

Total No. of Questions : 8]

SEAT No. :

PE-897

[Total No. of Pages : 3

[6581]-1903

**F.E.**

**SYSTEMS IN MECHANICAL ENGINEERING**

**(2019 Pattern) (Semester - I / II) (102003)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) Classify automobiles based on various considerations. [7]
- b) Define vehicle specification. Explain following engine specifications [7]
- i) Torque
  - ii) Power and
  - iii) Cubic Capacity
- c) Compare vehicle specifications for two-wheeler and three-wheeler vehicles. [4]

**OR**

- Q2)** a) Explain various components of S. I engine with neat sketch. [7]
- b) Explain electric vehicle with neat sketch. Mention its components. [7]
- c) State differences between electric and hybrid vehicle with examples. [4]
- Q3)** a) State importance of suspension system. Explain telescopic suspension system with neat sketch. [7]
- b) With neat sketch explain the construction and working of disc brake system. [7]
- c) Why safety arrangements needed in vehicle? Explain the importance of seat belts and air bags in the vehicle. [3]

**P.T.O.**

**OR**

- Q4)** a) Define Gear Ratio of gear box. A pinion of pitch circle diameter 150 mm meshes with a gear having 80 teeth. Gear ratio is 4 and speed of gear is 500 rpm. Determine [7]
- Pitch circle diameter of gear
  - Speed of pinion
  - Number of teeth on pinion.
- b) Explain the working principle of ABS system in vehicle with neat sketch. State its importance over conventional braking system. [7]
- c) Explain working of water-cooling system in vehicle with neat diagram. [3]

- Q5)** a) With neat sketch explain the shielded metal arc welding. State its applications. [7]
- b) State significance of Metal Cutting process in industry. Explain following metal cutting processes. [7]
- Turning
  - Milling and
  - Drilling operation with neat sketch.
- c) Explain concept of Internet of Things (IoT) and its applications in manufacturing. [4]

**OR**

- Q6)** a) Explain sand casting process with neat sketch. State its advantages and disadvantages. [7]
- b) State the importance of sheet metal working in manufacturing. Explain Punching and Blanking with neat sketch. [7]
- c) Draw a block diagram for a 3D printer with all its components. [4]

- Q7)** a) Using block diagram, explain the application of blower in kitchen chimney and vacuum cleaner. [7]
- b) Explain with neat sketch working of water pump used for lifting water for overhead tank. [7]
- c) An electric motor driven pump fills an overhead tank placed at a height of 20 m from the ground level. The mass of the water pumped per second is 5.56kg. Input power of the motor is 2200 W. Calculate the efficiency of the motor. (use  $g = 9.81 \text{ m/s}^2$ ) [3]

**OR**

- Q8)** a) With the help of block diagram, explain working of electric geyser. State various specifications for an electric geyser. [7]
- b) Explain with neat sketch working of refrigerator. State its domestic and industrial applications. [7]
- c) A refrigerator has working temperatures in the evaporator and condenser coils as  $-30^{\circ}\text{C}$  and  $32^{\circ}\text{C}$ . What is the maximum COP of the system? Draw its block diagram. [3]

