14115

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) ***Use*** *of non-programmable Electronic Pocket Calculator is permissible.*

(6) *Mobile Phone, Pager and* ***any other*** *Electronic Communication devices are* ***not*** *permissible in Examination Hall.*

(7) ***Use*** *of steam tables, logarithmic, Mollier's chart is permitted.*

(8) *Write* ***any special*** *instructions if* ***any****.*

MARKS

1. A) Attempt **any three** of the following :   **(4×3=12)**

   a) Differentiate between renewable and non renewable energy sources.

   b) Draw and explain counter-flow heat exchanger.

   c) Define pre-ignition and detonation.

   d) Explain in brief different types of steam nozzles with diagrams.

   e) Wire classification of steam boilers.

   B) Attempt **any one** of the following :   **(8×1=8)**

   a) Cop. of refrigerator operating on a carnot cycle is 5.4. When it maintains – 50°C in the evaporator. Calculate the condenser temp. and refrigerating effect. If power required to drive the unit is 5 kW.

   b) Draw a neat labelled sketch of Loeffler boiler. Explain briefly and state its advantages.

2. Attempt **any four** of the following : **(4×4=16)**

   a) Explain the working of impulse turbine.

   b) Draw and explain otto cycle on P – V and T – S diagram.

   c) Write the steady flow energy equation stating the meaning of each term.

   d) Explain working of throttling calorimeter with neat sketch.

   e) Describe the working of shell and tube type heat exchanger.

   f) Define condenser efficiency and vacuum efficiency with its formula.

3. Attempt **any four** of the following : **(4×4=16)**

   a) Explain:

      i) Pure substance

      ii) Heat engine.

   b) Explain Intensive and extensive property of a system.

   c) Explain working with a neat sketch of water level indicator.

   d) Differentiate between impulse turbine and reaction turbine.

   e) Differentiate between four stroke engine and two stroke engine.

   f) Draw and explain working of solar distillation.

4. Attempt **any four** of the following : **(4×4=16)**

   a) Explain the brief working of nuclear power plant with neat sketch.

   b) Describe the working of four stroke S.I. engine.

   c) Explain first law of thermodynamics with its limitation.

   d) Describe mollier chart (or H – S diagram).

e) Explain the working of surface condenser with neat diagram.

f) Explain the concept of scavenging.

5. Attempt **any two** of the following : **(8×2=16)**

a) In an ideal otto cycle the air at the beginning of isentropic compression is at 1 bar and 18°C. The compression ratio is 8. If the heat added during constant volume process is 250 kJ/kg.

Determine :

 i) maximum temp. in the cycle

 ii) Air standard efficiency

 iii) WID per cycle

 iv) Heat rejected.

b) Explain :

 i) Dalton's law of partial pressure

 ii) Sources of air leakage in condenser.

c) Calculate the amount of heat required to produce 1 kg of steam at a pressure at 6 bar, from the water at a temp. of 25°C under the following conditions,

 1) When the steam is 90% dry

 2) When stream is dry saturated

 3) When it is saturated at a constant pressure at 250°C. Assuming mean specific heat of super heated steam is 2.3 kJ/kg k.

6. Attempt **any four** of the following : **(4×4=16)**

   a) Explain thermodynamic equilibrium.

   b) Explain the following term :

      i) Dryness fraction

      ii) Latent heat of vaporisation.

   c) Explain parallel flow jet condenser.

   d) Describe lubricant additives with their advantages.

   e) Classify heat exchangers. Write four materials used for heat exchanger.

   f) State Kelvin planks and Clausius statement.

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