Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40977

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth/Seventh Semester

Aeronautical Engineering

OAT 551 — AUTOMOTIVE SYSTEMS

(Common to Aerospace Engineering/Computer and Communication Engineering/ Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/ Industrial Engineering/ Industrial Engineering and Management/ Instrumentation and Control Engineering/Manufacturing Engineering/ Marine Engineering/ Material Science and Engineering/ Mechanical Engineering/ Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/ Mechatronics Engineering/Production Engineering/Robotics and Automation/ Bio Technology/Food Technology/Pharmaceutical Technology)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the differences between two-stroke and four-stroke engines?
2. Draw a typical valve and port timing diagrams.
3. What are the functions of a vehicle frame?
4. How true rolling motion is achieved in a steering system?
5. Draw a typical vehicle transmission system.
6. What are the functions of the propeller shaft and why two U-joints are provided?
7. What are the functions of Suspension system in a vehicle?
8. What is meant b Antilock braking system?
9. List out the safety precautions to be considered for hydrogen operated vehicles.
10. What is the need of esterification of vegetable oils?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the construction and working principle of a single cylinder four stroke petrol engine with a neat sketch. (10)

(ii) Compare a SI engine with that of a CI engine. (3)

Or

(b) (i) Explain the construction and working details of unit injector with neat sketch. (10)

(ii) Compare the merits and demerits of with conventional injector. (3)

12. (a) List out and sketch various types of frames used for passenger cars. Explain the salient features of anyone of them. (13)

Or

(b) List out the various types of steering gearboxes that are being used. Explain the construction and operation of any one of them with a neat sketch. (13)

13. (a) Why gearbox is necessary? Explain the construction and operation of a constant mesh gearbox with a layout. (13)

Or

(b) (i) What are the differences between fluid flywheel and torque converter? (3)

(ii) Explain the construction and principle of operation of a differential with a sketch. (10)

14. (a) (i) Distinguish between independent suspension and conventional rigid axle suspension. (4)

(ii) What are the functions of suspension system? Explain the construction and operation of leaf spring with a sketch. (9)

Or

(b) (i) Illustrate the function and classification of braking system. (3)

(ii) With a neat sketch explain the construction and operation of the hydraulic brake system. (10)

15. (a) (i) What are the disadvantages of LPG and CNG as an alternate fuel? (3)

(ii) Discuss the engine performance and emission characteristics of ethanol as a fuel. (10)

Or

(b) (i) What is meant by bio-diesel? How it can be produced-illustrate with en example? (3)

(ii) Explain the construction and operation of three way catalytic converter for the reduction of emissions. (10)

PART C — (1 × 15 = 15 marks)

16. (a) What are the loads acting on the drive axle of a vehicle? Explain how the different loads, reaction forces and torques are taken care in a vehicle having Hotchkiss drive. (15)

Or

(b) Derive the equation of forces acting on a vehicle moving down a gradient inclined at an angle θ to the horizontal, when the brakes are applied to the rear wheels only and to all the four wheels. (15)