U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October / November 2021 Supplementary Examinations

Programme: B.E. **Semester : I / II**
Branch : ALL **Duration: 3 hrs.**
Course Code: 18CV1ESENM / 18CV2ESENM **Max Marks: 100**
Course: ENGINEERING MECHANICS **Date: 02.11.2021**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) Explain the basic idealizations of mechanics **06**

b) Determine the resultant of the force system acting as shown in the figure 1 **06**

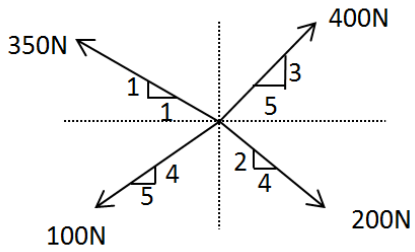

Figure 1

c) Determine the resultant of the force system acting on the plate shown in Figure2 with respect to point A. **08**

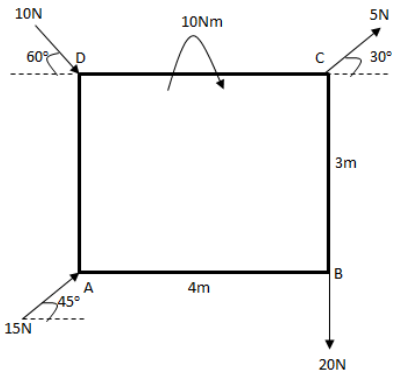

Figure 2

OR

2 a) State and prove Varignon's theorem. **05**

b) Determine the reactions at contact points A, B, C and D as shown in Figure3. Assume all contact surfaces smooth. **08**

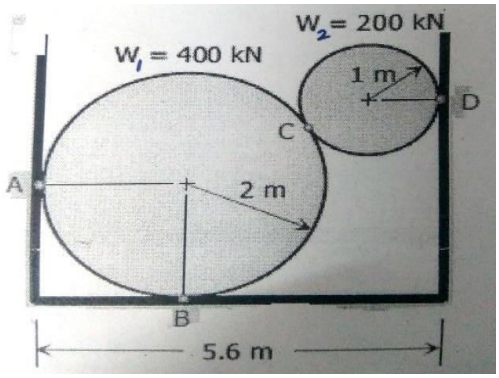

Figure 3

c) A load of 2000N is supported by a jib crane fastened to a vertical wall as shown in the Figure 4. The crane consists of 1m long steel cable AB and 0.8m long hollow tube AC. The cable and tube are attached to wall by 1.5m apart. Find the forces in cable and the tube. **07**

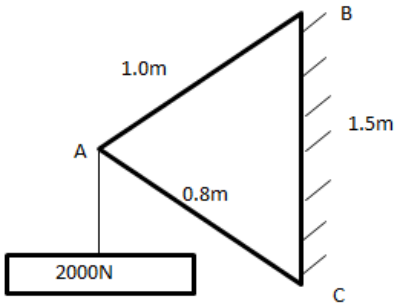

Figure 4

UNIT - II

3 a) Explain different types of supports. **04**

b) Determine the reactions at A and B of the overhanging beam shown in figure5. **06**

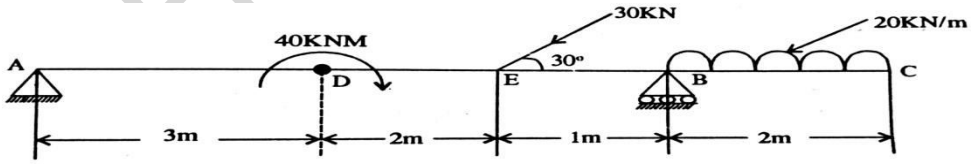

Figure 5

c) Analyze the Truss & determine the forces in all the members of the Truss shown in the Figure 6 **10**

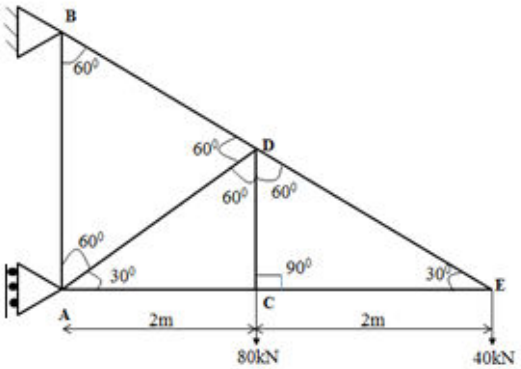

Figure 6

UNIT - III

4 a) State the laws of dry friction. **05**

b) A uniform ladder 4 m long weighs 200N. It is placed against a wall making an angle of 60^0 with the floor as shown in figure 7. The coefficient of friction between the wall and the ladder is 0.25 and that between the ground and the ladder is 0.35. The ladder in addition to its own weight, has to support a man of 1000N at the top at B. Calculate the horizontal force P to be applied to the ladder at the ground level to prevent slipping. **10**

