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

Engineering Mechanics

P. Pages : 4 **NRJ/KW/17/4345/4999**

Time : Two Hours * 0 1 1 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. Due credit will be given to neatness and adequate dimensions.
7. Assume suitable data whenever necessary.
8. Illustrate your answers whenever necessary with the help of neat sketches.
9. Use of non programmable calculator is permitted.

1. a) Explain Principle of Transmissibility of forces. **3**

b) The force system shown in fig. 1 (b) has a resultant of 300N down to the right at 60º with X-axis. Calculate the value of F and θ. **7**

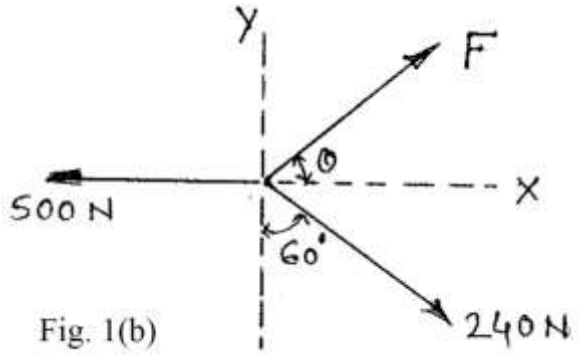


Fig. 1(b)

OR

2. a) State and Explain the Varignon's theorem. **3**

b) The lever AB is hinged at C and attached to a control cable at A as shown in the fig. 2 (b) If the lever end B is subjected to a 400N horizontal force, determine the tension in the cable and the reaction at C. **7**

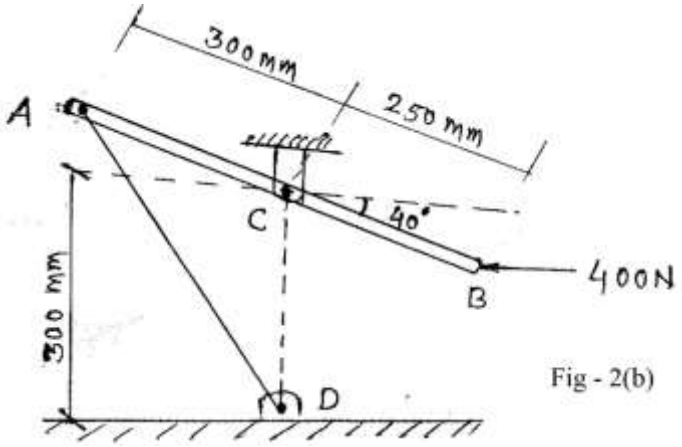
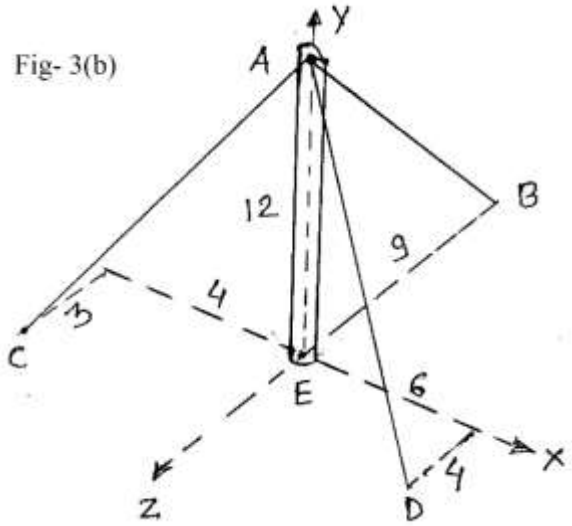


Fig - 2(b)

3. a) Define free Body Diagram. State its significance with example. **3**

b) A vertical boom AE is supported by guy wires from A to B, C and D, if the tensile load in AD = 252N, find the forces AC and AB so that the resultant force on A will be vertical. (Fig. 3 (b)). **7**

Fig- 3(b)



