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F.E. (Part I&II) (Semester -I&II) (Revised) Examination, May - 2016

BASIC MECHANICAL ENGINEERING

Sub. Code: 59186

Day and Date : Saturday, 07 - 05 - 2016 **Total Marks : 100**
Time :10.30 a.m. to 1.30 p.m.

Instructions :
1) **Solve any three question from each section.**
2) **Figures to right indicate full marks.**
3) **Assume any additional data if required and state it clearly.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) a) Define: **[4]**

i) Thermodynamic state

ii) Thermodynamic process

iii) Thermodynamic cycle

b) Limitations of first law of thermodynamics. **[4]**

c) A steam turbine receives steam with flow rate of 900 kg/min. and experiences a heat loss of 840 kJ/min. The exit pipe is 3m. below that of inlet pipe. Find the power developed by the turbine if the pressure decreases from 62 bar to 9.86 kpa. Velocity increases from 30.5 m/s to 274.3m/s and internal energy decreases by 938.8kj/kg. The specific volume changes from 0.058 m^3/kg to 13.36 m^3/kg. **[10]**

P.T.O.

Q2) a) Prove that internal energy is a property of the system. **[8]**

b) A turbine operating under a steady flow conditions receives 5000 kg of steam per hour. The steam enters the turbine at a velocity of 3000 m/min, an elevation of 5 meter and a specific enthalpy of 2787 kJ/kg. It leaves the turbine at a velocity of 6000 m/min, an elevation of 1 meter and a specific enthalpy of 2259 kJ/kg. Heat loss from the turbine to the surrounding is 16736 kJ/hour.

Determine the power output of the turbine. **[8]**

Q3) a) Explain construction and working of S.I. engine with the help of neat diagram. **[8]**

b) Sketch the Joule cycle with T-S and P-V diagram. Derive an expression for its air standard efficiency. **[8]**

Q4) Define: **[6]**

i) Dry bulb temperature (D.B.T)

ii) Wet bulb temperature (W.B.T)

iii) Relative humidity.

b) Explain desired properties of ideal refrigerants. **[4]**

c) Explain with neat diagram working of vapour compression refrigeration system. **[6]**

SECTION-II

Q5) a) Explain wiht neat sketch construction, working, advantages and disadvantages of Hydro electric power plant. **[8]**

b) Explain construction, working, advantages and disadvantages of bio-gas and explain concept of bio-diesel. **[8]**

Q6) a) With neat sketch, explain working of Pelton wheel. **[8]**

b) A cross belt connects two pulleys of 500 mm diameter, 2m apart. The initial tension in the belt is 500 N, if the coefficient of friction between the belt and pulley is 0.3. Find the power transmitted at 700 r.p.m. Also calculate the length of belt. **[8]**

Q7) a) Explain casting process and steps involved in casting process. **[8]**

b) Explain metal removing processes and its applications. **[8]**

Q8) Write short notes on following: **[18]**

a) Flat plate collector.

b) Centrifugal pump.

c) Welding and soldering.

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