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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. I Year I-Semester (Supplementary) Examinations, May/June-2016

Engineering Mechanics-I

Time: 3 hours

Max. Marks: 50

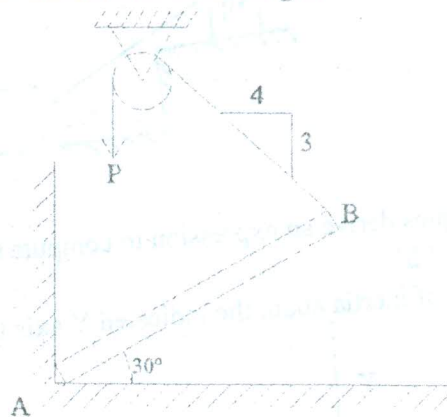
Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (15 Marks)

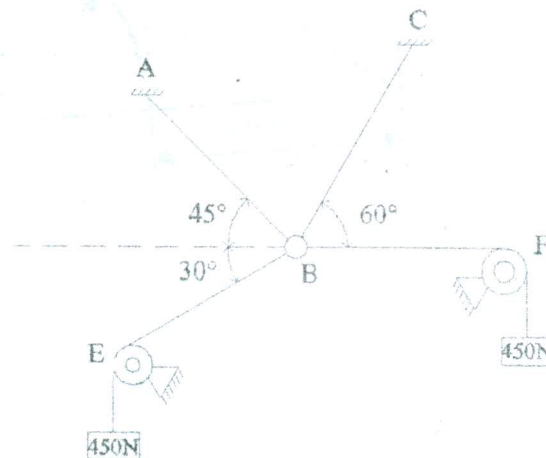
1. Define resultant of force. [1]
2. Explain about fixed support. [1]
3. Define coefficient of friction. [1]
4. Define polar moment of Inertia. [1]
5. Describe about a perfect frame. [1]
6. Compute magnitude of the resultant of two forces 6N and 5N acting at a point, the angle between forces is 25° . [2]
7. Explain equilibrium of spacial force system. [2]
8. Enumerate the assumptions made in computing the force in a trusses. [2]
9. List the laws of friction. [2]
10. State and prove parallel axis theorem. [2]

Part-B (5 X 7=35 Marks)

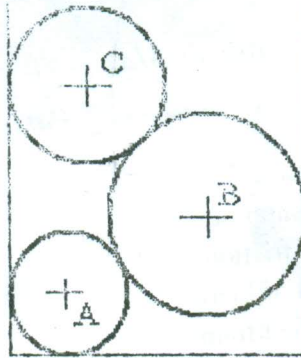
11. a) A homogeneous 6mts steel column to be erected at a construction site is lifted up. Determine the force 'P' required to hold the column under equilibrium in the position. Also, determine the reaction at A. The mass of the column is 28.5 Kg/m. [3]



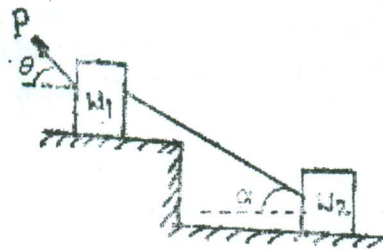
- b) Find the tensile force in cables AB & CB. The remaining cables ride over frictionless pulleys E & F. [4]



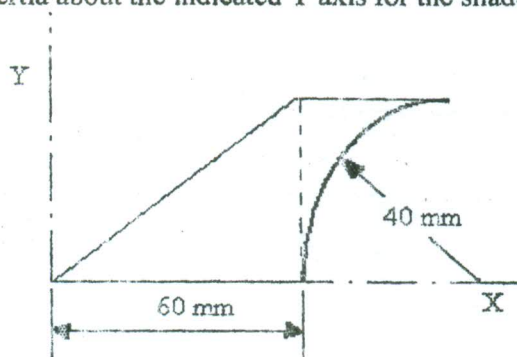
12. a) Explain free body diagram with suitable examples. [3]
 b) Three Cylinders are piled in a rectangular ditch of width 0.18 m as shown in Fig. Neglecting friction, determine the reaction between cylinder A and the Vertical Wall. Take $W_A = 150\text{ N}$, $W_B = 400\text{ N}$, $W_C = 200\text{ N}$, $R_A = 40\text{ mm}$, $R_B = 60\text{ mm}$, $R_C = 50\text{ mm}$ [4]



13. a) Derive the expression for the belt friction. [3]
 b) Two blocks having weights W_1 and W_2 are connected by a string and rest on horizontal planes as shown in figure. If the angle of friction for each block is ϕ , find the magnitude and direction of the least force 'P' applied to the upper block that will induce sliding. Take $W_1 = 200\text{ N}$, $W_2 = 300\text{ N}$, $\alpha = 30^\circ$ and $\phi = 15^\circ$. [4]

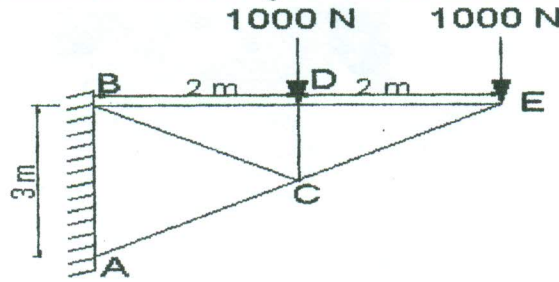


14. a) From first principles derive an expression to compute the centroid of a triangle about its base of 'b' and height 'h' [3]
 b) Find the moment of inertia about the indicated Y axis for the shaded area as shown in the fig. [4]



15. a) List the advantage of method of section over method of joints. How will you use method of section in finding forces in the members of a truss? [3]

b) A cantilever truss is loaded as shown in figure. Find the member forces. [4]

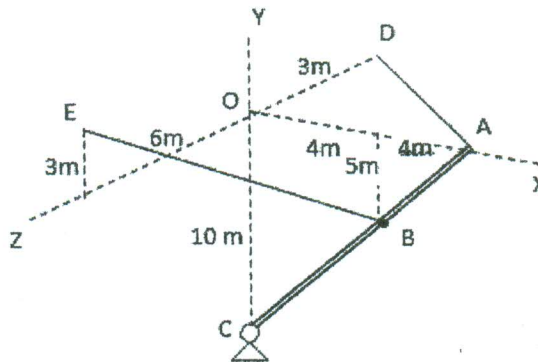


16. a) Explain various force systems. [3]

b) In the figure, a boom AC is supported by a ball and socket joint at C and by the cables BE and AD. If the force multiplier of force F acting from B to E is $F_m = 10 \text{ N/m}$.

(i) Find the moment of F about the point C.

(ii) Find the component of F that is perpendicular to the plane DAC. [4]



17. Write short notes on any two of the following: [7]

a) With a suitable diagram explain how the forces in trusses are determined using analytical methods.

b) Describe wedge friction with a suitable diagram of its applications.

c) Derive from first principle the expression to compute the centroid of an arc of semi-circle which is symmetric about y-axis and having radius R.
