

17406

11819

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) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) 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 I.C. engine on the basis of:
 - (1) Cycle of operation
 - (2) Method of ignition
 - (ii) State methods used to obtain energy from biomass.
 - (iii) Define extensive property. Give two examples of it.
 - (iv) Draw P.V. and T.S. diagram for isobaric process.
 - (v) State Arogadro's law.
 - (vi) State uses of compressed air (any four)
 - (vii) Define capacity of compressor.
 - (viii) List components of 'Vapour compression cycle'.

P.T.O.

- b) **Attempt any TWO of the following:** **8**
- (i) Explain with neat sketch working of four stroke petrol engine.
 - (ii) Define system and differentiate between open system and closed system.
 - (iii) Differentiate between isothermal and isentropic process (at least four points)
2. **Attempt any FOUR of the following:** **16**
- a) Explain with neat sketch working of single stage reciprocating air compressor.
 - b) Explain with neat sketch solar distillation plant.
 - c) Define:
 - (i) Enthalpy
 - (ii) Internal energy
 - (iii) Heat
 - (iv) Work
 - d) Derive the relation for work done in adiabatic process.
 - e) Explain with neat sketch screw compressor.
 - f) 1.5 kg of air at a pressure of 1.1 bar and temperature 20°C is compressed adiabatically to a pressure 22 bar. Calculate final temperature of gas (Take $\gamma = 1.4$)
3. **Attempt any FOUR of the following:** **16**
- a) Explain the term related to thermodynamics :
 - (i) Entropy
 - (ii) Flow work
 - b) Differentiate two stroke engine and four stroke engine on the basis of :
 - (i) No. of strokes required
 - (ii) Valves used
 - (iii) Power developed
 - (iv) Thermal efficiency

- c) Define renewable and non renewable energy source and give two examples of each.
- d) Explain with P.V. diagram working of two stage reciprocating air compressor, with inter cooler.
- e) Draw P.V. and T.S. diagram for isothermal process. Write formula to calculate work done in isothermal process.
- f) Draw labelled diagram of 'Cochran Boiler'.

4. Attempt any TWO of the following: 16

- a) Draw a neat sketch of simple vapour compression refrigeration system and state function of following parts used in above system:
 - (i) Compressor
 - (ii) Condenser
 - (iii) Expansion valve
 - (iv) Evaporator
- b) Describe with suitable sketch working of two stroke petrol engine. Also draw it's indicator diagram.
- c) Differentiate between reciprocating air compressor and rotary air compressor on the basis of :
 - (i) Action of compressing air
 - (ii) Delivery pressure
 - (iii) Speed
 - (iv) Application

5. Attempt any TWO of the following: 16

- a) A cyclic heat engine operates between source temperature 800°C and sink temperature 3°C what is least rate of heat rejection per kW.
- b) Explain with neat sketch 'Steam power plant'.
- c) Explain with neat sketch summer air conditioning system.

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

- a) State first law of thermodynamics and write its limitations.
 - b) Explain with neat sketch working of impulse steam turbine.
 - c) Explain application of second law of thermodynamics with reference to refrigerator.
 - d)
 - (i) State Zeroth law of thermodynamics
 - (ii) State kelvin Plank's statement
 - e) Classify renewable energy source on the basis of :
 - (i) Availability
 - (ii) Harnessing technology developed
 - (iii) Harnessing cost
 - (iv) Pollution
 - f) For 50 TR ice plant suggest following parameters for vapour compression cycle.
 - (i) Compressor
 - (ii) Condenser
 - (iii) Refrigerant
 - (iv) Evaporator
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