P1271

OCT/FE/INSEM-4
F.E. (Semester - I)
SYSTEMS IN MECHANICAL ENGINEERING
(2019 Pattern)

Time : 1 Hour]   *[Max. Marks : 30*

CO 1 : Describe and compare the conversion of energy from renewable and non renewable energy.

CO 2: Explain basic laws of thermodynamic, heat transfer and their applications.

Instructions to the candidates:

1)   Solve Q. 1 or Q. 2, Q.3 or Q.4.

2)   Assume suitable data if necessary.

3)   Figures to the right indicate full marks.

Q1) a)   Explain working of hydroelectric power plant with neat labeled diagram. Write two advantages of hydroelectric power plant.   **[8]**

b)   A coal fired power plant uses 5000 tons of coal per day. The average power output from plant is 200MW. Compute the efficiency of power plant. Take calorific value of coal as 15000kJ/kg. Write two advantages and disadvantages of thermal power plant.   **[7]**

OR

Q2) a)   Explain working of Centrifugal Pump with neat labeled diagram and its application.   **[8]**

b)   Compare Conventional and non conventional energy source. Draw neat labeled diagram of solar steam power plant.   **[7]**

Q3) a)   Describe the concept of Heat Pump and Refrigerator with diagram and write expression for COP. Compare Heat Engine & refrigerator.   **[8]**

b)   State Stefan Boltzman's law of radiation. A body having $5m^2$ of surface area is maintained at $227°C$. It exchanges the heat with another surface enclosing it at $27°C$ by radiation. Its emissivity is 0.1, $\sigma = 5.67 \times 10^{-8}$ W/m^2K^4. Compute the rate of heat lost by radiation.   **[7]**

Q4) a) Explain the working of Four Stroke CI Engine with line diagram. Write Advantages. **[8]**

b) State Second law of thermodynamics. A refrigerator with COP of 1.6 removes heat from freezer at the rate of 400 kJ/min. Draw block diagram of system. Compute the power consumed by compressor and heat rejected to the surroundings. **[7]**

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