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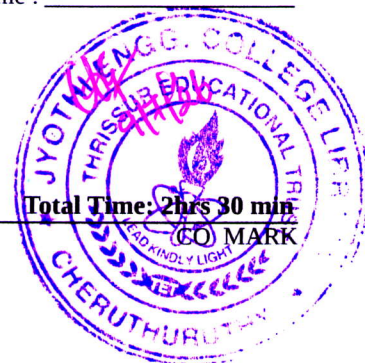
Name : _____



Jyothi Engineering College(Autonomous)
 B. Tech Degree S2 (S) Examination, June 2026 (2025 Scheme)

25EST203 - ENGINEERING MECHANICS

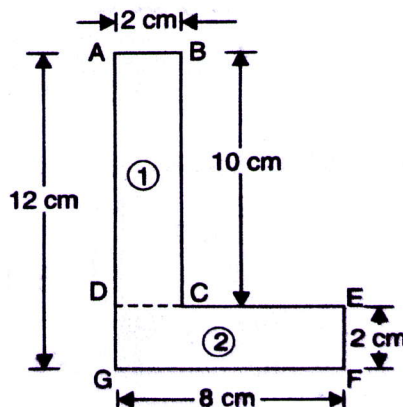
Total Mark: 60



PART A

(Answer All Questions. Each question carries 3 marks)

1. What is a Free Body Diagram (FBD)? Explain the significance of drawing a Free Body Diagram in engineering mechanics. CO1 (3)
2. State and explain Vaigon's theorem. CO1 (3)
3. Find the centre of gravity of the L-section shown in figure. CO2 (3)



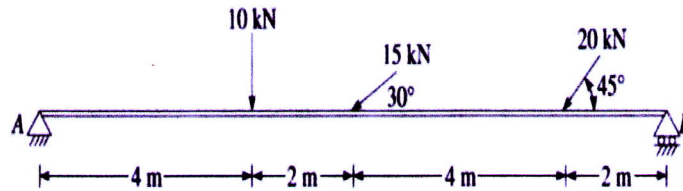
4. Explain the difference between the coefficient of friction and the angle of friction. CO2 (3)
5. A wheel increases its speed from 45 r.p.m. to 90 r.p.m. in 30 seconds. Find (a) angular acceleration of the wheel, and (b) no. of revolutions made by the wheel in these 30 seconds. CO4 (3)
6. State and explain D'Alembert's principle with the help of a neat sketch. CO4 (3)
7. What are the different types of vibratory motion? CO5 (3)
8. The piston of a steam engine moves with simple harmonic motion. The crank rotates at 200 rpm with a stroke of 2 m. Find the velocity and acceleration of the piston, when it is at a distance of 0.8 m from the centre. CO5 (3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module - 1

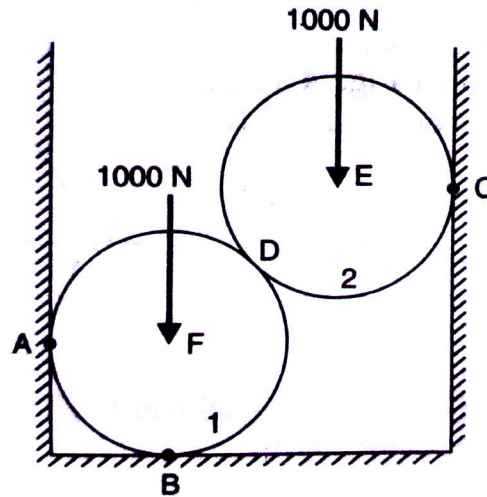
9. The beam AB of span 12 m is hinged at A and is on rollers at B. Determine the reactions developed at A and B due to the loading shown in the figure. CO1 (9)