OR

4. a) Two identical rollers each of weight 100N are supported by an inclined plane and a vertical wall as shown in fig. 4 (a) Assuming smooth surface, find the reactions at A, B and C. **5**

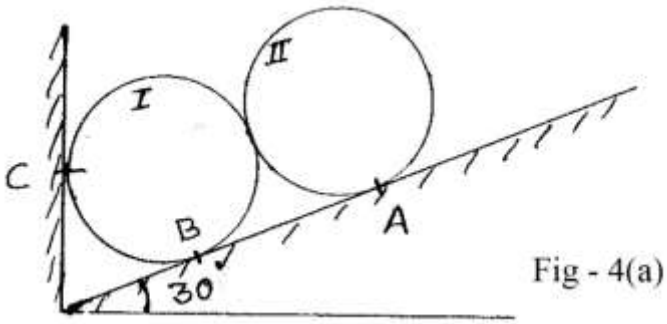


Fig - 4(a)

b) Find the forces in all the members of a truss shown in fig. 4 (b). **5**

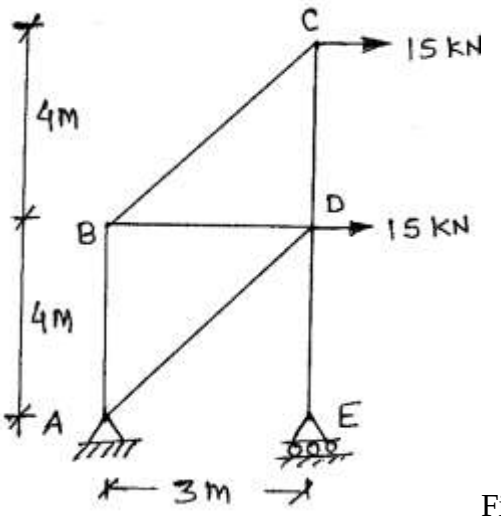


Fig. 4 (b)

5. a) State and explain the principle of virtual work. **3**

b) Find moment of inertia for the shaded area as shown in fig. 5 (b) about the specified X and Y axis. **7**

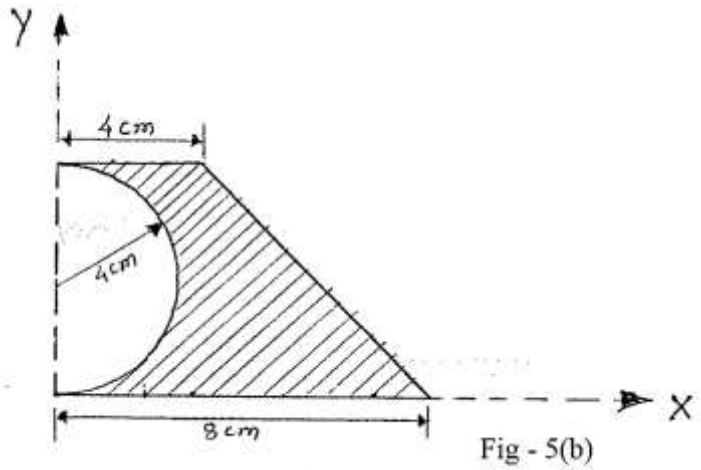


Fig - 5(b)

OR

6. a) The system consisting of two equal bars and a block C, is held in equilibrium by force P. The weight of each bar is 80N. Using virtual work method find the value of P to maintain the system in equilibrium. Shown in fig. 6 (a). **5**

