

# 17406

**21415**

**3 Hours / 100 Marks**

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) 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) Classify sources of energy.
  - (ii) Define system. State types of system.
  - (iii) Define properties of system with examples.
  - (iv) State Boyles law and Charles law.
  - (v) Define latent heat and sensible heat.
  - (vi) What is two stroke and four stroke engine?
  - (vii) State the uses of compressed air.
  - (viii) Define Tonne of refrigeration and C.O.P..
- b) **Attempt any TWO of the following:** **8**
- (i) What is polytropic process? How does it differ from an adiabatic process?
  - (ii) Explain the working of four stroke petrol engine with neat sketch.
  - (iii) Draw only labelled diagram of Cochran boiler.

P.T.O.

- 2. Attempt any FOUR of the following:** **16**
- a) Explain with neat sketch - solar water heater.
  - b) State zeroth law of thermodynamics and first law of thermodynamics.
  - c) A gas occupies a volume of  $0.1 \text{ m}^3$  at a temperature of  $20^\circ \text{ C}$  and a pressure of  $1.5 \text{ bar}$ . Find final temperature of gas, if it is compressed to a pressure of  $7.5 \text{ bar}$  and occupies a volume of  $0.04 \text{ m}^3$ .
  - d) Draw only neat sketch of Babcock and Wilcox boiler.
  - e) Differentiate between two stroke and four stroke engine.
  - f) Describe working of two stage reciprocating compressor.
- 3. Attempt any FOUR of the following:** **16**
- a) Differentiate between heat and work.
  - b) What is an isothermal process? Show it on P-V and T-S diagram.
  - c) Give classification of boiler.
  - d) Explain with neat sketch two stroke petrol engine.
  - e) Explain with neat sketch centrifugal compressor.
  - f) What are the components of vapour compression refrigeration system? State its applications.
- 4. Attempt any TWO of the following:** **16**
- a) A domestic food freezer is to be maintained at  $-15^\circ \text{ C}$ . The ambient air temperature is  $30^\circ \text{ C}$ . If the heat leaks into the freezer at the continuous rate of  $1.75 \text{ kJ/s}$ . Find the power required to pump this heat out continuously.
  - b) Show isochoric, isothermal, adiabatic and polytropic process on P-V and T-S diagram.
  - c) Explain the construction and working of impulse turbine.

**5. Attempt any TWO of the following:****16**

- a) Explain Fuel cell. What are its types?
- b) Explain second law of thermodynamics and types of energy.
- c) Classify air conditioning systems. Explain summer air conditioning system with neat sketch.

**6. Attempt any FOUR of the following:****16**

- a) (i) What is irreversibility?  
(ii) Explain the concepts of enthalpy.
  - b) Why the solids and liquids have one value of specific heat and gases have two values of specific heat? Explain.
  - c) Explain the formation of steam at constant pressure from water at 0° C and at atmosphere pressure.
  - d) Classify I.C. engines.
  - e) Explain with neat sketch screw compressor.
  - f) Draw a neat sketch of window air conditioner.
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