

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examination (September, 2025)

COURSE NAME: B. Tech

SEMESTER: 1st

Section: A, B, C, D, E, F, G & H

SUBJECT NAME: Engineering Mechanics

FULL MARKS: 30

TIME: 90 Minutes

Answer All Questions.

The figures in the right hand margin indicate Marks. Symbols carry usual meaning.

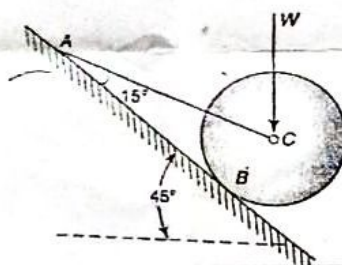
Answer all Questions.

[2 × 3]

- a) What do you mean by free body diagram? With neat sketch show the FBD of
 (i) Roller support (ii) Hinged support (iii) Fixed support.
- b) Explain the principle of transmissibility
- c) What is statically indeterminate problem? Explain.

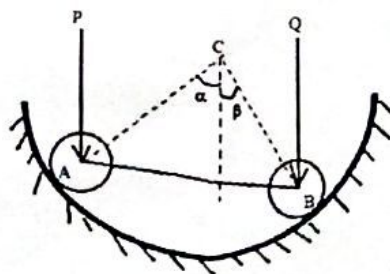
[8]

A roller of weight $W = 5 \text{ kN}$ rests on a smooth inclined plane and is kept from rolling down by a string as shown in Figure. Find the tension S in the string and the reaction at B at the point of contact.

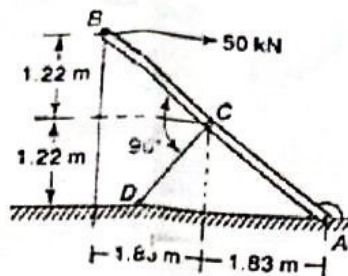


OR

Two roller of weights " P " = 750 N and " Q " = 1250 N are connected by a rigid bar at its ends & supported inside a circular ring in a vertical plane as shown in figure. The length of the bar " AB " is such that radii " AC " and " BC " form right-angle at center of the circular ring " C ". Neglecting friction and weight of the bar, find the compressive force in the bar " AB " and reaction at A and B.



- (i) A weightless bar AB is supported in a vertical plane by a hinge at A and a tie bar DC as shown in Figure. Determine the axial force S induced in the tie bar due the load ($=50 \text{ kN}$) applied at B.



[8]

[6]

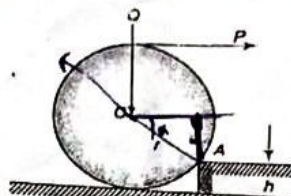
- (ii) What is couple? And explain the moment of couple.

[2]

OR

- (i) A roller of radius $r = 300 \text{ mm}$ and weight $Q = 2 \text{ kN}$ is to be pulled over a curb of height $h = 150 \text{ mm}$ by a horizontal force P applied to the end of a string wound around the circumference of the roller. Find the magnitude of P required to start the roller over the curb.

[6]

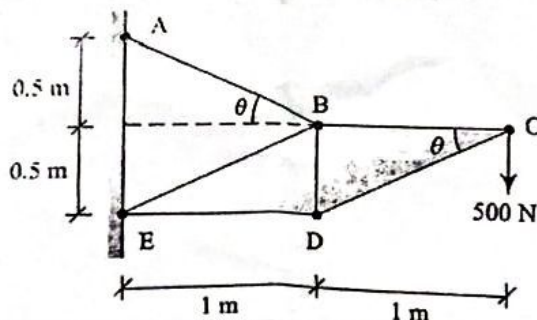


- (ii) Explain Varignon's theorem

[2]

- Determine the axial forces in each member of truss, as shown in the figure.

[8]



OR

- Using the method of sections, find the axial force in each of the bars of the plane truss in the figure.

[8]