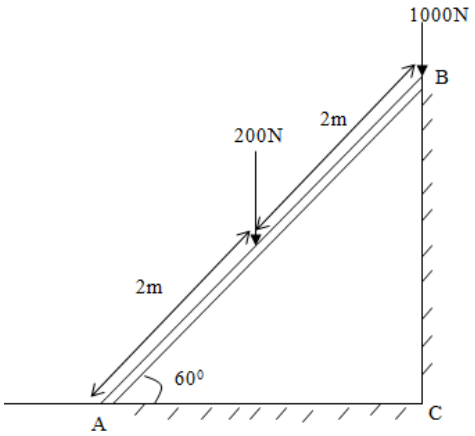

Figure 7

c) Determine the force P required to start the movement of the wedge as shown in figure 8. The angle of friction for all surface of contact is 15^0. Given $\theta=20^0$; $\phi=15^0$; W=20kN. Weight of the wedge is neglected **05**

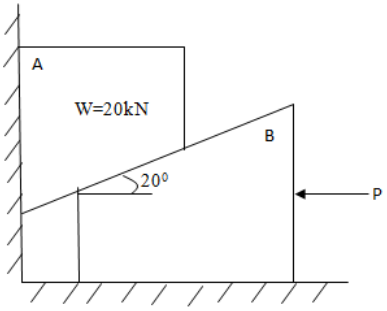

Figure 8

UNIT - IV

5 a) Explain Radius of Gyration and state the applications of the same. **04**

b) Locate of centroid of the shaded area shown in Figure 9. **06**

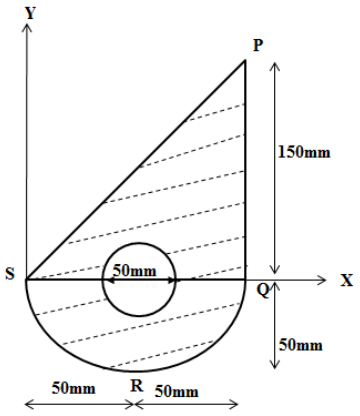

Figure 9

c) Determine the radius of gyration of the given I section shown in fig.10 about horizontal centroidal axis. **10**

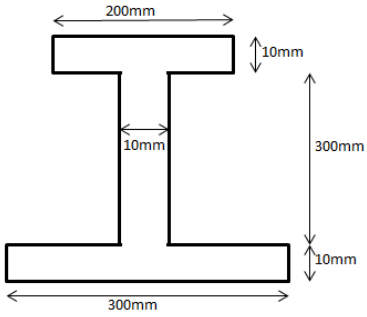

Figure 10

UNIT - V

6 a) Show that the path traced by a projectile is a parabolic **04**

b) A cricket ball is hit by a batsman at a height of 1.8m above the ground. The ball is caught by the fielder near the boundary at a height of 1m above the ground exactly after 5 seconds. If the ball is hit with a velocity of 90 Kmph, find the angle at which the ball is to be hit by the batsman. Find also the distance between the batsman and the fielder. **10**

c) A body weighing 10N is dropped from a position 600mm above the top of a spring whose stiffness is 0.5N/m. find the amount the spring will be compressed in bringing the body to rest. Solve by work energy principle. **06**

OR

7 a) Differentiate between Impulse and Momentum **04**

b) A car weighing 15kN goes round a flat curve of 50m radius. The distance between inner & outer wheel is 1.5m & the C.G is 0.75m above the road level. What is limiting speed of the car on this curve? Determine the normal reactions developed at the inner & outer wheels if the car moves with a speed of 40kmph. Take μ=0.40 **10**

c) A man weighing 500N stands on an elevator moving downwards. The elevator moves at first with an acceleration of 2m/sec^2, then with constant velocity and finally with retardation 2m/sec^2. Find the pressure on the elevator exerted by the man in three cases. Solve using D'Alembert's principle **06**

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