Reg No.:_

Name:

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

First Semester B.Tech Degree Regular Examination December 2024 (2024 Scheme) THURUT

Course Code: GCEST103

Course Name: ENGINEERING MECHANICS

Max. Marks: 60

Duration: 2 hours 30 minutes

110

Pages: 4

PART A

	(Answer all questions. Each question carries 3 marks)	со	Marks
1	Define force system. List of different systems of forces.	CO2	(3)
2	A force of magnitude 44N acts through the point A (4, -1,7) in the direction	CO1	(3)
	of vector 9i+6j-2k. Find the moment of the force about the point		
	B (1, -3,2)?		
3	State coulomb's law of friction	CO4	(3)
4	State parallel axis theorem and perpendicular axis theorem.	CO4	(3)
5	A body is moving with a velocity of 20m/s. after 10 seconds the velocity of	CO4	(3)
	the body becomes 50m/s. find the acceleration of the body and the distance	CO5	
	traveled while accelerating.		
6*	A lift has an acceleration of 1.5m/s2 downwards. What force will a man	CO3	(3)
	weighing 1050N exert on the floor of the lift?	CO4	
		CO5	
7	A bullet is fired with a velocity of 250m/s at an angle of 60° . Determine the	CO4	(3)
4	horizontal range and time of flight.	COS	
8	A grinding wheel is attached to the shaft of an electric motor of rated speed	CO4	(3)
	of 1500rpm. When the power is switched on the unit attains the rated speed	CO5	
	in 5 seconds. Determine the number of revolutions required to attain the		
	rated speed.		

PART B

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

Module -1

9

a) Two spheres of weight 2000N and 2500N and radius 50cm and 80cm rest CO2 (9) in a horizontal channel of width 250cm as shown in figure. Find the CO3 reactions on the point of contact A, B and C?



a) A beam AB 20m long is hinged at A and simply supported over a smooth CO2 (9) surface inclined at 30⁰ to the horizontal at B. The beam is loaded as shown CO3 on figure. Determine the reaction at supports A and B CO4



Module -2

11

12

a) A steel ladder of 10 m length and weighing 800 N is placed against a CO2 (9) vertical wall in a construction site. The ladder is inclined 30⁰ to the vertical. CO3
A mazdoor weighing 75 kg is carrying brick of weight 50 kg on his head is CO4
climbing the ladder. At what position will he induce slipping? (g = 10m/s²)



C

the original point. Determine the width of the material, shown shaded at the left to be added to achieve this.



Module -3

13

a) Two blocks are joined by an inextensible string as shown in figure. The CO3 (9) block resting in the horizontal surface is placed 10m away from the edge. If CO4 the system is released from rest, determine the velocity of block after it has cO5 moved 4 m, also find the time at which the horizontal block reaches the edge of the surface? Assume the coefficient of friction between the block and the plane is 0.2. The pulley is weightless and frictionless.



14

a) On a straight road car A passes Car B with a uniform velocity of 25m/s. CO4 (5) after 10 seconds car B chases car A with a uniform acceleration of 2.5m/s². CO5 Find the time needed by car B to catch up to car A?

b) A stone, dropped into a well, is heard to strike the water after 3 seconds. CO4 (4)
Find the depth of the well, if the velocity of the sound is 340m/s? CO5

E.

Module -4

	a)	A particle is projected with a given velocity u at an angle of elevation α	CO4	(9)
		from the origin. It passes through two points (18,8) and (42,10). Find the	CO5	
	in the second	greatest height reached by the particle and its range?		
	a)	A flywheel weighing 900N and having radius of gyration 1.3m loses its	CO4	(5)
		speed from 500 rpm to 200 rpm in 150 seconds. Calculate the retarding	CO5	
		torque acting on it		
ł	b)	A fly wheel has an angular acceleration of 200 rad/sec an it accelerate to	CO4	(4)
		600 rad/sec in 8 seconds. calculate the angular acceleration.	CO5	

16

15

E.