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15CIV13

First Semester B.E. Degree Examination, Dec.2015/Jan.2016

Elements of Civil Engineering & 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. Briefly explain the scope of any four fields of civil engineering. (08 Marks)
- b. Draw typical cross section of road and explain its components. (08 Marks)

OR

- 2 a. Write short notes on: i) Shoulders ii) Kerbs iii) Traffic separators. (06 Marks)
- b. Resolve 300 N force acting on a block as shown in Fig. Q2 (b):
i) Into horizontal and vertical components.
ii) Along the inclined plane and right angles to the plane. (10 Marks)

Module-2

- 3 a. State and prove Lami's theorem. (06 Marks)
- b. Determine the resultant of forces which are acting as shown in the Fig. Q3 (b). (10 Marks)

OR

- 4 a. State and prove Parallelogram law of forces. (10 Marks)
- b. Explain with sketches : i) Cone of friction ii) Angle of repose. (06 Marks)

Module-3

- 5 a. State and prove Varignon's theorem. (06 Marks)
- b. Find the magnitude, direction and position of the resultant with respect to the point A for the force system shown in Fig. Q5 (b). (10 Marks)

OR

- 6 a. Explain the different types of supports in the analysis of beams. (06 Marks)
- b. Determine the support reaction at A and B for the beam shown in Fig. Q6 (b). (10 Marks)

Module-4

- 7 a. State and prove parallel axis theorem. (08 Marks)
- b. Determine Centroid of the area shown in Fig. Q7 (b). (08 Marks)

OR

- 8 a. Determine the moment of inertia and radii of gyration of the area shown in Fig. Q8 (a) about the base AB and centroidal axis parallel to AB. (08 Marks)
- b. Determine the moment of inertia of triangle of base width 'b' and height 'h' about the base. (08 Marks)

Module-5

- 9 a. Define : i) Displacement ii) Speed iii) Velocity iv) Acceleration. (06 Marks)
- b. A cricket ball thrown from a height of 1.8 m above ground level at an angle of 30° with the horizontal with velocity of 12 m/s and is caught by fielder at a height of 0.6 m above the ground. Determine the distance between the two players. (10 Marks)

OR

- 10 a. A stone is dropped into a well and a sound of splash is heard after 4 s. Find the depth of well. (08 Marks)
- b. Determine the position at which the ball is thrown up the plane will strike the inclined plane as shown in Fig. Q10 (b). The initial velocity is 30 m/s and angle of projection is $\tan^{-1}\left(\frac{4}{3}\right)$ with horizontal. (08 Marks)

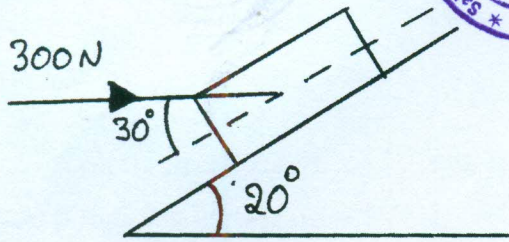


Fig. Q2 (b)

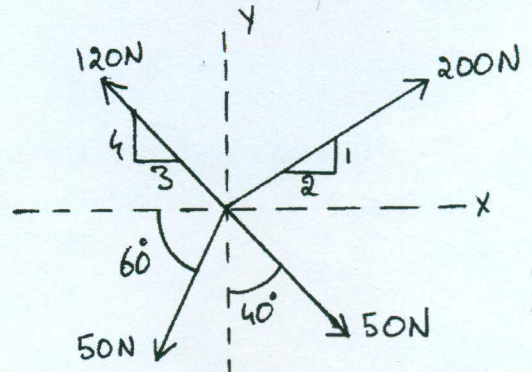


Fig. Q3 (b)

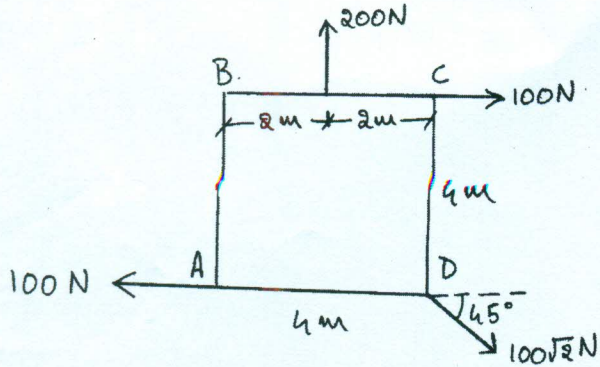


Fig. Q5 (b)

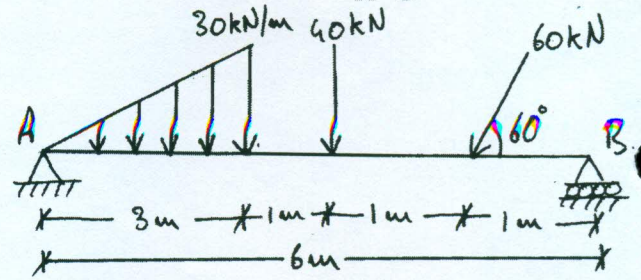


Fig. Q6 (b)

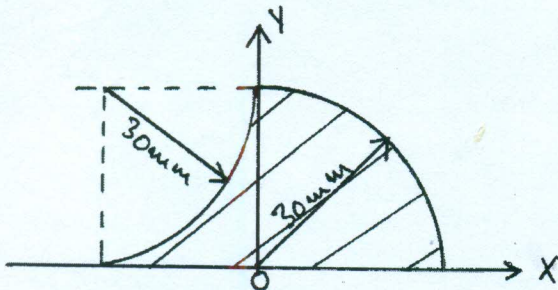


Fig. Q7 (b)

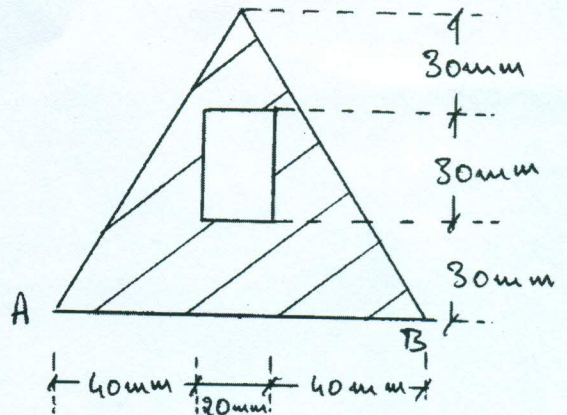


Fig. Q8 (a)

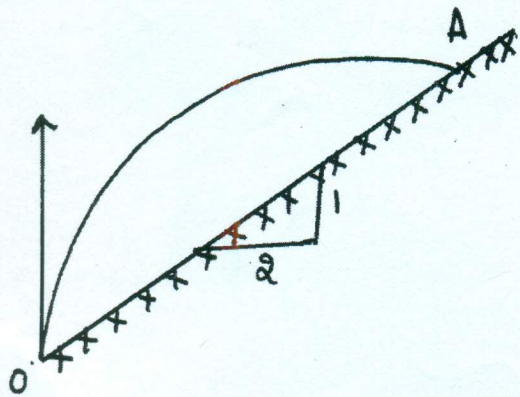


Fig. Q10 (b)
