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Question Paper Code:R2104

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

First Semester

Civil Engineering

R21UCE204- ENGINEERING MECHANICS

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (5x 1 = 5 Marks)

1. The _____ forces do not cause the rotation. CO1-U
(a) Non-concurrent (b) Parallel (c) Non-Parallel (d) Concurrent
2. What is not the condition for the equilibrium in three dimensional CO1-U
system of axis?
(a) $\sum F_x=0$ (b) $\sum F_y=0$ (c) $\sum F_z=0$ (d) $\sum F \neq 0$
3. What is the formula of radius of gyration? CO1-U
(a) $k^2 = I/A$ (b) $k^2 = I^2/A$ (c) $k^2 = I^2/A^2$ (d) $k^2 = (I/A)^{1/2}$
4. The co-efficient of friction depends upon CO1-U
(a) nature of surfaces (b) area of contact
(c) shape of the surfaces (d) all of the above.
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

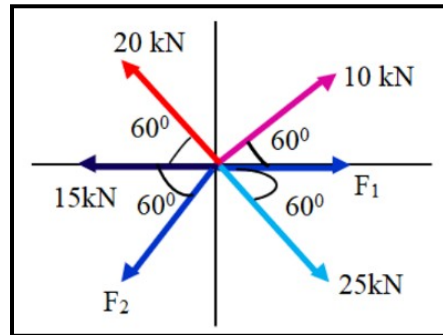
PART – B (5 x 3= 15 Marks)

6. Write down the expression for the force vector AB. CO2– App
Coordinates of A (5,4,8)
Coordinates of B (2,9,7)
Position Vector
Unit Vector
Tension in AB

- 7. Distinguish between scalar and vector quantity with examples CO4- Ana
- 8. State Perpendicular Axis Theorem. CO1-U
- 9. Draw the Free Body Diagram of the Block of weight W subjected to an effort P . The surface is assumed to be smooth. CO5– App
 - 1. Block on Horizontal Plane
 - 2. Block on Inclined Plane
- 10. A stone is dropped from the top of a tower. The stone reaches the ground in 100seconds. Determine the height of the tower. CO6– App

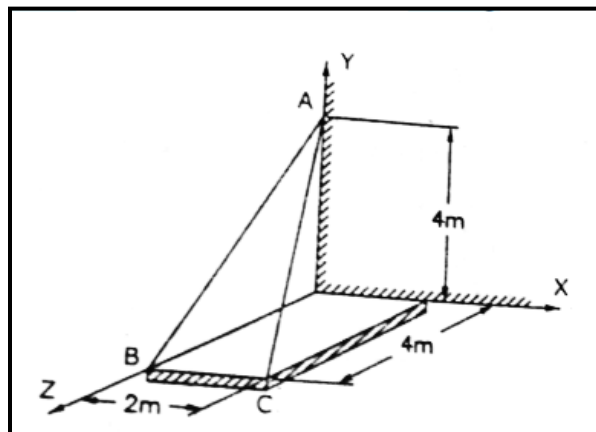
PART – C (5 x 16= 80 Marks)

- 11. (a) Determine the unknown forces F_1 & F_2 for the force system as shown in fig. CO4-Ana (16)

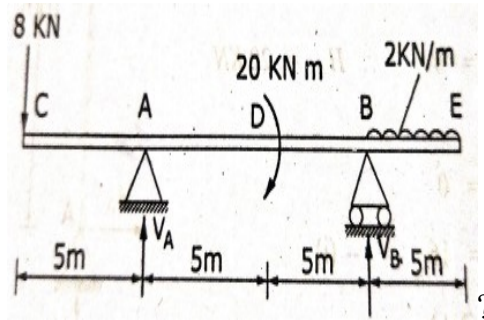


Or

- (b) The tension in cables AB and AC are 100 N & 120 N respectively as shown in fig. Determine the magnitude of the resultant force acting at A. CO4-Ana (16)

