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Question Paper Code: U2104

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Second Semester

Civil Engineering

21UCE204- Engineering Mechanics

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

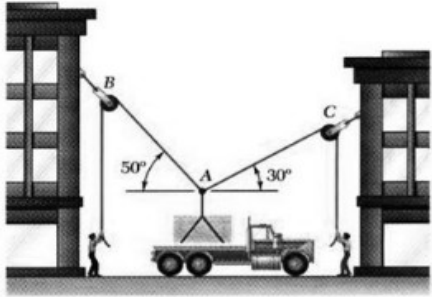
Answer All Questions

PART A - (5x 1 = 5 Marks)

1. The velocity ratio in case of an inclined plane inclined at angle ' θ ' to the horizontal and weight being pulled up the inclined plane by vertical effort is
(a) $\sin\theta$ (b) $\cos\theta$ (c) $\tan\theta$ (d) $\operatorname{cosec}\theta$ CO1- U
2. The _____ forces do not cause the rotation. CO2- U
(a) Non-concurrent (b) Concurrent (c) Parallel (d) Non-Parallel
3. What is the Centroidal distance of an equilateral triangle of side 2 m? CO3- App
(a) 0.866m (b) 0.769m (c) 1.000m (d) 0.577m
4. A cubical block rests on an inclined plane of $\mu = 1/\sqrt{3}$, determine the angle of inclination when the block just slides down the inclined plane? CO1- U
(a) 40° (b) 50° (c) 30° (d) 20°
5. If we place some coins over the paper strip and pull it with a jerk, then coins don't fall off because of CO5- U
(a) friction (b) inertia (c) resistance (d) force

PART – B (5 x 3= 15Marks)

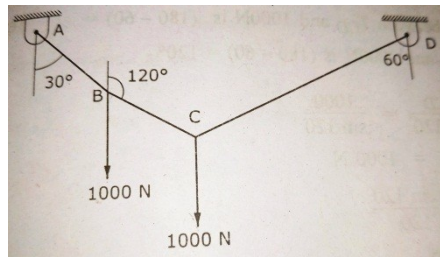
6. Draw free body diagram for given fig. CO1- U



7. Sketch the different types of supports with support reactions CO1- U
8. Differentiate Centroid and Center of Gravity. CO1- U
9. Define dynamic friction and static friction CO2- App
10. Define Rolling resistance CO1- U

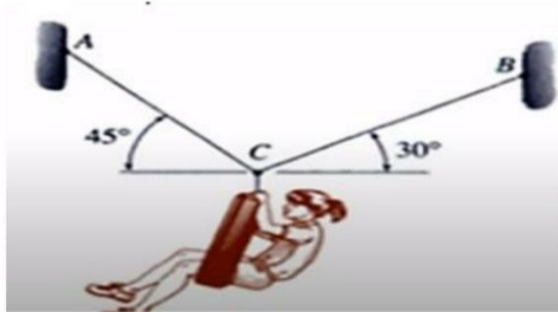
PART – C (5 x 16= 80Marks)

11. (a) A string ABCD attached to two fixed points A and D has two equal weights of 1000N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles of 30° and 60° respectively, to the vertical as shown in fig. Find the tension in the portions AB, BC and CD of the string. CO2-App (16)

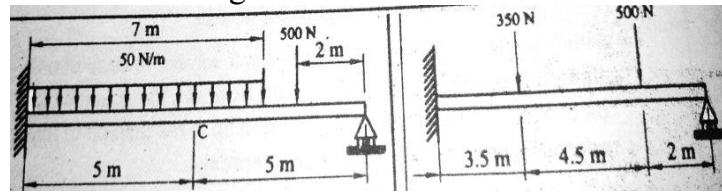


Or

- (b) A girl is sitting on an automobile tire which is suspended as shown in fig. CO2-App (16)
 If the girl and the tire together have a mass of 60 kg.
 Determine (i) The tension in the rope AC (ii) The tension in the rope BC

