



BUDDHA INSTITUTE OF TECHNOLOGY, GIDA, GORAKHPUR

DEPARTMENT OF _____

PRE AKTU EXAM (EVEN SEMESTER 2022-23)

July-2023

Course:

Semester:

Subject:

Subject Code:

Engineering
Mechanics

KME-452

M.M.

100

Time:

3:00 hrs

Roll No. _____

SECTION-A

1. Attempt all questions. Each questions carry equal marks.

Marks: 10*2=20

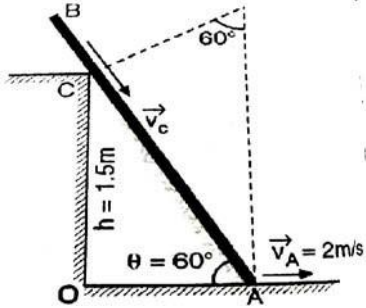
Q. No.	Question	Level of Taxonomy	Course Outcome
a.	State the principle of transmissibility of force.	L2	CO1
b.	What is the difference between collinear and concurrent forces?	L2	CO1
c.	List the assumptions used in the analysis of a truss.	L2	CO2
d.	Define point of contraflexure. In what type of beams this point occurs.	L2	CO2
e.	What is the importance of axis of symmetry in determination of centre of gravity of a body?	L2	CO3
f.	Explain the term radius of gyration.	L2	CO3
g.	Explain D'Alembert's principle.	L2	CO4
h.	Find the work done in pulling a weight 500 N through a distance of 5 m along a horizontal surface by a force of 200 N, whose line of action makes an angle of 30° with the horizontal.	L3	CO4
i.	Differentiate between resilience and toughness.	L2	CO5
j.	What do you understand by term pure bending?	L2	CO5

SECTION-B

2. Attempt ALL questions. Each questions carry equal marks.

Marks: 3*10= 30

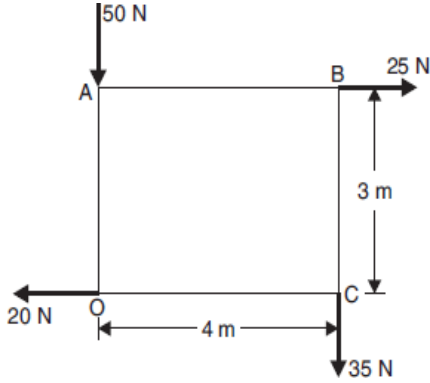
Q. No.	Question	Level of Taxonomy	Course Outcome
a.	Determine the mass moment of inertia of cone about its central axis. Take mass of cone as M and radius as R.	L3	CO3
OR			
a.	Determine the moment of inertia of the 'T' section with respect to centroidal X-X axis. Section as shown in figure. <p style="text-align: center;">100mm 10mm 70mm 10mm Figure.1</p>	L3	CO3

b.	<p>A long rod AB is supported at the upper edge of a wall of height 1.5 m and on a horizontal floor as shown in fig. 2. If the lower end of the rod moves with a velocity $V_A = 2 \text{ m/s}$ find the velocity of the contact point C of the rod and the angular velocity of the rod, when the rod is 60° to the horizontal.</p>  <p style="text-align: center;">Figure.2</p>	L3	CO4
or			
b.	<p>The equation of motion of a particle moving in a straight line is given by: $s = t + 2.5t^2 - 1.5t^3$, where s is the total, distance covered from the starting point in meters at the end of t seconds. Find the following:</p> <p>(i) the velocity and acceleration at start, (ii) the time, when the particle reaches its maximum velocity</p>	L3	CO4
c.	<p>What do you mean by 'simple bending' or 'pure bending'? What are the assumptions made in the theory of simple bending?</p>	L2	CO5

SECTION-C

3. Attempt ANY ONE questions. Each questions carry equal marks.

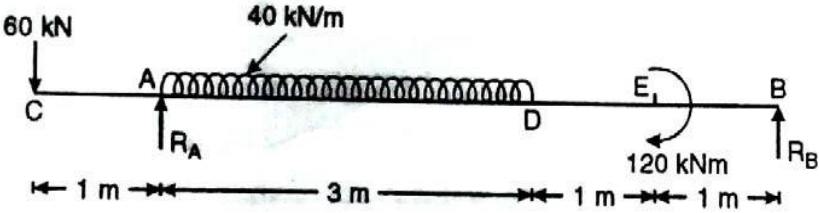
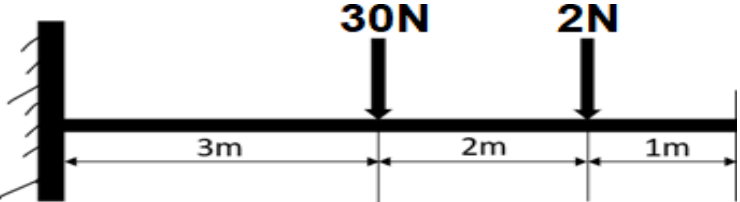
Marks: 1*10=10

