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Code No. : 11102 S

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. I-Semester Supplementary Examinations, September-2022

Basic Engineering Mechanics

(Common to Civil, CSE, AIML, EEE, ECE & Mech.)

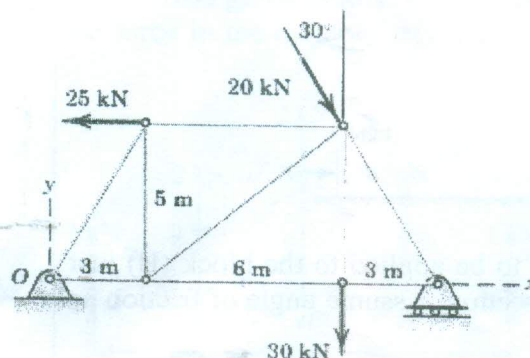
Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

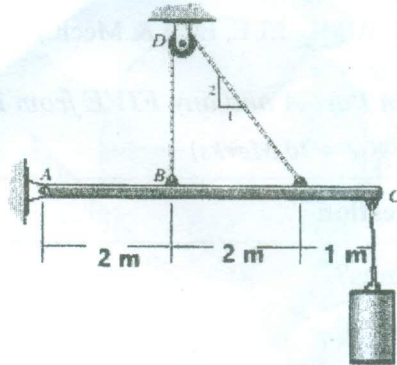
Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	What is force multiplier? What are its units?	2	1	1	1
2.	State Principle of Moments	2	1	1	1
3.	What are the conditions of equilibrium for spatial non-concurrent force system?	2	1	2	1
4.	State Lami's theorem	2	1	2	1
5.	State the assumptions in the analysis of trusses	2	1	3	1
6.	What is the main advantage of method of sections over the method of joints?	2	1	3	1
7.	Define angle of friction	2	1	4	1
8.	What are the applications of wedges?	2	1	4	1
9.	Differentiate the terms Centroid and Centre of gravity	2	2	5	1
10.	State Parallel axis theorem	2	2	5	1
Part-B (5 × 8 = 40 Marks)					
11. a)	Define couple	2	2	1	1
b)	Determine the resultant R of the three forces acting on the simple truss shown below. Specify the points on the x - and y -axes through which R must pass.	6	2	1	2



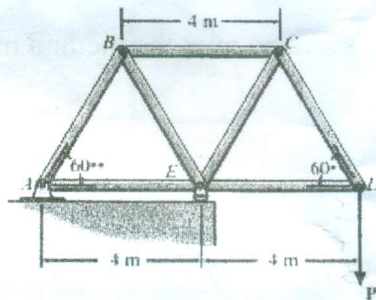
12. Weightless bar AC is supported as shown below. If the weight suspended at C=1000 N, find the reactive forces at A and the tension in the cable. (Assume the pulley to be frictionless)

8 4 2 2



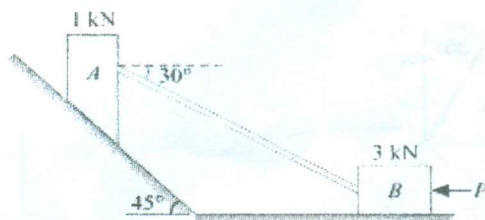
13. Determine the forces in members BC, BE and CE of the truss shown below. $P = 8$ kN. (Roller support at E and hinged support at A)

8 2 3 2



14. A block (A) weighing 1 kN rests on a rough inclined plane whose inclination to the horizontal is 45° . This block is connected to another block (B) weighing 3 kN rests on a rough horizontal plane by a weightless rigid bar (hinged at both the ends) inclined at an angle of 30° to the horizontal as shown in Fig.

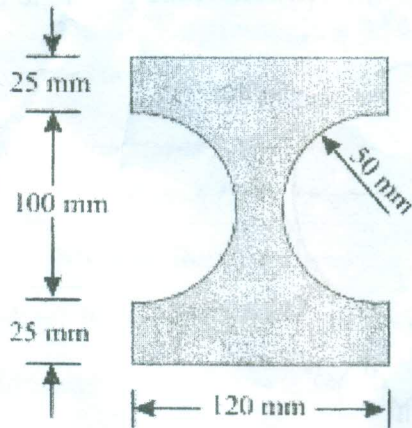
8 2 3 2



Find horizontal force (P) required to be applied to the block (B) just to move the block A in upward direction. Assume angle of friction as 15° at all contact surfaces.

15. Determine the Area Moment of Inertia of the section shown below about its horizontal and vertical centroidal axes

8 3 4 2

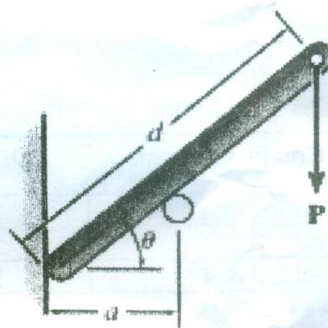


16. a) A force $P = 1000\text{ N}$ force is directed from point $A(3, -5, 8)$ to $B(6, 2, 4)$. Another force $Q = 800\text{ N}$ is directed from $A(3, -5, 8)$ to $C(4, -2, 10)$. Find the magnitude of their Resultant.

4 2 1 2

b) With reference to the figure given below, if $d=1\text{m}$, and $\theta = 30^\circ$, determine the normal reaction at both the smooth supports and the required distance a for the placement of the roller if $P = 600\text{N}$. Neglect the weight of the bar.

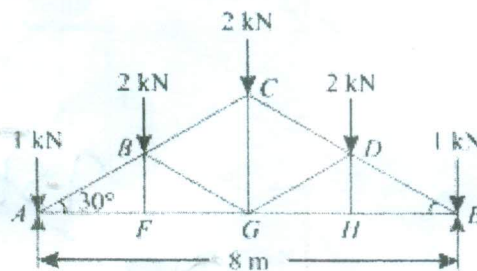
4 2 2 2



17. Answer any *two* of the following:

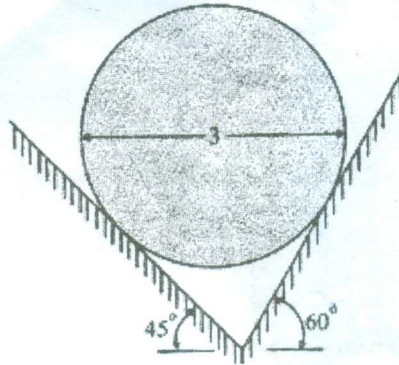
a) With reference to THE truss given below, identify the members with **zero** force. Find the force in the member BG . ($AF=FG=GH=HE$ and $AB=BC=CD=DE$)

4 2 3 2



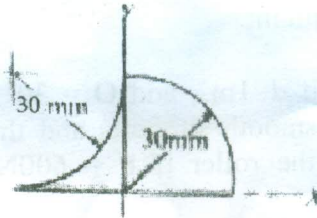
- b) A homogeneous cylinder 3 m diameter and weighing 500 N is resting on two inclined planes as shown below. Find the couple required to be applied to cylinder to start it rotating clockwise. Take the angle of friction at all contact surfaces to be 15° .

4 2 4 2



- c) Locate the centroid of the shaded area shown in the figure given below.

4 3 5 2



M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	30%
iii)	Blooms Taxonomy Level - 3 & 4	50%

1st Sem All