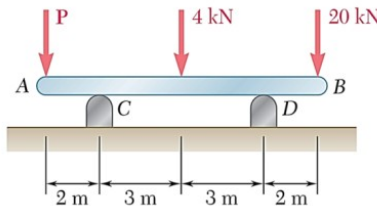


12. (a) Find the simplest equivalent force for the system of forces acting on the beam shown in fig. CO4-Ana (16)

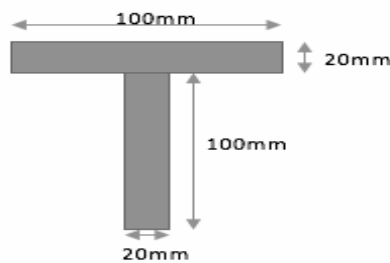


Or

- (b) The 10 m beam AB rests upon, but is not attached to, supports at C and D. Neglecting the weight of the beam. Determine the range of value P for which the beam will remain in equilibrium. CO4-Ana (16)

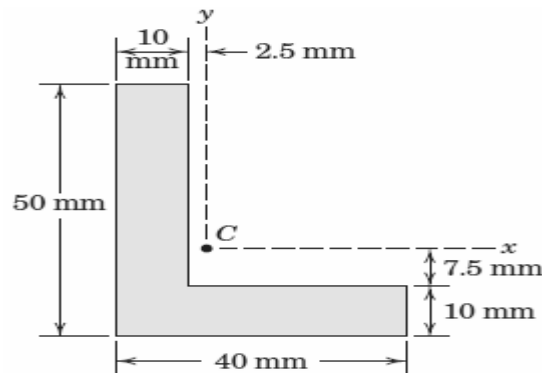


13. (a) Locate the centroid of the given T Section as shown in fig. CO3-App (16)



Or

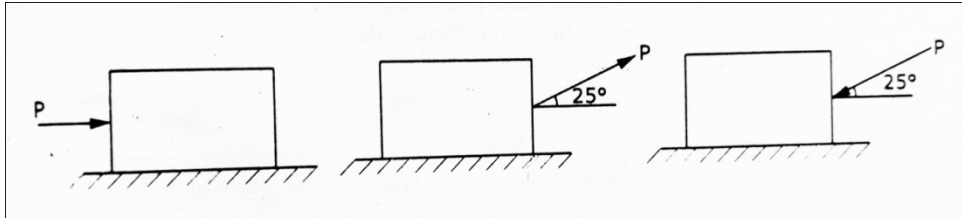
- (b) Find the moment of inertia of a channel section as shown in fig, CO3-App (16)



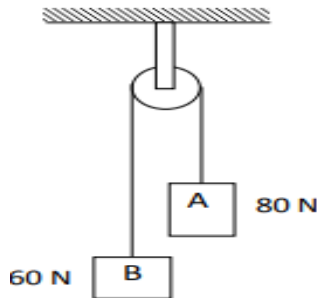
14. (a) A 7m long ladder rests against a vertical wall, with which it makes an angle of 45° and on a floor. If a man whose weight is one half that of the ladder climbs it, at what distance along the ladder will he be, when the ladder is about to slip? Take coeff. of friction between the ladder and the wall is $\frac{1}{3}$ and that between the ladder and the floor is $\frac{1}{2}$. CO4-Ana (16)

Or

- (b) A body of weight 100N is placed on a rough horizontal plane and pushed by a force of 45N as shown in fig. to just cause sliding over the horizontal plane. Determine the coefficient of friction in all the three cases. CO4-Ana (16)



15. (a) Two blocks of A and B of weight 80 N and 60 N are connected by a string passing through a smooth pulley as shown in fig. Calculate the acceleration of body and the tension in the string. CO2-App (16)



Or

- (b) An elevator of weight (including the weight of man) 4.5 kN starts moving upwards with a constant acceleration and acquires a velocity of 1.8 m/s, after travelling a distance of 2 m. Find the pull in the cable during accelerated motion. CO2-App (16)