

22441

11920

3 Hours / 70 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. Attempt any FIVE of the following. **10****
- a) Draw P-V diagram of otto cycle.
 - b) List the different types of thermodynamic system.
 - c) Define calorific value of fuel and state it's unit.
 - d) State any four requirements of good fuel.
 - e) Write the PVT relation for adiabatic process and give the meaning of each suffix used.
 - f) Write any four application of compressed air in automobile industry.
 - g) Enlist non-conventional energy sources.

P.T.O.

- 2. Attempt any THREE of the following. 12**
- Compare the efficiency of Otto cycle and Diesel cycle for same maximum pressure with neat sketch.
 - Write the classification of air compressor.
 - One Kg of gas occupying 0.1m^3 at pressure of 14 bar is expanded at constant pressure to 0.2m^3 . Determine an initial and final temperature of gas. Take, $C_p = 1.008 \text{ KJ/Kgk}$, $C_v = 0.72 \text{ KJ/Kgk}$
 - Write factors used for governing the selection of cogeneration system and state the advantages of cogeneration.
- 3. Attempt any THREE of the following. 12**
- Explain application of conduction and convection mode of heat transfer in automobile.
 - Draw neat labelled sketch of La-Mount Boiler.
 - Determine the amount of heat required to produce 1Kg of steam at a pressure of 7 bar, at a temperature 29°C , under the following conditions.
 - when the steam is wet having dryness fraction 0.87
 - when the steam is dry saturated.Assume specific heat = 2.35 KJ/kgk .
 - Explain solar power plant and write its two advantages.
- 4. Attempt any THREE of the following. 12**
- Write the importance and impact of energy conservation on environment and economy.
 - Explain the process of formation of steam from 0°C water with T-H diagram.
 - Explain combustion chemistry of carbon, methane and hydrogen.

- d) Estimate higher and lower calorific value of a coal having following composition by mass carbon 81%, Hydrogen. 7%, Oxygen 8%, Nitrogen 2.5%, Sulphur 1.5% and remaining is ash.
- e) Define
- (i) I.P
 - (ii) B.P.
 - (iii) Volumetric efficiency
 - (iv) Isothermal efficiency of air compressor.

5. Attempt any TWO of the following. 12

- a) i) Draw neat sketch of Bomb calorimeter.
ii) Write any three sources of air leakage in steam condenser.
- b) Explain the necessity of multi-staging and inter cooling in case of two stage compressor with PV diagram.
- c) Write the strength and limitation of biomass power plant.

6. Attempt any TWO of the following. 12

- a) Explain the construction and working of electricity generation through photovoltaic system.
- b) Describe construction and working of two pass flow surface condenser also write it's function and location in steam power plant.
- c) (i) Explain Zeroth Law of thermodynamic with neat sketch.
(ii) Write the procedure for Energy saving in household appliances.
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