

**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)

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

Where P is in bar and V is in m³. During the process the volume change from 1.7m³ to 4.5m³ 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 $V_1 = 30\text{m/sec}$, $V_{s1} = 0.15 \text{ m}^3/\text{kg}$, $u_1 = 2600\text{kJ}$ and $P_2 = 1 \text{ bar}$, $V_{s2} = 1.7 \text{ m}^3/\text{kg}$, $u_2 = 2500 \text{ KJ/ Kg}$. 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 required 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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