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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S2 (R) Examination May 2025 (2024 Scheme)



Course Code: GBEST213

Course Name: ENGINEERING MECHANICS

Max. Marks: 60

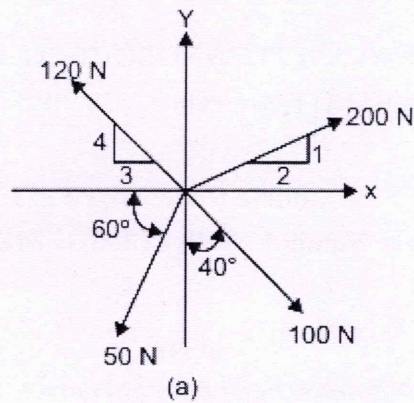
Duration: 2 hours 30 minutes

PART A*(Answer all questions. Each question carries 3 marks)*

		CO	Marks
1	State and explain principle of transmissibility of force with sketches.	CO1	(3)
2	Determine the magnitude of the resultant of the two forces of magnitude 12 N and 9 N acting at a point, if the angle between the two forces is 30°.	CO1	(3)
3	Distinguish between angle of friction and angle of repose.	CO2	(3)
4	State and explain parallel axis theorem with a neat sketch.	CO2	(3)
5	Differentiate between curvilinear motion and rectilinear motion.	CO5	(3)
6	The equations of motion of a particle moving in a straight line is given by $s = 20t + 5t^2 - 3t^3$ where s is in metres and t in seconds. Find the velocity and acceleration at the start.	CO5	(3)
7	Differentiate between free vibration and forced vibration	CO5	(3)
8	An 80 N weight is hung on the end of a helical spring and is set vibrating vertically. The weight makes 4 oscillations per second. Determine the stiffness of the spring.	CO5	(3)

PART B*(Answer any one full question from each module, each question carries 9 marks)***Module -1**

9	Determine the magnitude and direction of the resultant of the forces shown in figure.	CO3	(9)
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Two smooth cylinders each of weight 1000 N and radius 20 cm are connected at their centers by a string of length 50 cm and rest on a horizontal plane. The third cylinder of weight 2000 N of 20 cm radius is placed on top in between the other two cylinders. Find the tension in the string and the pressure exerted at all contact points.

CO3 (9)

Module -2

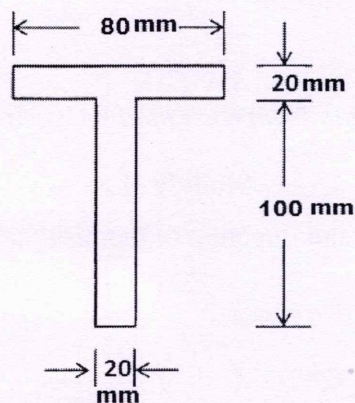
11

A uniform ladder 6 m long weighing 250 N is resting against a wall with which it makes 30° . A man weighing 500 N climbs up the ladder. At what position along the ladder from the bottom end does the ladder slip? The coefficient of friction for both the wall and the ground with the ladder is 0.2.

CO4 (9)

Determine the moment of Inertia of the T section shown in figure about the centroidal axes.

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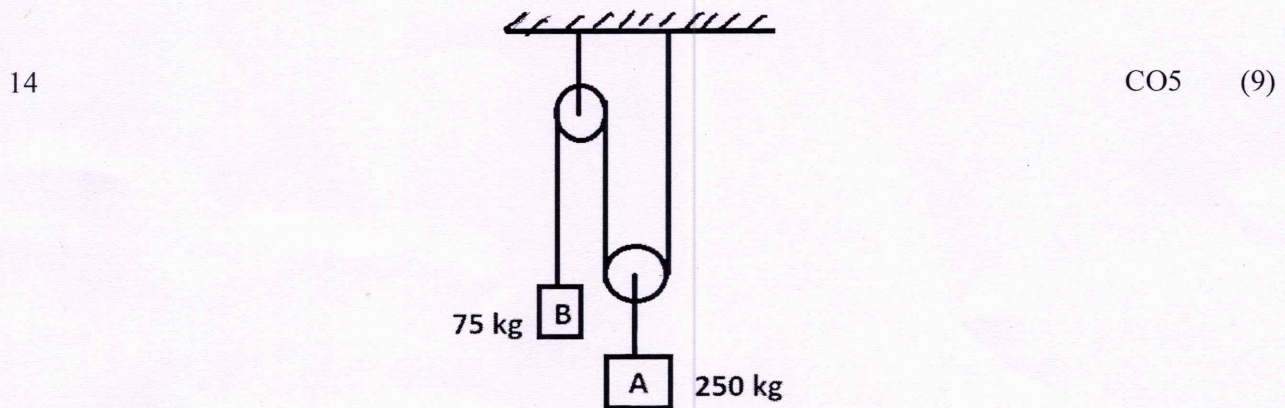


CO4 (9)

Module -3

- 13 A point is moving in a straight line with an acceleration given by $a = 20t - 30$. It passes through a reference point at $t = 0$ and another point 20 m away after an interval of 4 seconds. Calculate the displacement, velocity and acceleration of the point after a further interval of 4 seconds. CO5 (9)

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.



Module -4

- 15 A helical spring under a weight of 30 N extends by 0.5 mm. A weight of 1000 N is supported on the same spring. Determine the period and frequency of vibration of the spring when they are displaced vertically by a distance of 1.2 cm and released. Find the velocity of the weight and when the weight is 5 mm below its equilibrium position. Take the weight of spring as negligible. CO5 (9)
- 16 A body moving with SHM has amplitude of 1.5m and period of oscillation of 3 seconds. Find the velocity and acceleration of the body at $t = 0.5$ second, when time is measure from (i) the mean position and (ii) the extreme position CO5 (9)
