Bx/BESUS/AM-203/ 06S

B.E. (EE) Part-I 2nd Semester Suppl. Examination, 2006

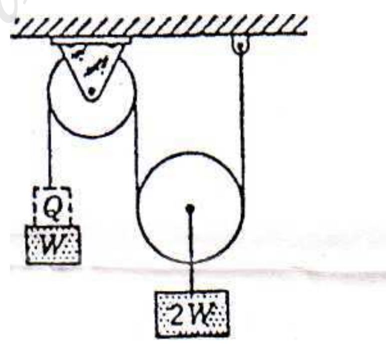
Engineering Mechanics and Graphics-IC
(AM-203)

Time : 3 hours (For Old ^ulation) Ful, Marks ·

Use separate answerscript for each half. Answer SIX questions, taking THREE from each half.
The questions are of equal value. Two marks are reserved for neatness in each half.

FIRST HALF

Fig.Q.l



1. Weights W and 2 W are supported in vertical plane by a string and pulleys arranged as shown in Fig.Q.l. Find the magnitude of an additional weight Q applied on the left which will give a downward acceleration 0.1 g to the weight W. Neglect inertia and friction of pulleys.

2. Neglecting friction and inertia of the two-step pulleys shown in Fig.Q.2, find the acceleration of the weight P. Assume P = 36N, Q=54N and $r_2 = 2r_1$.

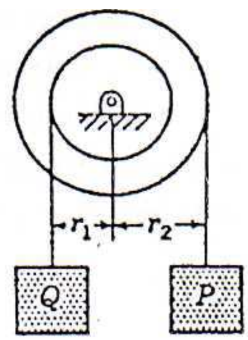
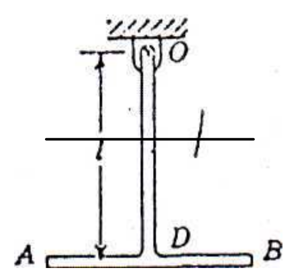


Fig.Q.2

3. Find the time period for small oscillations of the compound pendulum shown in Fig.3Q. Treat OD and AB as identical slender bars of uniform cross-section.



M4-H

Fig.Q.3

4. a) A small car of weight *W* starts from rest at *A* and rolls without friction along the loop-the-loop *ACBD* as shown in Fig.Q.4a. What is the least height '/z' above the top of the loop at which the car can start without falling off the track at point *B,* and for such a starting position what velocity with the car have along the horizontal portion *CD* of the track? Neglect friction.

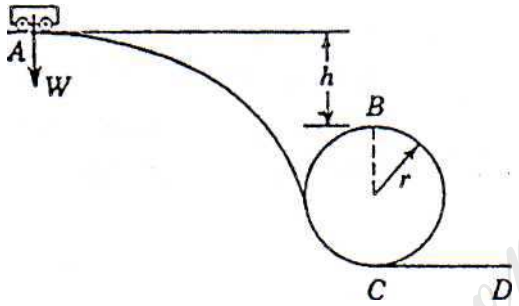


Fig.Q.4a

b) An automobile of weight *W* travels with uniform speed v over a vertical curve ACB (Fig.Q.4b) which is parabolic. Determine the total pressure *R* (in terms of v, / & 8) exerted on the road by the four wheels of the car as it passes the crest 'C\

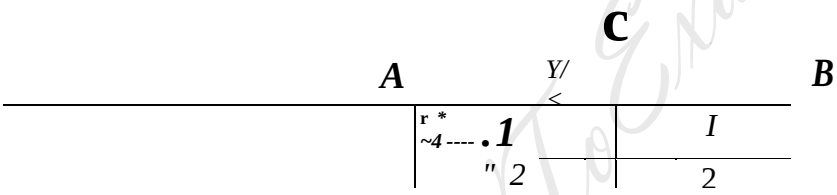


Fig.Q.4b

5. At what uniform speed of rotation around the vertical axis *AB* will the balls *C* and *D* of equal weights *W* begin to lift the weight *Q* of the device shown in Fig.Q.5? The following numerical data are given : *W=4.5N,* Q = 9.0N,/ = 0.254 m. Neglect all friction and the weights of the four hinged bars of length /. The weight *Q* can slide freely along the shaft *AB.*