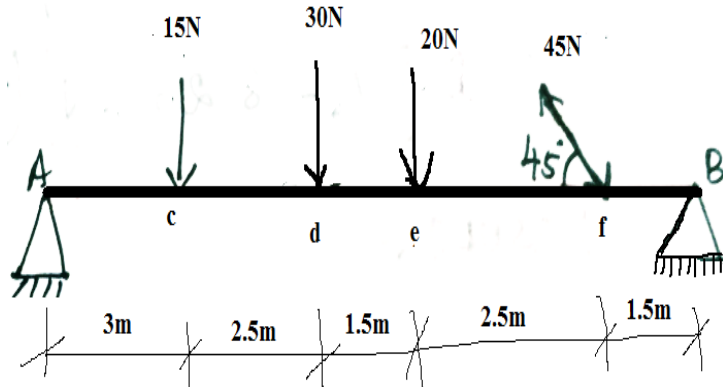


12. (a) Analyse a simply supported overhanging beam 20 m long carries a system of loads and a couple as shown in figure to determine the reactions at support A and B. CO4-Ana (16)

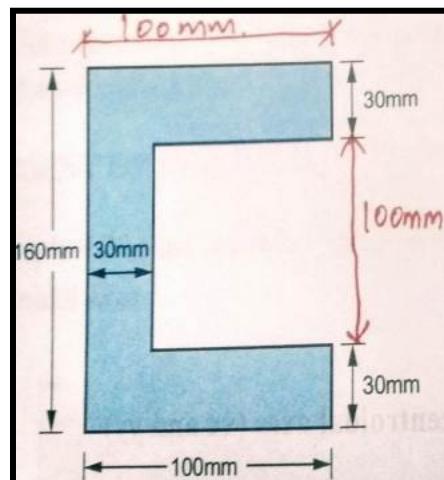


Or

- (b) Analyse the simply supported beam to determine the reaction about A & B as shown in figure. CO4- Ana (16)



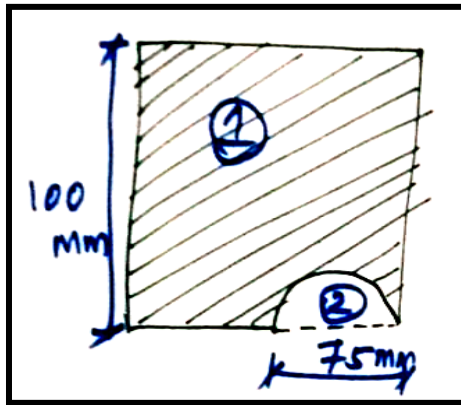
13. (a) Find the Moment of Inertia of the channel section as shown in fig., CO3- App (16) about its centroidal axes.



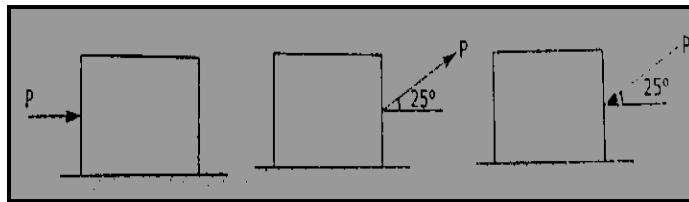
Or

(b) Locate the centroid of lamina as shown in fig.,

CO3- App (16)

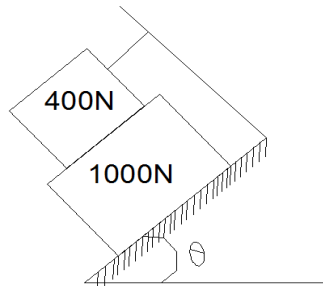


14. (a) A body of weight 100 N is placed on a rough horizontal plane, and pushed by a force of 45 N as shown in fig., to just cause sliding over the horizontal plane. Determine the Co-efficient of friction in all cases. CO5-App (16)



Or

- (b) What should be the value of the angle θ so that motion of the 1000N block impends down the plane? . The coefficient of friction μ for all surfaces is $\frac{1}{4}$. CO5-App (16)



15. (a) A train starts from rest and attains a velocity of 45 kmph in 2 minutes, with uniform acceleration. Calculate i) acceleration ii) distance travelled and iii) time required to reach a velocity of 36 kmph. CO6-Ana (16)

Or

- (b) Two bodies, one of mass 30kg, moves with a velocity of 9m/s centrally. Find the velocity of each body after impact, if the coefficient of restitution is 0.8. CO6-Ana (16)

