

First/Second Semester B.E. Degree Examination, June/July 2016 Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

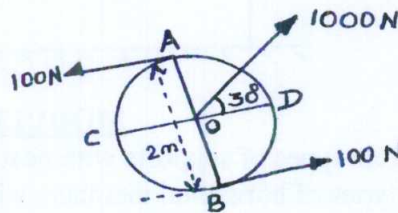
Max. Marks: 80

Note: Answer any FIVE full questions choosing ONE full question from each Module.

MODULE - 1

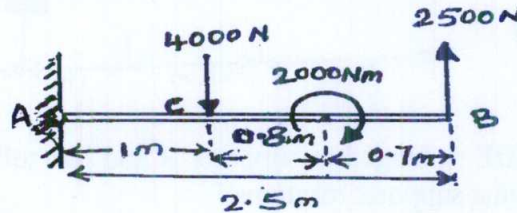
- 1 a. What is the role played by a Civil Engineer in the infrastructure development of a country? (08 Marks)
- b. Replace the force couple system by a single force with respect to AB and CD as shown in fig.1(b). (06 Marks)

Fig.Q1(b)



- c. Define Moment of a Force. (02 Marks)
- 2 a. What is the scope of (1) Environmental Engineering (2) Surveying? (06 Marks)
- b. Distinguish between Rigid pavement and Flexible pavement. (06 Marks)
- c. Fig.Q2(c) shows a cantilever beam with two forces and a couple i) Determine the resultant of a system ii) Determine an equivalent system through A. (04 Marks)

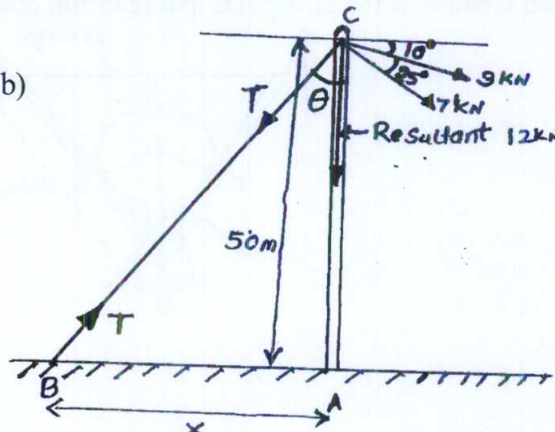
Fig.Q2(c)



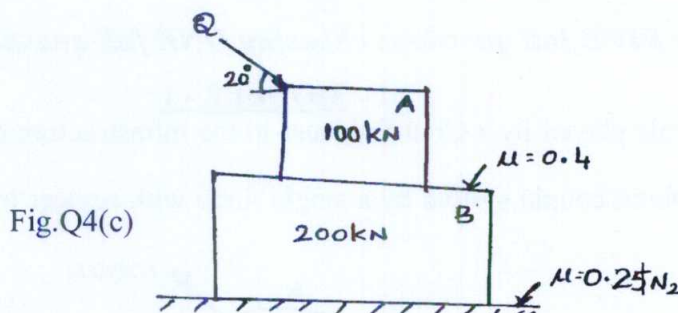
MODULE - 2

- 3 a. Define the following : i) Equilibrant ii) Resultant force iii) Angle of friction iv) Angle of Repose. (08 Marks)
- b. A vertical mast AC as shown in fig.Q3(b) supports two cables with tension 3kN and 7kN at the angles shown. BC is a guy wire to be situated at a distance X from the mast base. The resultant of the force system is limited to 2kN maximum and must acts vertically down the mast. Calculate the value of the distance X. (08 Marks)

Fig.Q3(b)

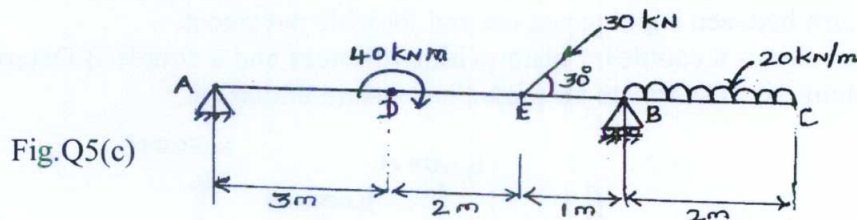


- 4 a. Explain different types of frictions. (04 Marks)
 b. State and prove Lami's theorem. (04 Marks)
 c. Figure Q4(c) shows two blocks along with values of μ . Determine the force Q to be applied for impending motion between A and B. Will this force cause movement between B and the ground? (08 Marks)

