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Question Paper Code : 90283

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Second/Third Semester

Civil Engineering

GE 8292 : ENGINEERING MECHANICS

(Common to Aeronautical Engineering/Aerospace Engineering/Agriculture Engineering/Automobile Engineering/Environmental Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical Engineering/Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/Mechatronics Engineering/Petrochemical Engineering/Production Engineering/Robotics and Automation Engineering/ Petrochemical Technology/ Petroleum Engineering)
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. State Newton's first law of motion.
2. Find out the force system on which the following belong to :
 - i) Forces acting on a moving bus
 - ii) Forces on a rod resting against a wall
3. State the concept of equilibrium of connected bodies.



4. Find the moment of 100 N force acting at B about point A as shown in Fig 4.

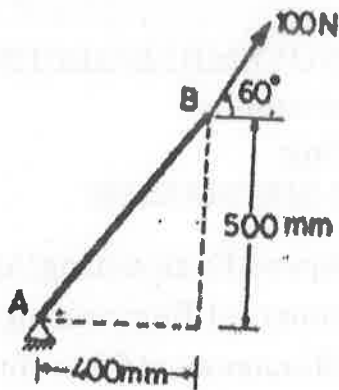


Fig. 4

5. What are principal axes ? What are principal axes of inertia of an area ?
6. When a lamina possesses axes of symmetry, what does it indicate ?
7. Indicate the concept involved the following games.
 - i) Billiards
 - ii) Boxing
8. Distinguish Power and Energy.
9. What is rolling resistance ?
10. How ladder friction varies from a wedge friction ?



PART – B

(5×13=65 Marks)

11. a) A roller of weight 10 kN rests on a smooth horizontal floor and is connected to the floor by the bar AC as shown in Fig. 11 (a). Determine the force in the bar AC and reaction from floor, if the roller is subjected to a horizontal force of 5 kN and an inclined force of 7 kN as shown in the figure.

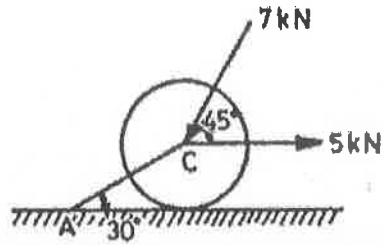


Fig. 11 (a)

(OR)

- b) A rope AB, 4.5 m long is connected at two points A and B at the same level 4m apart. A load of 1500 N is suspended from a point C on the rope 1.5 m from A as shown in Fig. 11 (b). What load connected at a point D on the rope, 1 m from B will be necessary to keep the position CD level ?

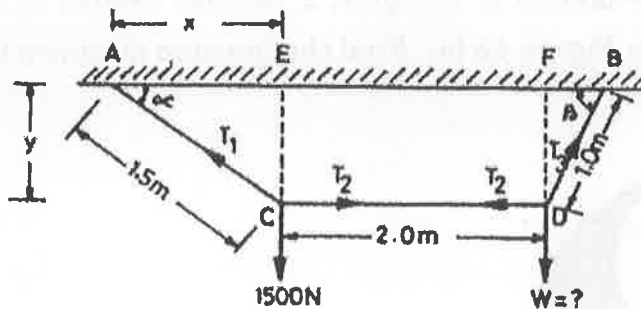


Fig. 11 (b)



12. a) The system of forces acting on a bell crank is shown in Fig. 12 (a). Determine the magnitude, direction and the point of application of the resultant.

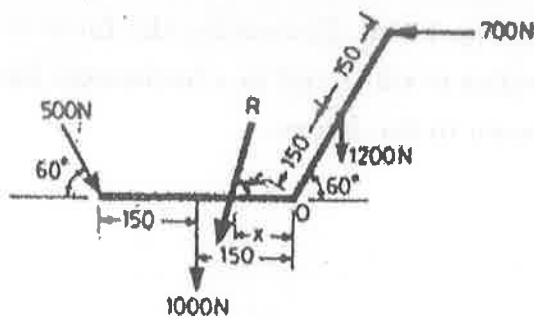


Fig. 12 (a)

(OR)

- b) Determine the reactions at A and B of the over-hanging beam shown in Fig. 12 (b).

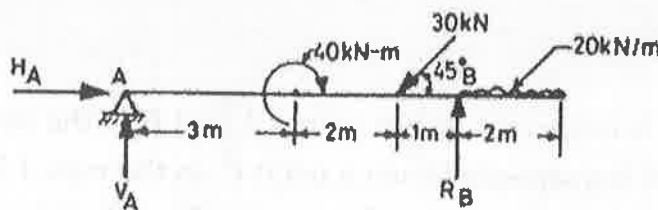


Fig. 12 (b)

13. a) From a semicircular lamina of radius r , a circular lamina of radius $(r/2)$ is removed as shown in Figure 13 (a). Find the position of centre of gravity of the remainder.

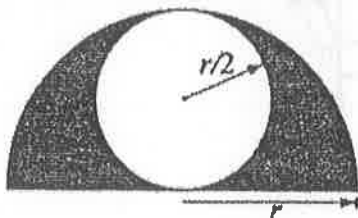


Fig. 13 (a)

(OR)



- b) Find the moment of inertia of a hollow rectangular plane shown in Figure 13 (b) about x-axis and y-axis through the centroid.

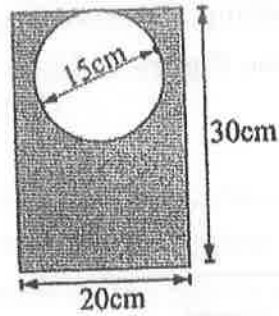


Fig. 13 (b)

14. a) An insect crawls at a constant speed u along the spoke of a bicycle wheel (Fig. 14 (a)), which is rotating with a constant angular velocity ω . Find the acceleration of insect in radial and perpendicular directions to the spoke.

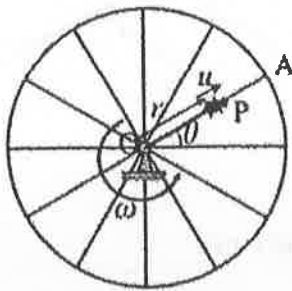


Fig. 14 (a)

(OR)

