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12526

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answer 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. Attempt any FIVE of the following: **10**

a) Define the following :–

i) Intensive property

ii) Extensive property.

b) List any two assumptions for ideal gas.

c) Define :–

i) Dry saturated steam

ii) Wet steam.

d) State Dalton's law of partial pressure.

e) List any two applications of nozzle.

f) Define thermal conductivity and state it's unit.

g) Define compression ratio in Internal combustion engines.

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) Differentiate between heat engine and refrigerator. (Any four points)

b) 2 kg of gas at 50°C is heated at constant volume until the pressure is doubled. Determine the final temperature and change in internal energy. (Assume C_v = 0.718 kJ/kgK)

c) Draw neat sketch forced draught cooling tower.

d) Determine the rate of heat transfer through a composite wall made of 25 mm thick steel plate and covered with insulating material of 7 mm thick on one side. Thermal conductivity of steel and insulating material is 58 W/mk and 0.116 w/mk respectively. The temperature at the inner and outer surface of the wall are 280°C and 40°C respectively.

3. Attempt any THREE of the following: **12**

a) Explain Zeroth law of thermodynamics with suitable example.

b) Represent following gas processes on P-V and T-S diagrams :–

i) Isochoric process

ii) Isobaric process.

c) Differentiate between water tube and fire tube boiler. (Any four points)

d) Represent OTTO cycle on P-V and T-S diagram.

4. Attempt any THREE of the following: **12**

a) A gas has a volume of 0.14 m^3, pressure 1.6 bar and temperature 110°C. If gas is compressed at constant pressure until it's volume becomes 0.112 m^3. Determine :–

i) Work done in compression of gas.

ii) Heat given out by gas.

b) Define sensible heat and latent heat.

c) Draw a neat sketch of surface condenser and label it.

d) Define transmissivity and Reflectivity.

e) Compare between Petrol engine and Diesel engine. (Any four points)

Marks

5. Attempt any TWO of the following: **12**

a) Write steady flow energy equation. State the meaning of each term in equation and apply it to boiler, steam nozzle and steam turbine.

b) Explain construction and working of lamont boiler with neat sketch.

c) State classification of heat exchangers. List any four applications of heat exchanger.

6. Attempt any TWO of the following: **12**

a) Describe the formation of steam at constant pressure with the help of Temperature-Enthalpy (T-H) diagram.

b) Explain the working of impulse steam turbine with neat sketch. Also show pressure and velocity variation for the same.

c) Explain the working of four stroke petrol engine with a neat sketch.

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