C **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U2104

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

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 rate of change of displacement of a body is called CO1- U

   a) Velocity b) Acceleration c) Momentum d) None of these

2. A beam which extends beyond it supports can be termed as _____ CO1- U

   a) Over hang beam b) Over span beam c) Isolated beams d) Tee beams

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

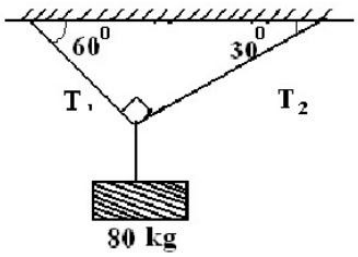
   (a) 40° (b) 50° (c) 30° (d) 20°

5. The motion of planets in the solar system is an example of conservation of CO1- U

   a) Energy b)Linear momentum c) Angular Momentum d) Mass

PART – B (5 x 3= 15Marks)

6. A man of 80 kg is supported by two cables as shown in fig ,what is the tension ratio of T1:T2 ? CO1- U



7. Show that if three coplanar forces, acting at a point be in equilibrium, then, each force is proportional to the sine of the angle between the other two. CO1- U

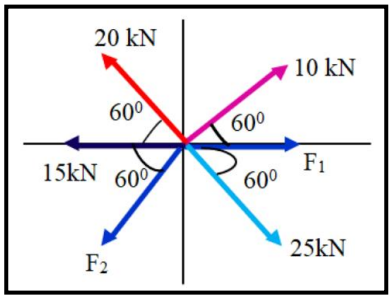
8. What do you meant by Statically Indeterminate Structure? CO1- U

9. Define dynamic friction and static friction CO2- App

10. Enlist the uses of Axes of Symmetry. CO1- U

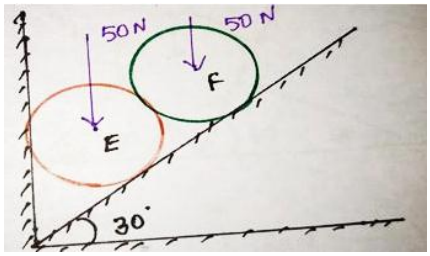
PART – C (5 x 16= 80Marks)

11. (a) Determine the unknown forces F1 & F2 for the force system as shown in fig. CO2-App (16)

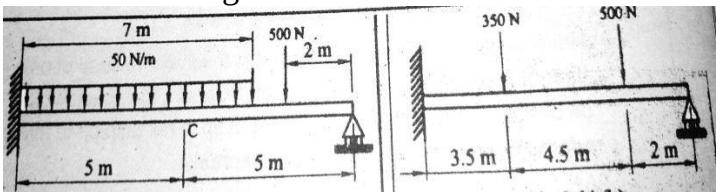


Or

(b) Two identical rollers, each of weight 50 N, are supported by an inclined plane on vertical wall as shown in fig. Find the reactions at the points of A, B and C. Assume all the surfaces to be smooth. CO2-App (16)

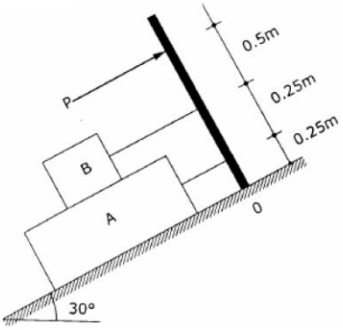


12. (a) Find the simplest equivalent force for the system of forces acting on the beam shown in fig. CO4-Ana (16)

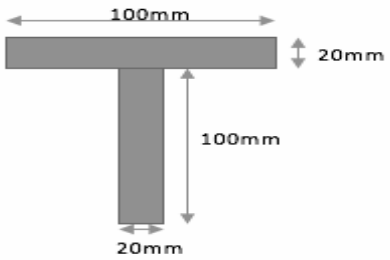


Or

(b) Blocks A and B of weight 200N and 100N respectively, rest on a 30^0 inclined plane and are attached to the post which is held perpendicular to the plane by force P, parallel to the plane, as shown in fig.Assume that all surfaces are smooth and that the cords are parallel to the plane . Determine the value of P. Also find the normal reactions of blocks A and B — CO4-Ana — (16)

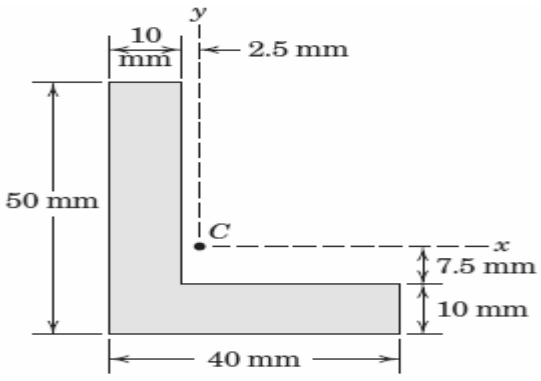


13. (a) Locate the centroid of the given T Section as shown in fig. — CO3-App — (16)



Or

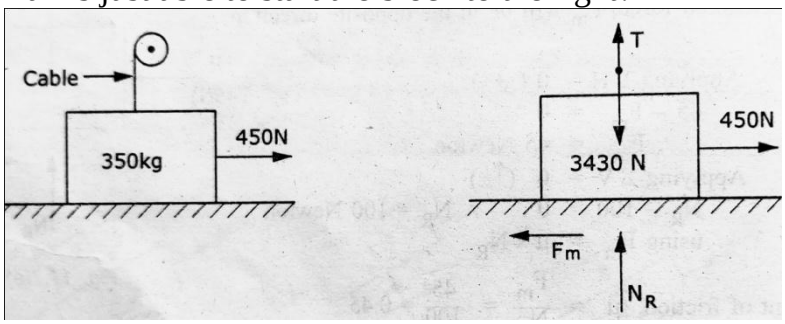
(b) Find the moment of inertia of a channel section as shown in fig, — CO3-App — (16)



14. (a) A Wheel of weight 1000N and diameter 600mm is required to move on a horizontal surface. If the co-efficient of rolling resistance is 15mm, calculate the force and Θ required to roll the wheel without slipping. — CO4-Ana — (16)

Or

(b) A man can pull horizontally with a force of 450N.A mass of 350kg is resting on a horizontal surface for which the coefficient of friction is 0.20.The vertical cable of a crane is attached to the top of the block as shown in fig 11.8.what will be the tension in the cable if the man is just able to start the block to the right? CO4-Ana (16)



15. (a) A train is traveling from A to D along the track shown in fig. Its initial velocity at A is zero. The train takes 5 min to cover the distance AB, 2250 m length and 2.5 minutes to cover, the distance BC, 3000 m in length, on reaching the station C, the brakes are applied and the train stops 2250 m beyond, at D (i) Find the retardation on CD, (ii) the time it takes the train to get from A to D, and (iii) its average speed for the whole distance. CO2-App (16)

Or

(b) Two blocks of weight 150N and 50Nare connected by a string and passing over a frictionless pulley as shown in fig., Determine the acceleration of the blocks A and B and the tension in the string. CO2-App (16)