Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | |

B. Tech. I Year (I Sem.)

Odd Semester Examination-2015

BASIC OF MECHANICAL ENGINEERING

Time : 3 Hours] *[Maximum Marks :100*

Attempt any four questions out of five. **(4x5=20)**

1. Define a thermodynamic system. Differentiate between open system , close system and an isolated system.
2. Explain the terms : State , Path , Process and cycle .
3. Distinguish between reversible and irreversible process.
4. What is energy ? Explain the different forms of energy.
5. Discuss the concept of continuum and its relevance.

Attempt any four questions out of five. **(4×5=20)**

1. State Zeroth law of thermodynamics.
2. Define the efficiency of a heat engine and COP of a heat pump and refrigerator.

3. State the first law for a closed system undergoing a cycle.

4. Write the steady flow energy equation and simplify when applied for: Nozzle and Turbine.

5. State the clausius and Kelvin plank statement being used for second law of thermodynamics

Attempt any two questions out of three. **(2×10=20)**

1. (a) Define the terms with reference to phase change or water:

Wet steam , Critical point , Latent heat of vaporization.

(b) Using steam table determine the volume , enthalpy and internal energy on per kg.
Basis for steam at 12 bar and 0.95 dryness fraction .Also find its temperature.

2. (a) How enthalpy changes are calculated for different stages of steam formation.

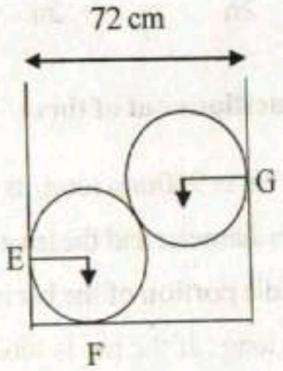
(b) Describe the generation of steam at constant pressure with the help of T-q and T-v diagram

3. (a) Explain the working of two stroke spark ignition engine

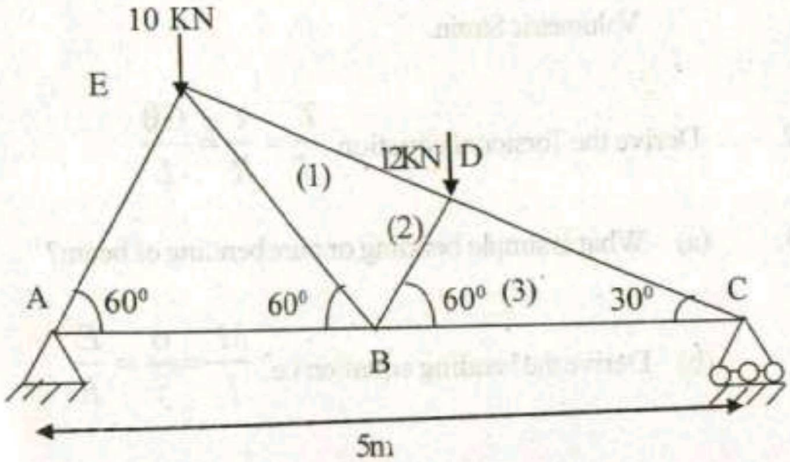
(b) Differentiate between SI engine and CI engine.

Attempt any two questions out of three. **(2×10=20)**

1. Two smooth spheres each of radius 20 cm and weight 200 N, rest in a horizontal channel having vertical walls, the distance between which is 72 cm as shown in fig. Find the pressure at contact points E, F and G.



2. Determine the forces in the members marked (1), (2) and (3) of the truss loaded and supported as shown in fig.



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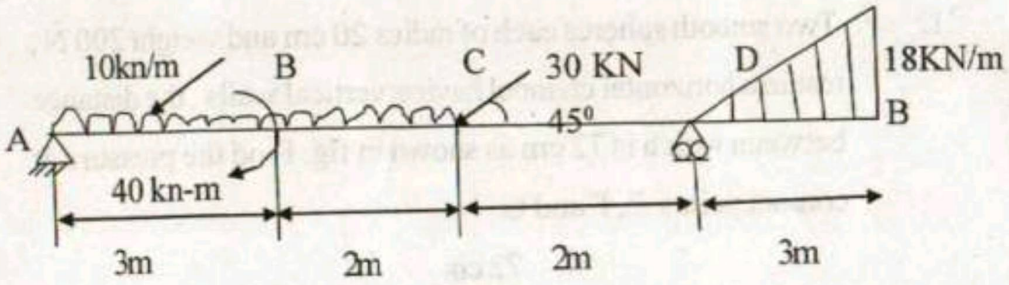
3. Draw shear force and bending moment diagram



Attempt any two questions out of three. **(2×10=20)**

1. (a) A Steel bar is 900mm long, its two ends are 40 mm and 30 mm in diameter and the length of each rod is 200 mm. The middle portion of the bar is 15 mmin diameter and 500 mm long. If the bar is subjected to an axial tensile load of 15 KN, find its total extension. Take E= 200GN/m^2 (G stand for Giga and 1 G = 10^9)

   (b) Discuss the following: Modulus of rigidity, Bulk modulus, Volumetric Strain.

2. Derive the Torsional equation $\frac{T}{J}=\frac{\tau}{R}=\frac{G\theta}{L}$

3. (a) What is simple bending or pure bending of beam?

   (b) Derive the bending equation i.e. $\frac{M}{I}=\frac{\sigma}{y}=\frac{E}{R}$

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