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*.

Marks

1. Attempt **any five** :   **(2×5=10)**

   a) Define dryness fraction and degree of superheat.

   b) What is compounding of steam turbines ?

   c) Enlist four important components of I.C. engines.

   d) Define Mach number.

   e) Write two effect of knocking in engine.

   f) Define ton of refrigeration.

   g) Enlist two effects of frosting.

2. Attempt **any three** :   **(4×3=12)**

   a) Explain second law of thermodynamics and give 1 example of each statement.

   b) Write the function of superheater and fusible plug in boilers.

   c) Draw layout of steam power plant and name the components.

   d) Explain construction and working of impulse turbine with simple sketch.

3. Attempt **any three** :   **(4×3=12)**

   a) Suggest with justification the remedies in the following situations :
      i) Engine does not start.
      ii) Smokey exhaust of diesel engine.

   b) Differentiate between open and closed cycle gas turbines.

   c) Suggest various measures to control the pollution due to petrol engine and diesel engines.

   d) A dam having 50 m head of water.
      i) Suggest with justification the turbine to be used.
      ii) Sketch the turbine you suggest.

P.T.O.

Marks

4. Attempt **any three** :   (4×3=12)

   a) Explain the working of two stage reciprocating air compressor with PV diagram.

   b) Suggest the type of air compressor for the following applications :
      i) Refrigerator (domestic)
      ii) Central air conditioner
      iii) Air filling station
      iv) Domestic air cooler.

   c) Explain two methods to reduce power consumption of air compressor.

   d) In a diesel engine, heat is supplied at the rate of 16.8 kW engine produces power at the rate of 4.2 kW. Estimate the brake thermal efficiency.

   e) A turbine is operating on 120 m of water head. The discharge of water is 3.5 m³/s. Find the power developed by the turbine, neglecting the losses. Take density of water 9.81 kN/m³.

5. Attempt **any two** :   (6×2=12)

   a) Explain with neat sketch the vapour compression system used in domestic refrigerator.

   b) Suggest the remedial action to be taken over following faults occurred in window air conditioner.
      i) Desired cooling effect is not getting.
      ii) Air conditioner making more noise.
      iii) Unit is not running.
      iv) Throw of conditioned air in room is with bad odour and dust.

   c) Suggest with justification the type of air conditioning system for
      i) Computer lab of 60 computers
      ii) Auditorium
      iii) ATM.

6. Attempt **any two** :   (6×2=12)

   a) Explain the function of following :
      i) Defrost heaters
      ii) Thermostat
      iii) HP/LP cutouts.

   b) Classify various types of nozzles and give their applications.

   c) Write with justification the situations when you will select the following pumps for particular applications.
      i) Centrifugal pump
      ii) Jet pump
      iii) Submersible pump.

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