BACHELOR OF ENGINEERING IN COMPUTER SCIENCE ENGINEERING EXAMINATION, 2012

(1st Year, 1st Semester, Supplementary)

ENGINEERING MECHANICS

Time : Three Hours Full Marks - 100

Answer **any Five** questions taking at least **Two** from each Group

All questions carry equal marks

Group : A

1. A cube of side 'a' is acted upon by a force P as shown in Fig. Q.1. Determine the moment of P(a) about A, (b) about the edge AB, (c) about the diagonal AG of the cube, (d) using result of part C determine the perpendicular distance from AG to FC.

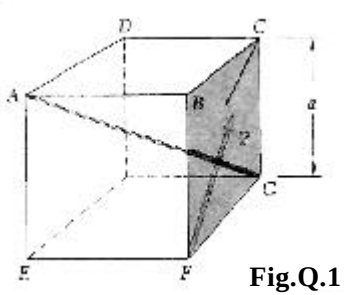

Fig.Q.1

2. A 12 m pole supports a horizontal cable CD and is held by a ball and socket at A and two cables BE and BF. Knowing that the tension in the cable CD is 14 KN and assuming that CD is parallel to the x-axis $(\varphi = 0)$, determine the tension the cable BE and BF and the reaction at A. [See Fig.2.]

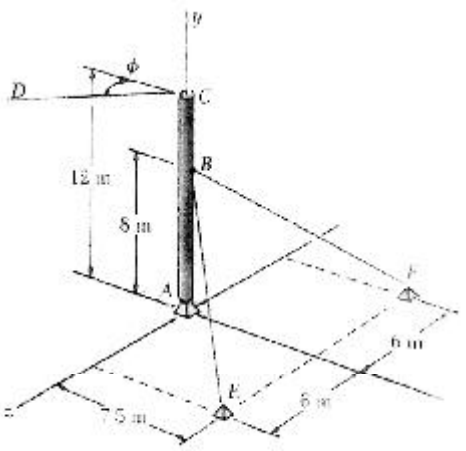

Fig.Q.2

3. The outside diameter of a pully is 0.8 m, and the cross section of its rim is as showin in Fig.Q.3. Determine the mass of the rim knowing that the pulley is made of steel of density $\rho = 7{\cdot}85 \times 10^3$ kg/m^3.

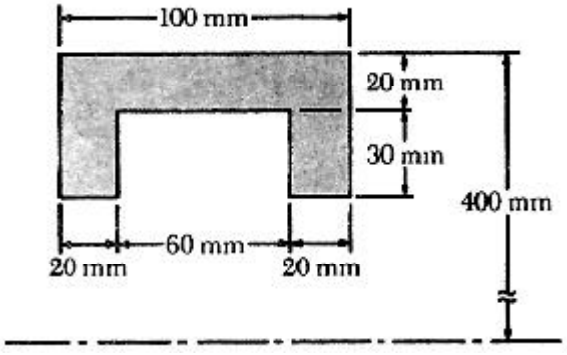

Fig.Q.3

8. A 10 kg package drops from a chute into a 25 kg cart with a velocity of 3 m/s. [See Fig.Q8] knowing that the cart is initially at rest and may roll freely, determine (a) the final velocity of the cart, (b) the impulse exerted by the cart on the package, (c) the fraction of the initial energy lost in the impact.

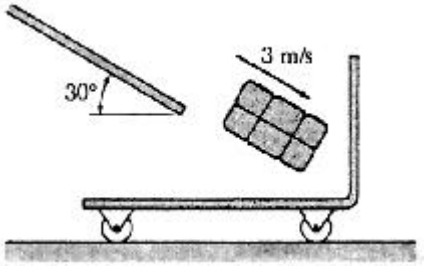

Fig.Q.8

4. The end of a slender, uniform rod of length L and weight W bears on a horizontal surface, while its end B is supported by a cord BC. [see Fig.Q.4] knowing that the co-efficient of friction are μ_s = 0·30 and μ_k = 0·25, determine (a) the maximum value of θ for which equillibrium is maintained, (b) the corresponding value of the tension in the cord.

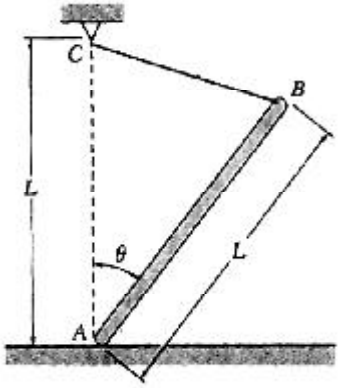

Fig.Q.4

Group : B

5. The elevator shown in the Fig.Q5 moves downward with a constant velocity of 5 m/s. Determine (a) the velocity of the cable C, (b) velocity of the counter weight W, (c) the relative velocity of cable C with respect to the elevator, (d) the relative velocity of the counter weight W with respect to the elevator.

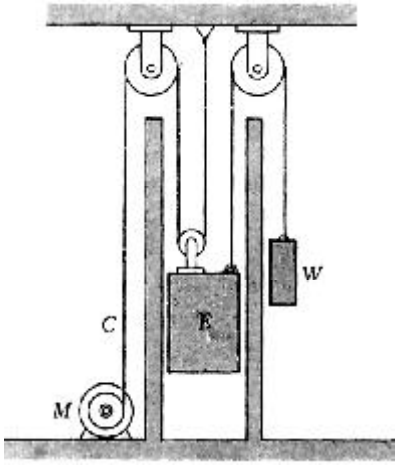

Fig.Q.5

[Turn over

6. The accileration record shown in Fig.Q6 was obtained for a small air plane travelling along a straight course. Knowing that x=0 and v=60 m/s when t = 0 determine (a) the velocity and position of plane at t = 20s, (b) its average velocity during the interval 6s < t < 14s.

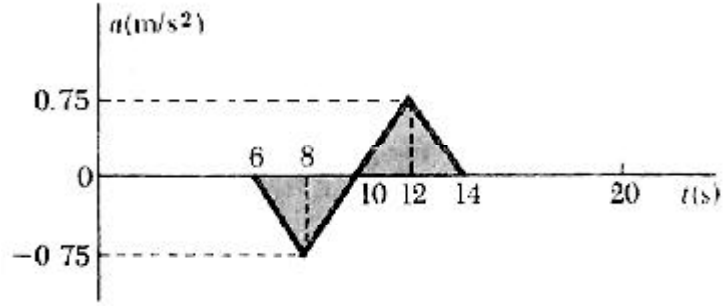

Fig.Q.6

7. Two blocks are joined by an inextensible cable as showin in Fig.Q7. If the system is released from rest, determine the velocity of block A after it has moved 2 m. Assume that the co-efficient of kinetic friction between blocks A and the plane is μ_k = 0·25 and that the pulley is weightless and frictionless.

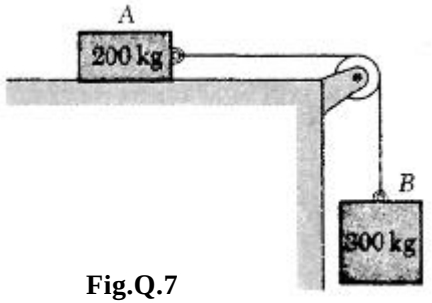

Fig.Q.7