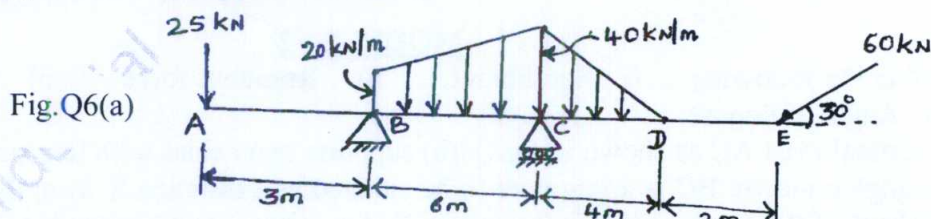


MODULE - 3

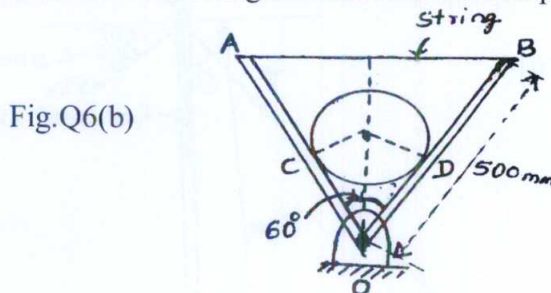
- 5 a. Mention the different types of supports with neat sketch. (04 Marks)
 b. Explain different types of horizontal members which generally placed on supports. (04 Marks)
 c. Determine the reactions at A and B of the overhanging beam as shown in fig. Q5(c). (08 Marks)



- 6 a. A beam ABCDE is hinged at supports B and has roller at C carries load as shown in fig. Q6(a). Determine supports reactions. (08 Marks)

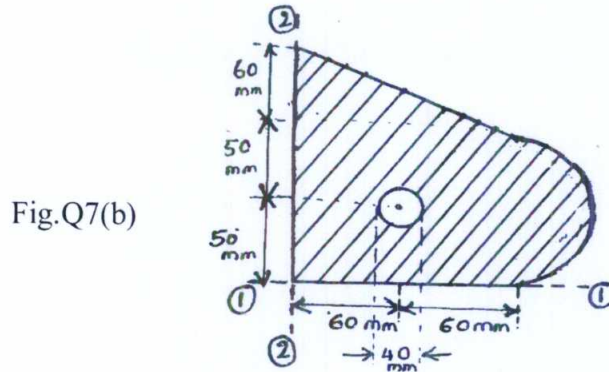


- b. A cylinder of radius 50mm and weighing 200N is kept in equilibrium position as shown in fig. Q6(b). Find tension in the string AB and reaction component at hinge O. (08 Marks)

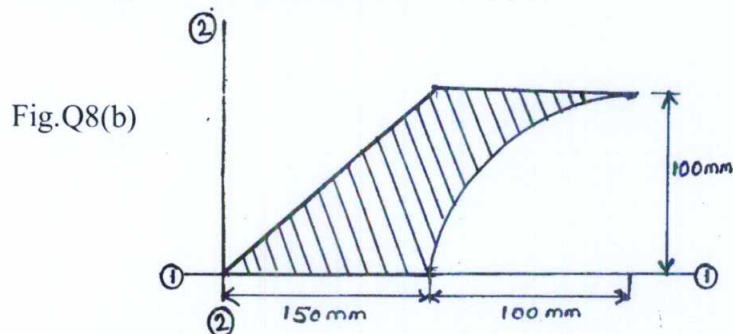


MODULE - 4

- 7 a. State and prove parallel axis theorem. (06 Marks)
 b. Determine the position of centroid of the lamina with circular cutout as shown in fig. Q7(b). (10 Marks)



- 8 a. Determine Centroid of a triangle by method of Integration. (06 Marks)
 b. Find the moment of Inertia of the region in fig. Q8(b) about horizontal axis ①-① and also find the radius of gyration about the same axis. (10 Marks)

**MODULE - 5**

- 9 a. Define the following : i) Kinematics ii) Kinetics iii) Motion iv) Path. (04 Marks)
 b. What is Super elevation and what is its necessity? (04 Marks)
 c. A projectile is projected from a point at an angle of elevation of 30° with a velocity of 600m/sec. Find the velocity and direction of motion of the particle at the end of
 i) 25 seconds ii) 40 seconds. (08 Marks)
- 10 a. Define the following : i) Uniform velocity ii) Rectilinear motion iii) Curvilinear motion iv) Projectile. (04 Marks)
 b. A particle falling under gravity falls 30 meters in a certain second. Find the time required to cover the next 30 meters. Take $g = 9.8\text{m/sec}^2$. (04 Marks)
 c. A vehicle carrying a vertical rocket launcher moves to the right at a constant velocity 35m/s along horizontal track. It launches a rocket vertically upwards with an initial velocity of 45m/s relative to the vehicle.
 i) How high will the rocket go up?
 ii) Where will the rocket land relative to the vehicle?
 iii) How far does the vehicle move while the rocket is in the air?
 iv) At what angle relative to the horizontal is the rocket travelling just when it leaves the vehicle as observed by an observer at rest on the ground? (08 Marks)
