

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 1st 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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