Q. No.	Question	Level of Taxonomy	Course Outcome
a.	<p>A ladder 6 m long has a mass of 18 kg and its center of gravity is 2.4 m from the bottom. The ladder is placed against a vertical wall so that it makes an angle of 60° with the ground. How far up the ladder can a 72-kg man climb before the ladder is on the verge of slipping? The angle of friction at all contact surfaces is 15°.</p>	L2	CO1
b.	<p>Determine the magnitude, direction, and position of a single force P, which keeps in equilibrium the system of forces acting on the corners of a rectangular block as shown in Fig. The position of force P may be stated by reference to axes with origin O and coinciding with the edges of the block</p>  <p style="text-align: center;">Figure.3</p>	L2	CO1

4. Attempt ANY ONE questions. Each questions carry equal marks.

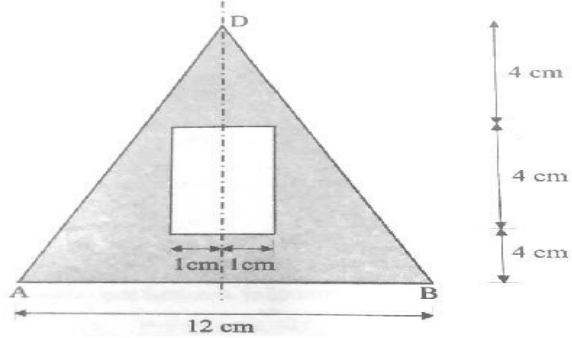
Marks: 1*10=10

Q. No.	Question	Level of Taxonomy	Course Outcome
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a.	<p>Draw the SFD and BMD for the beam shown in fig.</p>  <p style="text-align: center;">Figure.4</p>	L3	CO2
b.	<p>Draw the shear force & bending moment diagram for a loaded beam as shown in figure.</p>  <p style="text-align: center;">Figure.5</p>	L3	CO2

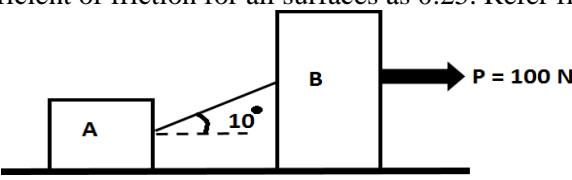
5. Attempt ANY ONE questions. Each questions carry equal marks.

Marks: 1*10=10

Q. No.	Question	Level of Taxonomy	Course Outcome
a.	<p>Find the moment of inertia of shaded area shown in fig. 7 about centroidal x-axis and also about axis AB.</p>  <p style="text-align: center;">Figure.6</p>	L3	CO3
b.	<p>Derive an expression for mass moment of inertia about axis of symmetry for a right solid circular cylinder.</p>	L3	CO3

6. Attempt ANY ONE questions. Each questions carry equal marks.

Marks: 1*10=10

Q. No.	Question	Level of Taxonomy	Course Outcome
a.	<p>Two bodies A and B of masses 5 kg and 20 kg are connected by an inclined string. A horizontal force P of 100 N is applied to block B. Calculate the tension in the string and acceleration of the system. Take coefficient of friction for all surfaces as 0.25. Refer figure.</p>  <p style="text-align: center;">Figure.7</p>	L3	CO4
b.	<p>Two blocks weighing 100 N and 40 N are supported at the ends of a rope of negligible weight which is passing over the rough surface of a pulley mounted on a horizontal axle. The pulley may be assumed as a solid disc with a weight of 50 N. Friction in the bearings of the pulley</p>	L3	CO4

	may be neglected. Find the tension on the two parts of the two rope and the linear acceleration of the blocks.		
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7. Attempt ANY ONE questions. Each questions carry equal marks.

Marks: 1*10=10

Q. No.	Question	Level of Taxonomy	Course Outcome
a.	Derive the pure torsion equation where symbols has usual meaning $\frac{T}{J} = \frac{\tau}{R} = \frac{G\theta}{L}$	L3	CO5
b.	A solid shaft of 150 mm diameter is used to transmit torque. Find the maximum torque transmitted by the shaft if the maximum shear stress inducedto the shaft is 45 N/mm ² .	L3	CO5