B.E. All Branches Second Semester (C.B.S.) / B.E. (Fire Engineering) Second Semester

Engineering Mechanics

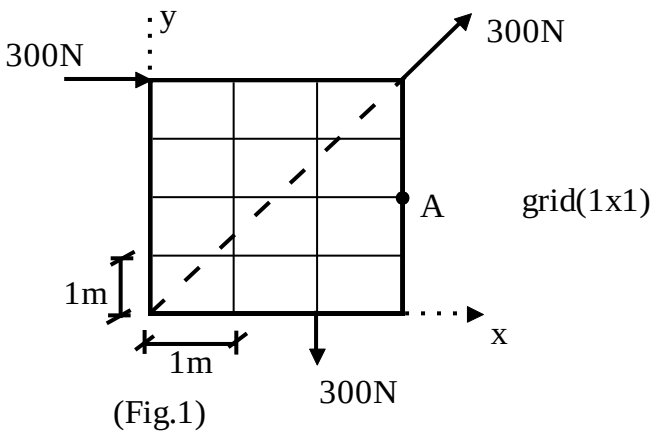
P. Pages : 3 **NIR/KW/18/3290/3942**

Time : Two Hours * 1 1 7 1 * Max. Marks : 40

Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Assume suitable data whenever necessary.

1. a) State and Explain Varignon's Theorem. **3**

b) The Resultant of four forces of which three are as shown in Fig. 1 is acting down to the right with slope of 5 to 12 [y: x] through point A. Determine missing force 'P' and its x- intercept. **7**



(Fig.1)

OR

2. a) State & Explain Lami's Theorem **3**

b) A force of 'F' 80kN Magnitude Passes through Point A (–2, 1, 3) towards B (4, 4, 5) co-ordinates of points C & D are (–2, 0, 1) & (2, 0, –2) respectively. Find, **7**

i) Component of Force 'F' along AC.

ii) Moment of Force 'F' about BC.

iii) Moment of Force about line CD.

3. a) What do you understand by "Free Body diagram" Explain it with examples. **3**

b) Find the distance 'X' (Measured along AB) at which a horizontal force of 260N should be applied to hold the uniform bar AB in equilibrium position as shown in fig. (2) Bar AB is 3m long & weight 620N. All surfaces are smooth one the **7**

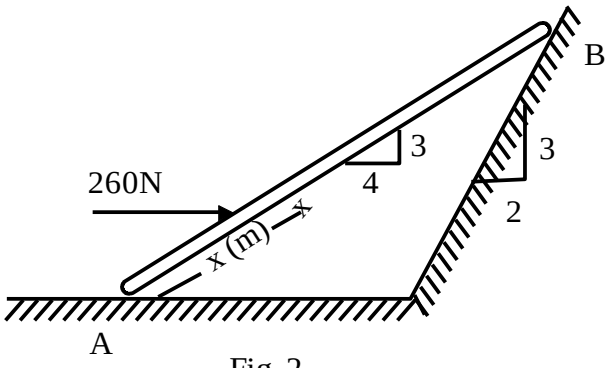
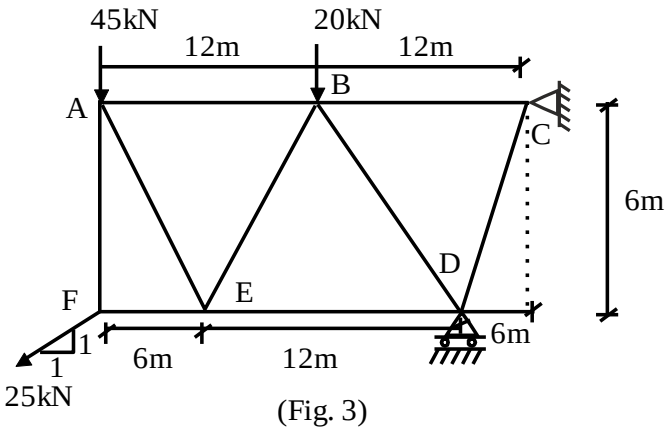


