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BTECH
(SEM III) THEORY EXAMINATION 2023-24
ENGINEERING MECHANICS

TIME: 3HRS

M.MARKS: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

2 x 10 = 20

Qno.	Question
a.	Explain with the help of neat diagram, the concept of limiting friction.
b.	Explain coplanar and concurrent force system.
c.	State name of the methods used to analyze the truss.
d.	What is point of contraflexure in beam?
e.	Differentiate between Centroid and Centre of Gravity.
f.	Explain mathematically the perpendicular axis theorem
g.	Explain Impulse-Momentum equation.
h.	Explain D'Alembert's principle.
i.	Describe strain energy.
j.	Write the assumptions made during analysis of beam under simple bending.

SECTION B

2. Attempt any *three* of the following:

10x3=30

a.	The greatest and least resultants of two forces acting on a body are 35 kN and 5 kN respectively. Determine the magnitude of the forces. What would be the angle between these forces if the magnitude of the resultant is stated to be 25 kN?
b.	Draw SFD and BMD of the 10 m long beam subjected to 20kN/m UDL for 5 m from its left end.
c.	Derive the relation of MOI of circular ring.
d.	A block of 4 kg mass slides from the rest at an inclined plane having angle of inclination 30° with the horizontal. What will be the speed of the block when it travels 2.5 m along the inclined plane? Obtain your solution by the principle of Work-energy or by the principle of conservation of energy.
e.	Derive pure bending equation.

SECTION C

3. Attempt any *one* part of the following:

10x1=10

a.	<p>The beam is hinged at P. The weight of the beam is 425 N. Calculate the tension in the string</p>
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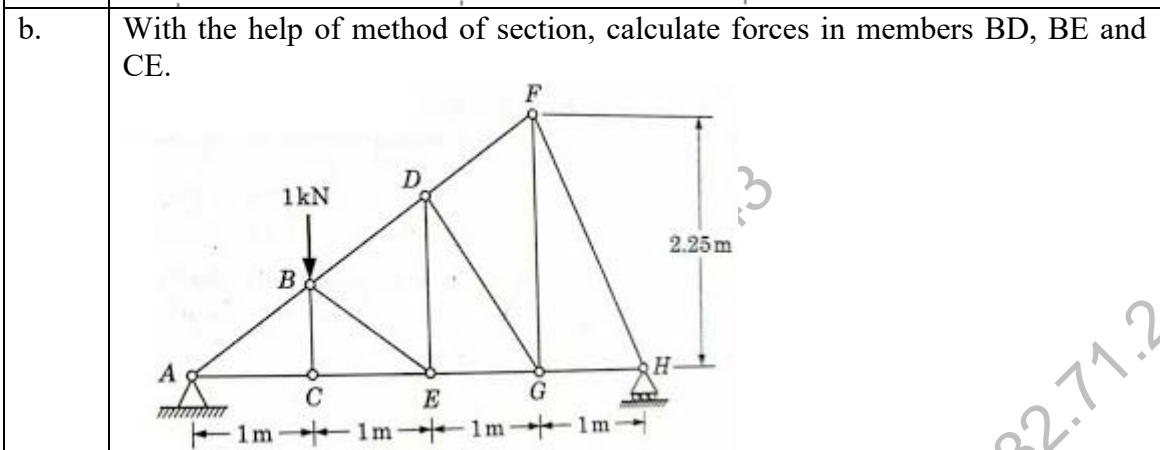
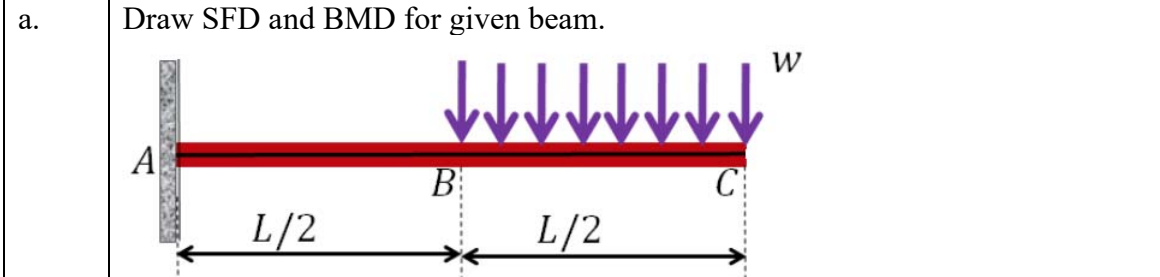
BTECH (SEM III) THEORY EXAMINATION 2023-24 ENGINEERING MECHANICS

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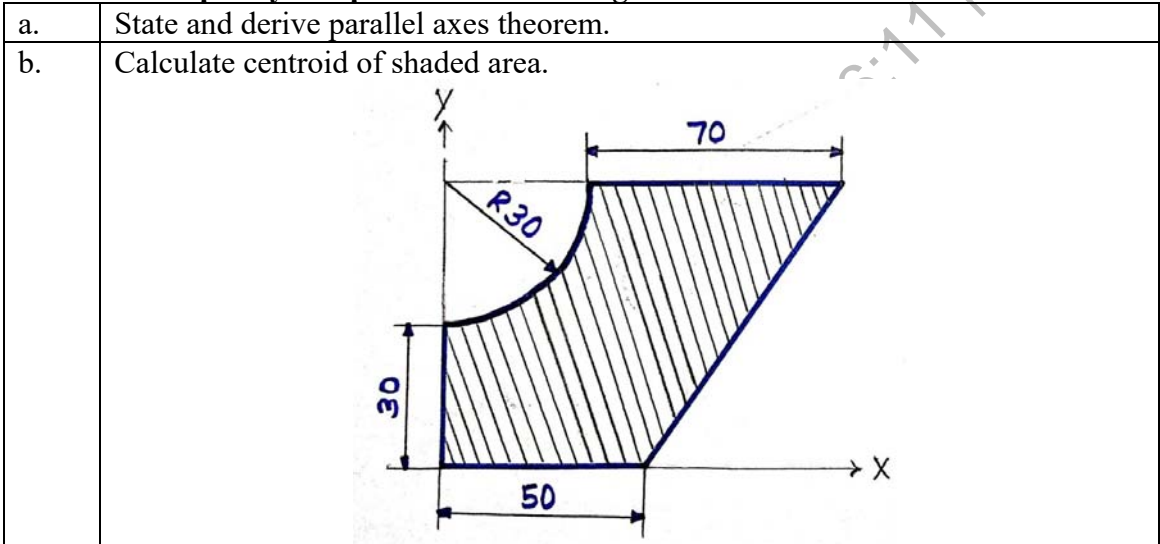
M.MARKS: 100

b. State and prove Varignon's theorem.

4. Attempt any one part of the following: 10x1=10



5. Attempt any one part of the following: 10x1=10



6. Attempt any one part of the following: 10x1=10

- a. Write short notes on:
 1. Kinematics and Kinetics
 2. Velocity-time graph
 3. Distance-time graph
- b. A roller of motorized mortar mixer rotates for 5 seconds with a uniform angular



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	acceleration and describes 120 radians during this time. It then rotates with constant angular velocity and covers 100 radians during next 5 seconds. Make calculations for the initial angular velocity and angular acceleration.
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7. Attempt any *one* part of the following:

10x1=10

a.	Derive Torsion equation. Also state the assumptions made during analysis.
b.	The MOI of a beam section 50 cm deep is 69490 cm^4 . Find the longest span over which a beam of this section, when simply supported, could carry a uniformly distributed load of 50 kN/m. The maximum flange stress in the material is not to exceed 110 N/mm^2 .

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