketch. (BT4)
7. Illustrate the operation of a sliding mesh gearbox and deduce the gear ratios. (BT 3)
8. Discuss the construction and operation of a constant mesh gear box. (BT2)
9. Illustrate the principle and working of a differential with a neat sketch. (BT3)
10. Generalize the mechanics of Hotchkiss drive and torque tube drive. (BT6)

## UNIT – IV STEERING BRAKES AND SUSPENSION

### PART-A

1. List out the types of front axle. (BT1)
2. Describe bleeding of brakes? (BT2)
3. Classify independent rear suspension system. (BT3)
4. Discuss about the functions of suspension system? (BT2)
5. Define slip angle. (BT1)
6. Define overall steering ratio. (BT1)
7. Illustrate centre point steering? (BT3)
8. Define caster angle. (BT1)
9. Discuss the term 'tread'? (BT2)
10. Compare the advantages of radial tyre and cross ply tyre. (BT4)
11. Classify wheel balancing. (BT3)
12. Summarize the meaning of a camel block? (BT5)
13. Prepare a comparison between cross ply and radial ply tyres? (BT6)
14. Compare the advantages of wire wheel and disc wheel? (BT4)
15. Define tube vulcanizing. (BT1)
16. Select the requirements of tyres? (BT5)
17. Classify wheels (BT3)
18. Generalize the purpose of Toe-in and Toe-out? (BT6)
19. Illustrate king pin inclination. (BT3)
20. Differentiate castor and camber. (BT4)

## **PART-B**

1. List out the types of wheels? Describe their relative merits. (BT1)
2. Discriminate castor, camber and King pin inclination with respect to wheel geometry? (BT5)
3. List down the various components of a steering system. (BT1)
4. Discuss about the different types of steering gears used in an automobile? (BT2)
5. Analyze the operation of a sliding mesh gearbox and deduce the gear ratios. (BT4)
6. Describe the construction and operation of a shock absorber with a neat sketch. (BT1)
7. Illustrate the operation of a telescopic type shock absorber with a sketch. (BT3)
8. Generalize the advantages of independent suspension system? (BT6)
9. Analyze the construction and operation of a hydraulic braking system with a sketch. (BT4)
10. Differentiate dead front axle and live front axle (BT2)

## **UNIT V - ALTERNATIVE ENERGY SOURCES**

### **PART-A**

1. Define fuel cell and how it work and list the application? BT1
2. List down the types and properties of alternate fuels? BT1
3. Define Volatility? BT1
4. List down the various forms of natural gas? BT1
5. Describe the composition of LPG? BT1
6. List down the properties of LPG? BT1
7. Differentiate working principle of LPG and CNG cars? BT2
8. Describe transesterification process? BT2
9. Discuss the methods for using hydrogen as a fuel? BT2
10. Express the process of electrolysis? BT2
11. Illustrate the limitation and application of electric vehicle? BT3

12. Show the layout of fuel cell? BT3
13. Demonstrate the term reversible fuel cell? BT3
14. Classify the types of various methods of storing hydrogen? BT4
15. Classification of hybrid vehicle and its application? BT4
16. Compare the series and parallel hybrid trains? BT4
17. Summarize the term biomass gasification and pyrolysis? BT4
18. Explain the methods for using hydrogen as a fuel? BT4
19. Develop the technical reason of flash point and state the effect? BT5
20. Generalize the term detonation and preignition? BT5

### **PART-B**

1. Define various alternate fuels available in detail. BT1
2. Define the fuel characteristics Alcohols, CNG, LPG and hydrogen. BT1
3. List out the various properties of alternative fuels? BT1
4. Discuss why hydrogen is considered as the most favorable fuel for nature? BT2
5. Describe the methods of hydrogen production? Explain any one in detail? BT2
6. Relate the working principle and application of series and parallel hybrid trains? BT3
7. Demonstrate fuel cell with its principle and application? BT3
8. Explain working feature of hybrid vehicle and give its merits? BT4
9. Convince the usage of hydrogen as alternate fuel in automobile industry? BT5
10. Generalize the comparison between a fuel cell –powered car to one powered by a battery. BT6