

**17554****21415**

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) 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**.

MARKS

1. A) Attempt **any six** : **(6×2=12)**
- a) What do you mean by Renewable source of energy ?
 - b) State advantages of biogas plant.
 - c) Define :
 - i) Intensive
 - ii) Extensive property.
 - d) State zeroth law of thermodynamics.
 - e) Define heat and work.
 - f) Define dryness fraction.
 - g) Give classification steam nozzle.
 - h) Give classification of I.C. Engines.
 - i) State the types of fuel cell.
- B) Attempt **any two** : **(4×2=8)**
- a) Explain hydroelectrical power plant with neat sketch.
 - b) Write steady flow energy equation. Apply it to boiler.
 - c) Draw line diagram of La-mont boiler and explain in brief.
2. Attempt **any four** : **(4×4=16)**
- a) Draw neat labelled sketch of Throttling calorimeter and explain.
 - b) Find volume of 1 kg of steam at a pressure of 12 bar if
 - i) Steam is dry saturated.
 - ii) Steam is wet having dryness fraction 0.80.

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- c) Differentiate between natural draught and mechanical draught.
- d) State and explain Dalton's law of partial pressure.
- e) State the various sources of air leakage in condenser.
- f) Compare two stroke and four stroke I.C. Engines.

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

- a) State factors responsible for pre-ignition. What are effects of pre-ignition ?
- b) Explain Carnot cycle with P-V and T-S diagrams.
- c) Draw theoretical valve timing diagram of four-stroke diesel engine.
- d) What is supercharging of I.C. Engines ? State necessity of supercharging.
- e) Draw labeled sketch of jet condenser.
- f) Define :
 - i) Condenser efficiency
 - ii) Vacuum efficiency.

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

- a) Give any four application of heat exchangers.
- b) How wind energy used for power generation ?
- c) Explain the concept of perpetual motion machine of first kind.
- d) Differentiate between closed system and open system.
- e) Differentiate between heat engine and heat pump.
- f) Draw neat labeled sketch of induced draught cooling tower.

5. Attempt **any two** : **(8×2=16)**

- a) State Kelvin Planck statement and Clausius statement and their equivalence.
- b) Draw and explain generation of steam at constant pressure with T-H diagram.
- c) Give classification of steam turbines. Explain construction and working of impulse turbine.

6. Attempt **any two** : **(8×2=16)**

- a) i) Explain Mollier chart with sketch. **6**
ii) Give classification of calorimeters. **2**
 - b) Explain with neat sketch shell and tube type heat exchanger.
 - c) i) List lubricant additives and state their advantages.
ii) Explain process of detonation in I.C. Engines.
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