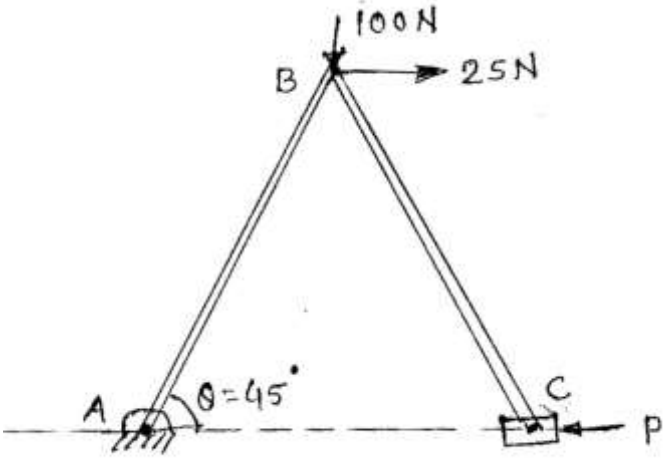


Fig - 6(a)

b) Determine the product of inertia as shown in fig. 6 (b) with respect to specified X and Y axis. **5**

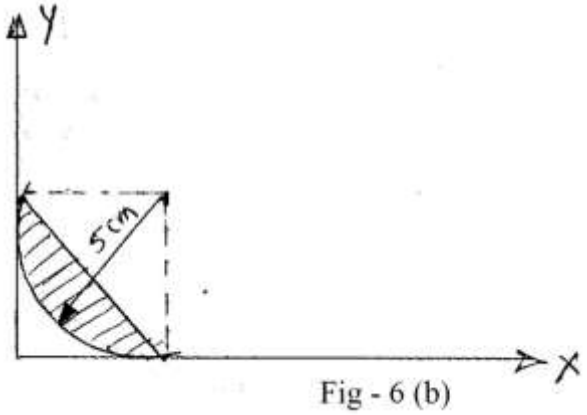


Fig - 6 (b)

7. a) Explain 'D' Alembert's principle. **3**

b) Determine the acceleration of the bodies shown in fig. 7 (b), if the coefficient of kinetic friction is 0.20 at all contact surfaces. Body A weights 200N and B weights 300N. **7**

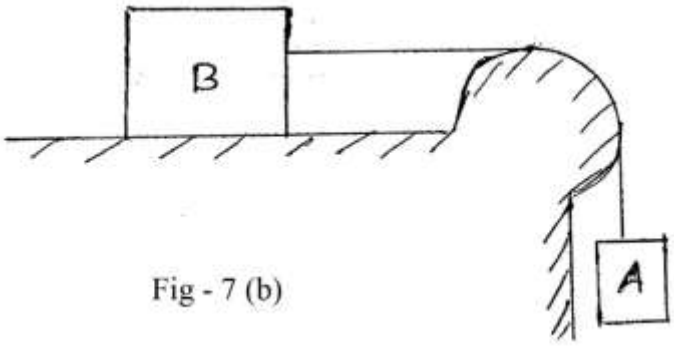


Fig - 7 (b)

OR

8. a) Explain the terms elastic impact and coefficient of Restitution. **3**

b) A spherical ball A of mass 1 kg when released from rest slides down the surface of the smooth bowl and strikes another spherical ball B of mass 0.25kg resting at the bottom of the bowl. Determine the height h from which ball 'A' should be released so that after the impact, ball B just leaves the bowl. The coefficient of restitution may be assumed to be 0.8. (Shown in fig. 8 (b)). **7**

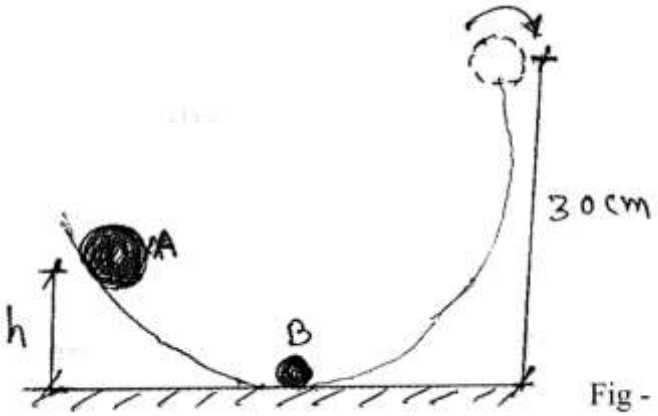


Fig - 8(b)

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