USN ftt **15CIV13/23**

First/Second Semester B.E. Degree Examination, June/July 2019
Elements of Civil Engineering and 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. Replace the force couple system by a single force with respect to AB and CD shown in F ig.Q. I (b). **(08 Marks)**

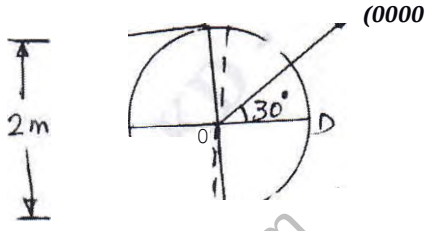

Fig.Q. 1 (b)

OR

2 a. Draw typical cross section of road and explain its components. **(08 Marks)**

b. Briefly explain:

i) Rigid body

ii) Principle of transmissibility of force

iii) Force and its characteristics

iv) Couple and its characteristics. **(08 Marks)**

Module-2

3 a. State and prove Lamis theorem. **(08 Marks)**

b. Determine the resultant of forces which are acting as shown in Fig.Q.3(b). **(08 Marks)**

Fig.Q.3(b)

OR

4 a. Define:

i) Coefficient of friction

ii) Angle of friction

iii) Angle of repose

iv) Limiting friction. **(08 Marks)**

b. A sphere of weight 100N rests against a vertical wall as shown in Fig.Q.4(b). If the sphere is 100mm radius and the rope RS is 400mm length, find the minimum horizontal force 'IP necessary to move the sphere free from the wall. **(04 Marks)**

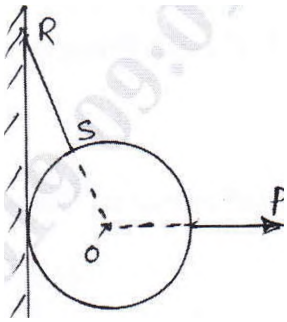

Fig.Q.4(b)

c. Determine the value of W_1 and W_2 shown in Fig.Q.5(c) to keep BC horizontal. **(04 Marks)**

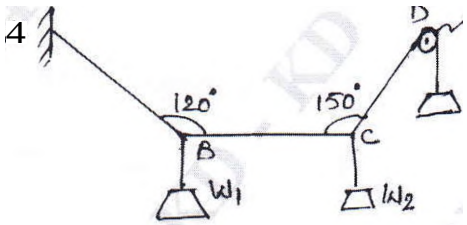

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Fig.Q.5(c)

Module-3

5 a. State and prove Varignon's theorem. **(08 Marks)**

b. Determine the support reactions at A and **B** for the beam shown in Fig.Q.5(b) **(08 Marks)**

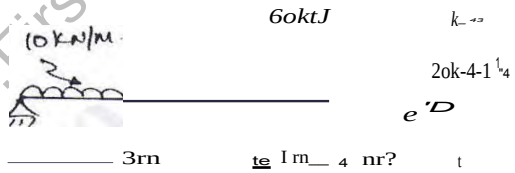

Fig.Q.5(b)

OR

6 a. Explain the different types of supports for beams. **(08 Marks)**

b. Find the resultant of the system of coplanar forces acting on a lamina as shown in Fig.Q.6(b). Each square has a side of 10mm. **(08 Marks)**

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Fig.Q.6(b)

Module-4

7 a. State and prove parallel axis theorem. **(08 Marks)**

b. Locate the centroid for the shaded area shown in Fig.Q.7(b) with respect to '0'. **(08 Marks)**

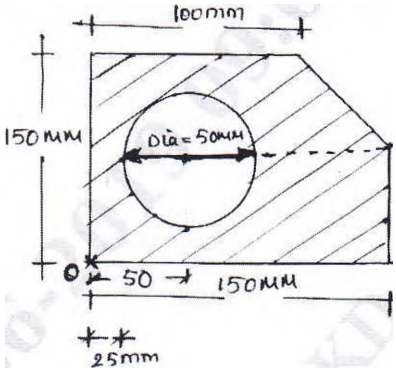

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Fig.Q.7(b)

OR

8 a. Determine the moment of inertia of the shaded area shown in Fig.Q.8(a) about x x axis. **(08 Marks)**

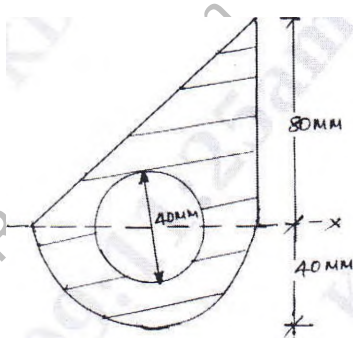

Fig.Q.8(a)

b. Derive the expression of centroid of a semicircle by the method of integration. **(08 Marks)**

Module-5

9 a. Define: i) Displacement ii) Acceleration iii) Velocity iv) Speed. **(08 Marks)**

b. Burglars car starts with an acceleration of 2m/sec'. A police van came after 10 seconds and continued to chase the burglars car with uniform velocity of 40m/sec. Find the time taken by the police van to overtake the burglars car. **(08 Marks)**

OR

10 a. A ball is dropped from the top of a tower 30m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15m/sec. When and where do they pass? **(08 Marks)**

b. A pilot flying his bomber at a height of 2000m with unifo rm horizontal velocity of 600 kmph wants to strike a target. At what distance from the target he should release the bomb. **(08 Marks)**

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