

# 17406

15116

**3 Hours / 100 Marks**

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.  
(2) Answer each next main Question on a new page.  
(3) Illustrate your answers with neat sketches wherever necessary.  
(4) Figures to the right indicate full marks.  
(5) Assume suitable data, if necessary.  
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. a) Attempt any SIX of the following: 12
- (i) Define I.C. Engine, how these engines are classified.
  - (ii) Define fuel cell and give its types.
  - (iii) State Kelvin - Plank statement of second law of thermodynamics.
  - (iv) State Avogadro's law for ideal gases.
  - (v) Define dryness fraction of steam. What is its value for saturated liquid?
  - (vi) Give the classification of compressor.
  - (vii) Mention uses of compressed air.
  - (viii) What is COP of refrigeration?

P.T.O.

- b) **Attempt any TWO of the following:** **8**
- (i) Explain theoretical and actual value time diagram for petrol engine.
  - (ii) Define thermodynamic system and its types with suitable example.
  - (iii) Draw P-V and T - S diagram for following processes:
    - 1) Isobaric
    - 2) Isochoric
    - 3) Isentropic
    - 4) Isothermal
2. **Attempt any FOUR of the following:** **16**
- a) Differentiate between S. I. Engine and C. I. Engine.
  - b) Explain with neat sketch Tidal Power Plant.
  - c) Explain Thermodynamic work and heat.
  - d) State and explain each term of equation of state for ideal gas.
  - e) Explain two - stage reciprocating compressor with P - V diagram.
  - f) Differentiate between Isobaric and Isochoric Process.
3. **Attempt any FOUR of the following:** **16**
- a) State Clausius statement of 2nd law of Irreversibility.
  - b) Describe with neat sketch working of two stroke diesel engine.
  - c) State the advantages and limitations of Wind Energy.
  - d) Write advantages of two stage compression over single stage compression for same compression ratio.
  - e) What are the characteristics of gas constant and universal gas constant?
  - f) Give the classification of boiler in detail.

- 4. Attempt any TWO of the following:** **16**
- a) Explain construction and working of vapour compression cycle and its application.
  - b) Explain Otto cycle with P - V and T - S diagram and derive expression for air standard efficiency.
  - c) Explain construction and working of screw compressor. What are its applications?
- 5. Attempt any TWO of the following:** **16**
- a) 1 kg of ideal gas is heated from 25°C to 90°C. Assuming  $R = 0.284 \text{ kJ/kgK}$  and  $\gamma = 1.18$  for the gas, find
    - (i) specific heat
    - (ii) change in internal energy
    - (iii) change in enthalpy
  - b) Draw labelled sketch of Cochran boiler. Show the path of water, steam and air fuel gases.
  - c) Classify air conditioning systems and explain window air - conditioning system with neat sketch.
- 6. Attempt any FOUR of the following:** **16**
- a) State zeroth law and 1<sup>st</sup> law of thermodynamics.
  - b) Explain construction and working of reaction turbine.
  - c) Differentiate between open system and closed system.
  - d) Attempt the following:
    - (i) Define entropy. State its unit.
    - (ii) Define specific heat.
  - e) Explain working principle of geothermal power plant with neat sketch.
  - f) List the components used in vapour compression cycle and explain function of any one.
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