

CBCS Scheme

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15CIV13/23

First/Second Semester B.E. Degree Examination, June/July 2017 Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain briefly the scope of the following civil engineering fields:
 - i) Environmental engineering
 - ii) Transportation engineering(06 Marks)
- b. Explain: i) Static and dynamics
ii) Kinematics and kinetics
iii) Couple and moment of couple (06 Marks)
- c. Find the components of 100 N force shown in Fig.1(c) along general x and y axes shown.

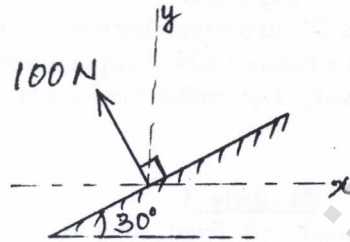


Fig.1(c)

(04 Marks)

OR

- 2 a. Explain the terms: (i) Kerbs, (ii) Skew bridge, (iii) Spillways, (iv) Subgrade. (08 Marks)
- b. With example, explain the characteristics of a force. (04 Marks)
- c. Transfer the force acting at point A to the point B. Refer Fig.Q2(c).

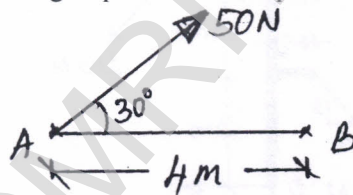


Fig.Q2(c)

(04 Marks)

Module-2

- 3 a. Four coplanar concurrent forces are acting at a point 'O' as shown in Fig.Q3(a). Determine the resultant completely.

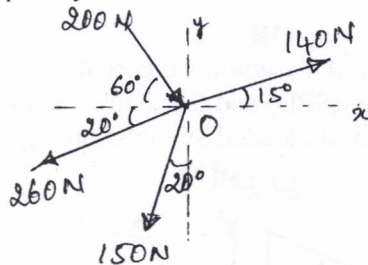


Fig.Q3(a)

(08 Marks)

- b. Explain: i) Angle of friction
ii) Angle of repose
iii) Limiting friction
iv) Coefficient of friction (08 Marks)

OR

- 4 a. Three cylinders A, B and C of diameter 200 mm, 300 mm and 250 mm and weight 75 N, 200 N and 100 N respectively are placed in a ditch as shown in Fig.Q4(a). Assuming contact surfaces smooth, determine the reaction between cylinder A and the vertical wall.

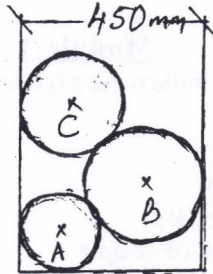


Fig.Q4(a)

(08 Marks)

- b. A pull of 180 N applied upward at 30° to a rough horizontal plane was required to just move a body resting on the plane, while a push of 220 N applied along the same line of action was required to just move the same body. Determine the weight of body and the coefficient of friction.

(08 Marks)

Module-3

- 5 a. With the nature of reaction, explain: (i) fixed support, (ii) Hinged support, (iii) simple support. (06 Marks)
- b. Determine completely the resultant of the system of four forces acting on the body shown in Fig.Q5(b) with respect to point 'O'.

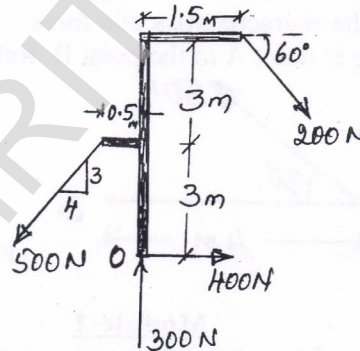


Fig.Q5(b)

(10 Marks)

OR

- 6 a. Give the statement and application of Varignon's theorem. (04 Marks)
- b. With sketch, explain space diagram (SPD) and free body diagram (FBD). (04 Marks)
- c. Find the support reactions for the beam loaded as shown in Fig.Q6(c).

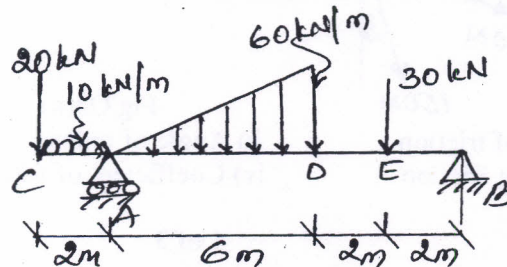


Fig.Q6(c)

(08 Marks)

Module-4

- 7 a. State and prove parallel axis theorem. (06 Marks)
 b. Locate the centroid of the plane area shown in Fig.Q7(b).

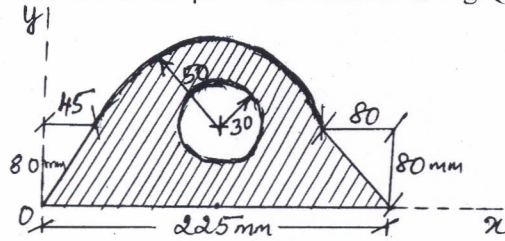


Fig.Q7(b) (10 Marks)

OR

- 8 a. Determine the centroid of a triangle by first principle. (06 Marks)
 b. For the cross section shown in Fig.Q8(b), calculate the MI about the centroidal axis parallel to top edge. Also determine the radius of gyration.

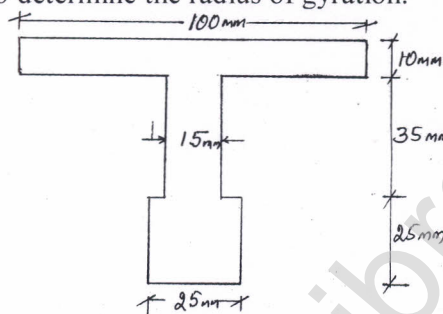


Fig.Q8(b) (10 Marks)

Module-5

- 9 a. A stone is dropped into a well. After 4 seconds the sound of splash is heard. If the velocity of sound is 330 m/sec, find the depth of the well up to water surface. (10 Marks)
 b. Explain with a sketch for projectile motion:
 i) Range ii) Time of flight
 iii) Maximum height iv) Angle of projection (06 Marks)

OR

- 10 a. A stone is projected with a velocity of 20 m/sec perpendicular to the incline as shown in Fig.Q10(a). Determine the range R on the inclined plane.

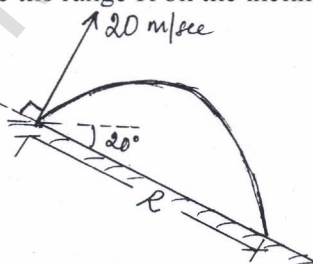


Fig.Q10(a) (06 Marks)

- b. Explain: (i) Super elevation, (ii) Relative motion. (04 Marks)
 c. A body moves in a straight line has the equation of motion given by $S = 2t^3 - 4t + 10$. Determine:
 i) The time required for the body to gain a velocity of 68 m/sec starting from rest.
 ii) The acceleration of the body when the velocity is equal to 32 m/sec. (06 Marks)