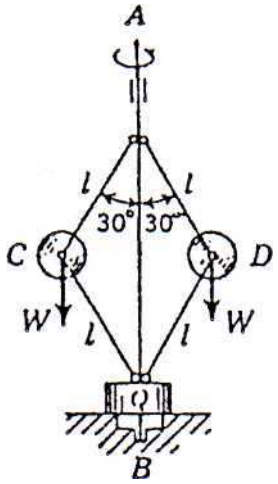


Fig.Q.5

SECOND HALF

6. Two spheres each of weight 1000 N and of radius 25 cm rest in a horizontal channel of width 90 cm as shown in Fig.Q.6. Find the reactions on the points of contact *A*, *B* and C.

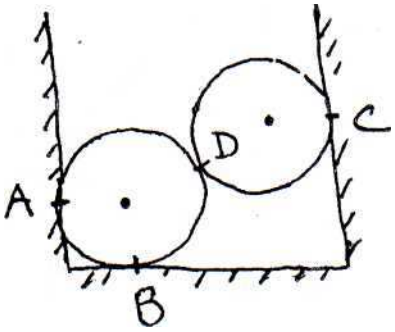


Fig.Q.6

7. A block of weight *W*\ = 1000N rests on a horizontal surface and supports on its top another block of weight W_x = 250N as shown in Fig.Q.7. The weight W_2 is attached by an inclined string *AB* to vertical wall. Find magnitude of horizontal force *P* applied to lower block to cause slipping to impend. Assume coefficient of friction for all surfaces of contact to be 0.3.

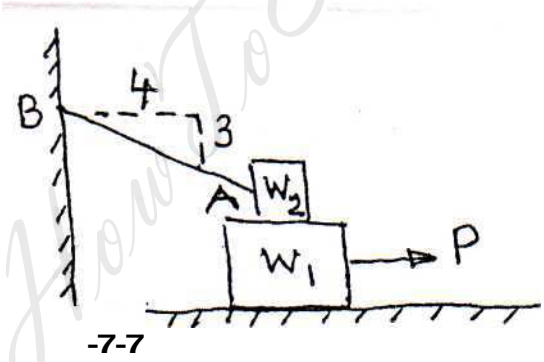


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Fig.Q.7

8. Determine the coordinates of the centre of a 4 cm diameter circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area. Refer Fig.Q.8.

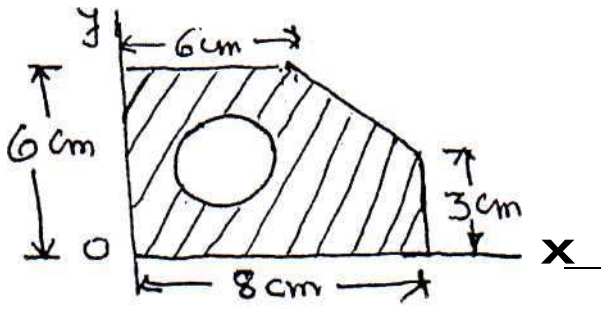

Fig. Q. 8

(AM-203)

9. Determine the magnitude and nature of the axial forces in the members of the truss shown in Fig.Q.9.

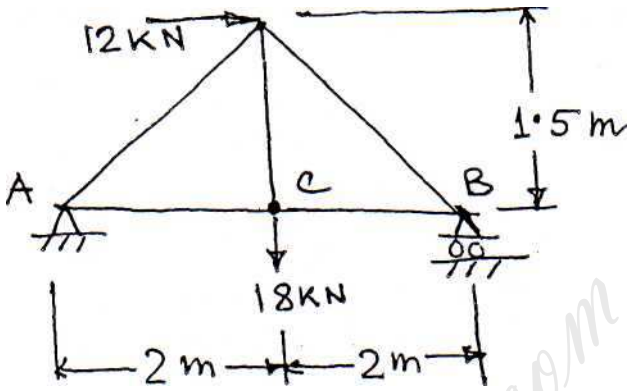

Fig.Q.9

10. Find the polar moment of inertia of an isosceles triangle having base, *b* and altitude, *h* with respect to its apex.