Total No. of Questions : 4]

SEAT No. : [ ]

P-5370

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F.E. (Insem.)
SYSTEMS IN MECHANICAL ENGINEERING
(2019 Pattern) (Semester - I) (102003)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***

Q1) a) In a thermal power plant, the work done by the steam turbine is 900 J/kg. The work consumed by the pump is 50 J/kg. The heat supplied by the boiler to the system is 2800 J/kg. Find i) Net Work done and ii) Efficiency of the plant. **[4]**

b) Explain construction and working of hydropower plant with neat sketch. **[6]**

c) With neat sketch, explain the working of reciprocating compressor. **[5]**

OR

Q2) a) Draw a layout of nuclear power plant and mention all its components. **[4]**

b) A steam powerplant has an efficiency of 62.443 %, with a coal consumption of 16200 kg/hr. If the speed of the turbine is 1000 rpm and generated torque is 477464.8293 N-m. Find i) Input Power ii) Output Power and iii) Calorific value of coal in kJ/kg. **[6]**

c) With neat sketch, explain the working of Pelton turbine. **[5]**

Q3) a) Explain working of 4 stroke petrol engine with neat sketch. **[6]**

b) Provide comparison between water tube and fire tube boilers. **[4]**

c) The condenser and evaporator temperatures in a refrigerator are 42°C and - 3°C respectively. Determine COP and refrigerating effect in kW, if the power required to run the refrigerator is 7.5 kW. **[5]**

P.T.O.

OR

Q4) a) A wall of furnace is constructed from 15 cm thick fire brick having constant thermal conductivity of 1.7 W/mK. The two sides of the wall are maintained at 1400 K and 1150 K respectively. What is the rate of heat loss through the wall which is 50 cm × 3 m on a side. **[5]**

b) Provide comparison between heat pump and refrigerator. **[4]**

c) State the statements and mathematical expression for laws associated with each mode of heat transfer. **[6]**

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