B- Tech - sem - II, (2014 course), E&TC
winter - 2018

B.Tech. SEM -II (Chemical/ Civil/ Electrical/ Mechanical/ Production/ Computer/ Info. Tech./ Electronics / Bio Medical / E & TC) 2014 Course (CBCS) : WINTER - 2018

SUBJECT: FUNDAMENTALS OF MECHANICAL ENGINEERING

Day: Thursday
Date: 15/11/2018

W-2018-2271

Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

N.B:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data **WHEREVER** necessary.
5) Neat diagram must be drawn **WHEREVER** necessary.

Q.1 **a)** State and explain the second law of thermodynamics. **(05)**

b) In non-flow reversible process the pressure and volume are related by **(05)**

$$p = \left[4 + \frac{3.8}{V}\right] bar,$$

Where P is in bar and V is in m^3. During the process the volume change from $1.7m^3$ to $4.5m^3$ and heat added is 2000 kJ. Determine change internal energy?

OR

Q.1 **a)** Draw a P-V diagram and explain how Carnot engine works. **(05)**

b) A steam at the rate of 40 kg/min at 15 bar is passed through a nozzle. The inlet and outlet conditions of the steam are V_1 = 30m/sec, V_{s1} = 0.15 m^3/kg, u_1 = 2600kJ and P_2 = 1 bar, V_{s2} = 1.7 m^3/kg, u_2 = 2500 KJ/ Kg. Find the velocity of steam at the exit of the nozzle. **(05)**

Q.2 **a)** Explain with neat sketch working of centrifugal pump. **(05)**

b) Differentiate between Petrol and Diesel engine. **(05)**

OR

Q.2 **a)** Classify various types of turbines. Explain closed cycle gas turbine with neat sketch. **(05)**

b) Draw a vapor compression refrigeration system and name its different parts. **(05)**

Q.3 **a)** Explain working of shell and tube type heat exchanger. **(05)**

b) Draw a neat sketch of hydroelectric power plant and name its various parts. **(05)**

OR

Q.3 **a)** List the conducting and insulating materials and state their properties. **(05)**

b) What are the advantages of wind energy? Explain a simple wind mill with a neat sketch. **(05)**

P.T.O.

Q.4 **a)** Explain the phenomenon of capillarity. Obtain an expression for capillary rise of liquid. **(05)**

b) Write a short note on: Material section criteria. **(05)**

OR

Q.4 **a)** Find the surface tension in a soap bubble of 40mm diameter when the inside pressure is $2.5N/m^2$ above the atmospheric pressure. **(05)**

b) Define viscosity. Obtain an expression for dynamic viscosity. **(05)**

Q.5 **a)** Compare between belt drive and chain drive. **(05)**

b) Draw neat sketches of following gears and state their applications: **(05)**
i) Rack and pinion ii) Worm and worm wheel

OR

Q.5 **a)** Explain with a neat sketch working of geneva mechanism. Also state its applications. **(05)**

b) Draw and explain following inversions of four bar chain. **(05)**
i) Rocker-Rocker Mechanism
ii) Double Crank Mechanism

Q.6 **a)** Draw a block diagram of pillar drilling machine and name its parts. **(05)**

b) Write a short note on "forging". **(05)**

OR

Q.6 **a)** Why grinding machine is requited in manufacturing processes? Explain cylindrical grinder in brief. **(05)**

b) Explain following sheet metal forming operations. **(05)**
i) Drawing ii) Coining

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