Course Code: 23CE2T01

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

I - B. Tech II-Semester Supplementary Examinations (BR23), Sep/Oct - 2024

ENGINEERING MECHANICS (CIVIL)

Time: 3 hours Max. Marks: 70

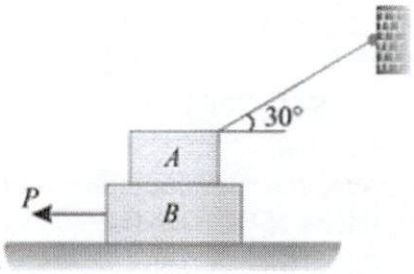
Question Paper consists of Part-A and Part-B
*Answer **ALL** the question in **Part-A and Part-B***

PART–A (10X2 = 20M)

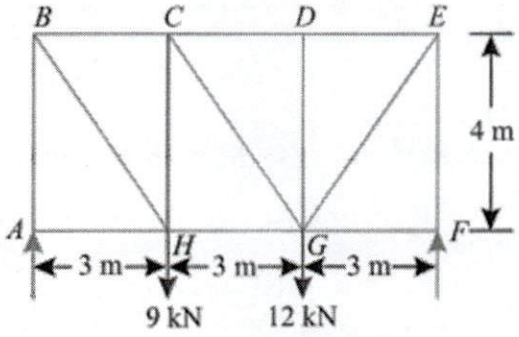
		Marks	CO	BL
1. a)	Explain Parallelogram law of forces?	(2M)	CO1	B2
b)	State the laws of dry friction?	(2M)	CO1	B1
c)	what is a coplanar force?	(2M)	CO2	B1
d)	write the conditions of equilibrium of a system of parallel forces acting in a plane?	(2M)	CO2	B1
e)	State parallel axis theorem with simple sketch?	(2M)	CO3	B2
f)	Define radius of gyration with respect to x-axis of an area?	(2M)	CO3	B1
g)	A train running at 80 kmph is brought to a standing half after 50 seconds.Find the retardation and distance travelled by the train before it comes to a halt?	(2M)	CO4	B5
h)	A stone is dropped from the top of a tower.It strikes the ground after 4 seconds.Find the height of the tower?	(2M)	CO4	B5
i)	what do you mean by impact of elastic bodies?	(2M)	CO5	B1
j)	Explain the difference between kinematics and kinetics?	(2M)	CO5	B2

PART–B (5X10 = 50M)

2.a)	A horizontal line PQRS is 12 m long, where PQ = QR = RS = 4 m. Forces of 1000 N, 1500 N, 1000 N and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of 90°, 60°, 45° and 30° respectively with PS. Find the magnitude, direction and position of the resultant force.	10(M)	CO1	B3
	(OR)			
b)	Two blocks A and B of weights 1 kN and 2 kN respectively are in equilibrium position as shown in Fig. 8.4.If the coefficient of friction between the two blocks as well as the block B and the floor is 0.3, find the force (P) required to move the block B.	10(M)	CO1	B2



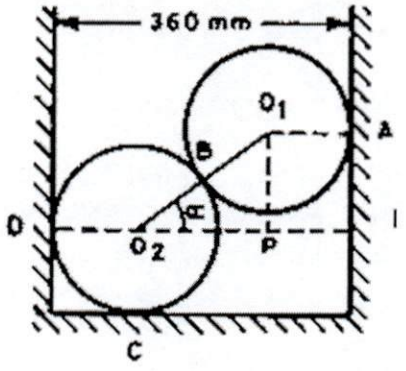
3.a) A 9 m span truss is loaded as shown in Figure.Find the Forces in the truss.



10(M) CO2 B4

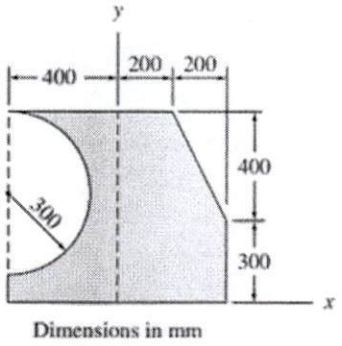
(OR)

b) Two smooth spheres each of radius 100 mm and weight 100 N, rest in a horizontal channel having vertical walls, the distance between which is 360 mm.Find the reactions at the points of contacts A,B,C and D shown in the below figure.



10(M) CO2 B3

4.a) Determine the location of the centroid of the shaded area shown in Figure.



Dimensions in mm

10(M) CO3 B2

(OR)

b) Find the moment of inertia of T-section with flange as 150 mm x 50 mm and web as 150 mm x 50 mm about X-X and Y-Y axes through the centre of gravity of the section. 10(M) CO3 B2

5.a) An elevator of gross mass 500 kg starts moving upwards with a constant acceleration, and acquires a velocity of 2 m/s, after travelling a distance of 3 m. Find the pull in the cables during the accelerated motion. If the elevator, when stopping moves with a constant deceleration from a constant velocity of 2 m/s and comes to rest in 2 s, calculate the force transmitted by a man of mass 75 kg the floor during stopping. 10(M) CO4 B3

(OR)

b) A body moves along a straight line and its acceleration (a) which varies with time (t) is given by $a = 2 - 3t$. After 5 seconds , from start of observations, its velocity is observed to be 20 m/s. After 10 seconds, from start of observation, the body was at 85 metres from the origin. 10(M) CO4 B3

Determine

(a) its acceleration and velocity at the time of start

(b) distance from the origin at the start of observations,

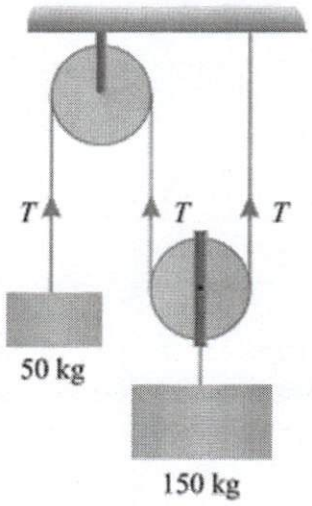
(c) the time after start of observation in which the velocity becomes zero.

6.a) Extract the impulse –momentum equation of a body in motion 10(M) CO5 B1

(OR)

b) Determine the tension in the strings and accelerations of two blocks of mass

150 kg and 50 kg connected by a string and a frictionless and weightless pulley as shown in Figure.



10(M) CO5 B2

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