

**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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