OR

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

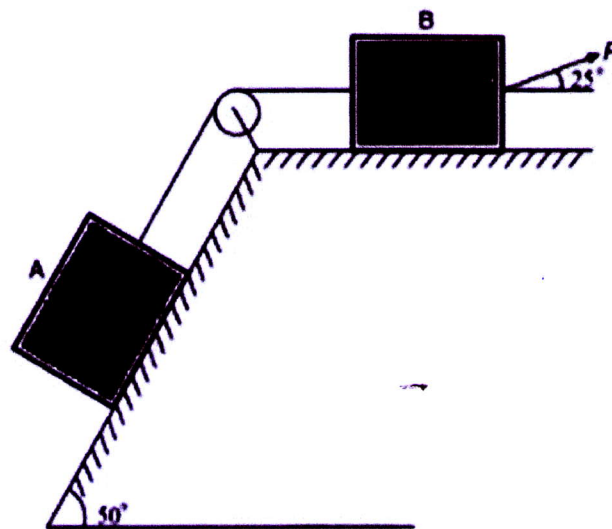
CO1 (9)



Module - 2

11. Two blocks A and B weighing 6 kN and 3.5 kN, respectively, are connected by a wire passing over a smooth frictionless pulley as shown in figure. Determine the magnitude of force P which is applied on block B at 25° from horizontal as shown in figure. Take $\mu = 0.20$.

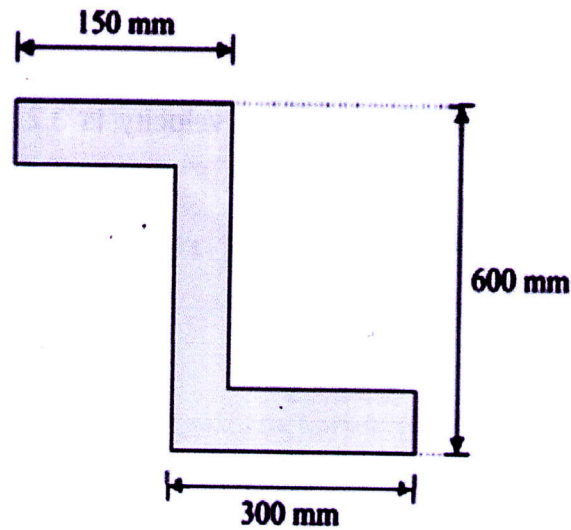
CO2 (9)



OR

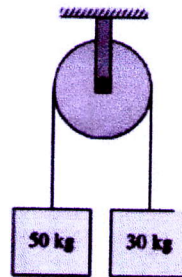
12. Determine the centroid of the Z section, where the width at all sections is 20 mm.

CO2 (9)



Module - 3

13. The block-and-pulley arrangement shown in the figure, when released from rest, determine the acceleration of the system and the tension in each portion of the string. Assume the pulley to be a solid cylinder of 20 kg mass and 15 cm radius. CO4 (9)

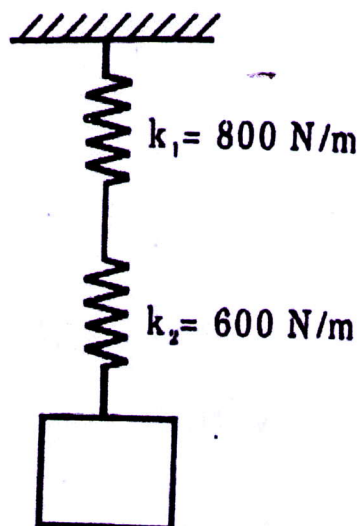


OR

14. A body of 5 kg mass is hung from a spring balance suspended from the ceiling of an elevator. What is the reading in the balance (i) if the elevator is accelerating upwards at 2 m/s^2 and (ii) if the elevator is accelerating downwards at 1.5 m/s^2 ? CO5 (9)

Module - 4

15. A 100 N block is suspended by two helical springs of constants $k_1 = 800 \text{ N/m}$ and $k_2 = 600 \text{ N/m}$ arranged in series as shown in figure. If the block is pulled 50 mm down from its equilibrium position and released, Determine the period of oscillation, maximum velocity and acceleration of the block. CO5 (9)



OR

16. A point moves with SHM .When this point is 0.7 m from the mid path, its velocity is 10 m/s and when 1.8 m from the centre of its path its velocity is 3.2 m/s. Find angular velocity, periodic time and its maximum acceleration.

CO5 (9)
