

Reg No.: _____



Jyothi Engineering College(Autonomous)
B. Tech Degree S1 (S) Examination, June 2026 (2025 Scheme)

25EST106 - ENGINEERING MECHANICS

Name: _____



Total Mark: 60

Total Time: 2hrs 30 min
CO MARK

PART A

(Answer All Questions. Each question carries 3 marks)

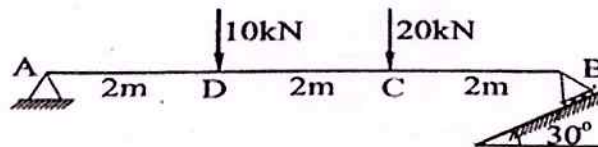
1. State and explain Lami's theorem. CO1 (3)
2. Find the magnitude of the two forces P and Q, such that if they act at right angles, their resultant is $\sqrt{10}$ N. But if they act at 60° , their resultant is $\sqrt{13}$ N. CO1 (3)
3. A body of weight 50 N is on a rough inclined plane with $\mu = 0.35$ which makes an angle 30° with the horizontal. Will the body move? CO2 (3)
4. State and prove parallel axis theorem. CO3 (3)
5. The equation of motion of an engine is given by $s = 2t^3 - 6t^2 - 5$, where (s) is in metres and (t) in seconds. Calculate displacement and acceleration when velocity is zero. CO4 (3)
6. Calculate the increase in reaction under the feet of person of weight 600 N in a lift, if the lift accelerates upward with an acceleration 1 m/s^2 . CO4 (3)
7. A flywheel weighing 500 N and having radius of gyration 0.4 m loses its speed from 300rpm to 180 rpm in 1 minute. Calculate the torque acting on it. CO5 (3)
8. A car is moving at 10 m/s accelerates and reaches a speed of 20 m/s in 5 s. Find out the total acceleration at the end of 5 s if the radius of curvature is 100 m. CO5 (3)

PART B

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

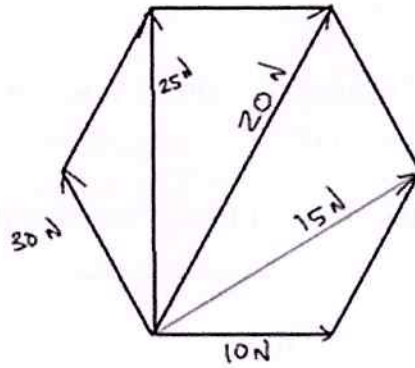
Module - 1

9. For the beam shown in the figure. Find the support reactions. CO1 (9)



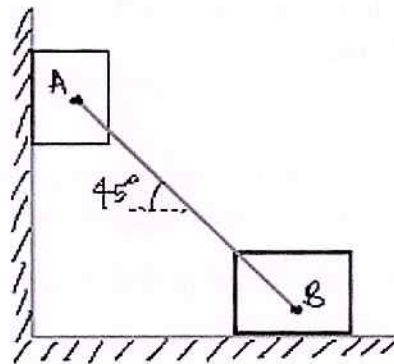
OR

10. Forces of 10 N, 15 N, 20 N, 25 N and 30 N act at an angular point of a regular hexagon towards other angular points as shown in figure. Calculate the magnitude and direction of the resultant force. CO1 (9)



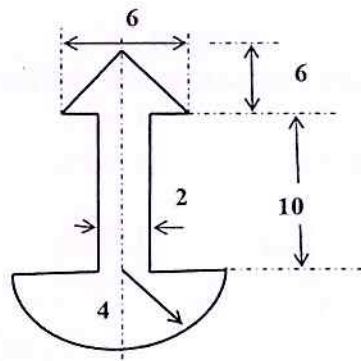
Module - 2

11. Two identical blocks, A and B, of weight W are supported by a rigid bar inclined 45° with horizontal as shown in figure. If both the blocks are in limiting equilibrium, find the coefficient of friction, assuming it to be same at the floor and the wall. CO2 (9)



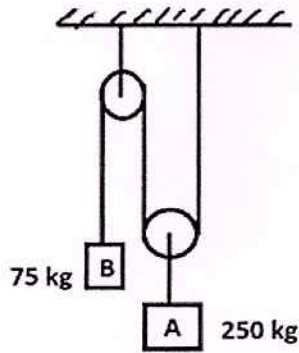
OR

12. Find the moment of inertia of the area about the horizontal and vertical centroidal axes. All dimensions in cm. CO3 (9)



Module - 3

13. Determine the tension in the string and acceleration of two blocks A & B of masses 250 kg and 75 kg respectively, connected by a string and a frictionless and weightless pulley as shown in the figure. CO4 (9)



OR

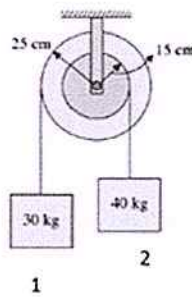
14. An elevator cage of weight 4500 N (including the weight of man) starts moving upwards with a constant acceleration. Starting from rest it acquires a velocity of 1.8 m/s after travelling a distance of 2 m. Find the tension in the cables of elevator. Also find the force exerted by a man weighing 600 N on the floor of the lift when the elevator moves up with a retardation of 1 m/s^2 .

CO4 (9)

Module - 4

15. The stepped pulley system shown in the figure when released from rest, determine the acceleration of the blocks, angular acceleration of the pulley, and tension in the strings connecting the blocks. The mass of the pulley is 20 kg and its radius of gyration is 20 cm.

CO5 (9)



OR

16. A flywheel rotates for 5 s with a constant angular acceleration and describes 100 radians during that time. Then it rotates with constant angular velocity and during the next 5 seconds it describes 80 radians. Find the initial angular velocity and angular acceleration.

CO5 (9)