Fig. 2

OR

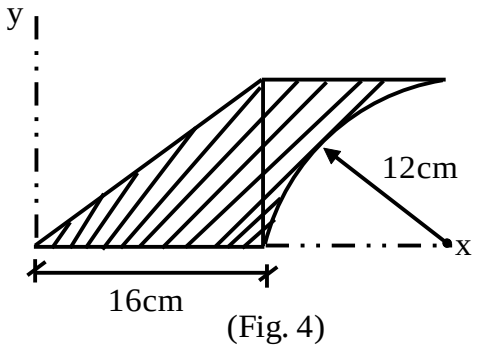
4. Determine Magnitude & nature of forces in the member's of given truss as shown in (Fig. 3). **10**



(Fig. 3)

5. a) State Parallel Axis Theorem of Moment of Inertia. **3**

b) Determine Moment of Inertia of Shaded Area as shown in Fig. 4 about y-Axis. **7**

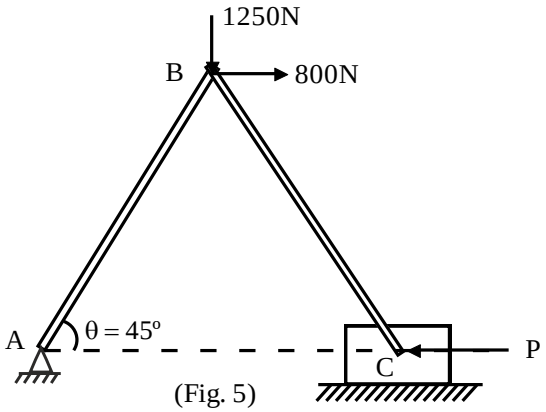


(Fig. 4)

OR

6. a) State and explain virtual work principle. **3**

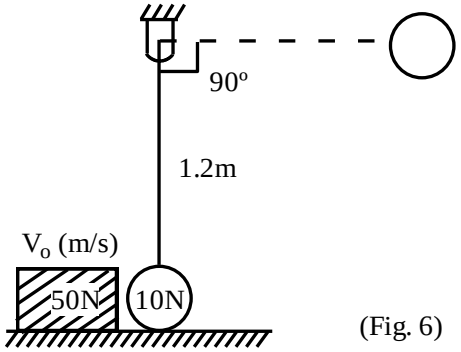
b) The two linkage consisting of two bar & sliding block loaded as shown in fig. 5 is held in Equilibrium by force 'P' applied to the sliding block. Each bar weight 1000N & bars one of Equal length. Using principle of virtual work Determine the Magnitude of force 'P' [Fig. 5]. **7**



(Fig. 5)

7. a) Explain the terms co-efficient of Restitution. **3**

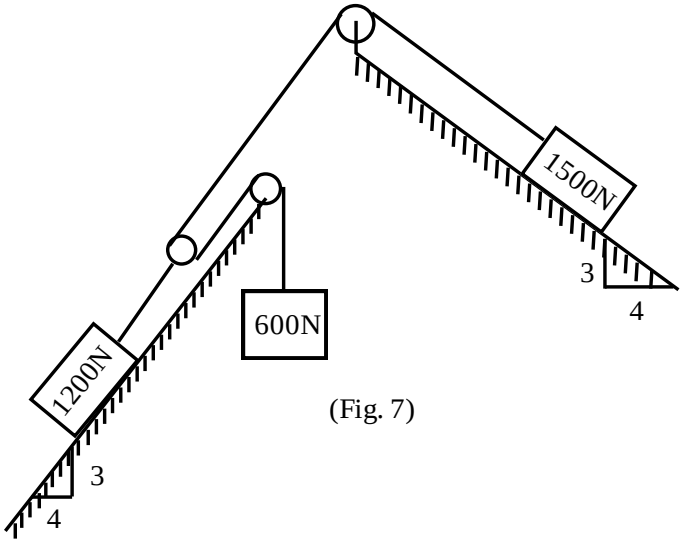
b) A block of 50N weight moving with 'V_0' velocity hits a sphere of 10N weight was initially at rest before impact. If coefficient of Restitution is 0.70. Determine the initial velocity of the block just before Impact, so that sphere will swing through 90°. **7**



(Fig. 6)

OR

8. Determine acceleration of each block as shown in fig. take coefficient of friction for all contact surfaces as 0.20. (Fig. 7). **10**



(Fig. 7)

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