CBCS SCHEME

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18CIV14

First Semester B.E. Degree Examination, Dec.2018/Jan.2019
Elements of Civil Engineering and Mechanics

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Briefly explain the scopes of branches:
i) Transportation Engineering
ii) Geotechnical Engineering. **(10 Marks)**

b. What are the effects of infrastructural facilities on socio-economic development of a country? **(05 Marks)**

c. What is the role of a civil engineer in infrastructural development of a country? **(05 Marks)**

OR

2 a. Explain briefly,
i) Law of physical independency of forces.
ii) Law of superposition of forces. **(06 Marks)**

b. State and prove Varignon's law of moments. **(06 Marks)**

c. Find the moment of 100kN force acting on a rigid body ABC as shown in Fig.Q.2(c), about point A. **(08 Marks)**

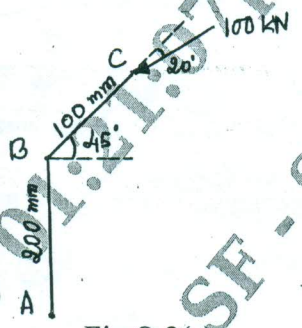

Fig.Q.2(c)

Module-2

3 a. Define Free Body Diagram, with the help of at least two examples. What is the importance of drawing a F.B.D (Free Body Diagram) in Engineering Mechanics? **(05 Marks)**

b. What are the laws of dry friction? **(05 Marks)**

c. A mass of 580 kg resting on a rough inclined plane is acted upon by a 6000N force as shown in Fig.Q.3(c). If the coefficient of friction is 0.25 at point of contact, check whether the body slides up or down. **(10 Marks)**

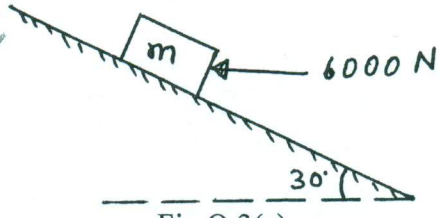

Fig.Q.3(c)

OR

4 a. State and prove Lami's theorem. **(04 Marks)**

b. Find the reactions developed at contact points A, B and C supporting two identical rollers each of weight 1000N as shown in Fig.Q.4(b) **(06 Marks)**

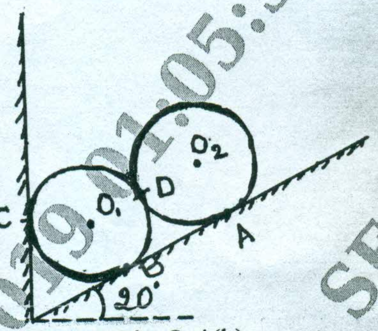

Fig.Q.4(b)

c. A ladder 4m long and weighing 200N is placed against a vertical wall and rests on a horizontal floor making an angle 60° with the floor. The coefficient of friction between ladder and floor is 0.3 and that between ladder and wall is 0.2. The ladder in addition to its own weight supports a person weighing 600N at a distance of 3m from the floor along the ladder. Calculate the minimum force 'P' to be applied horizontally at the floor level on the ladder to keep it in equilibrium. **(10 Marks)**

Module-3

5 a. Determine the support reactions in case of a simply supported beam shown in Fig.Q.5(a). **(06 Marks)**

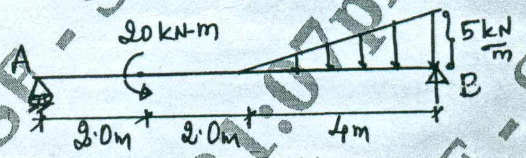

Fig.Q.5(a)

b. Analyze the truss shown in Fig.Q5(b) to find member forces in member BC, CH and GH by method of sections. **(14 Marks)**

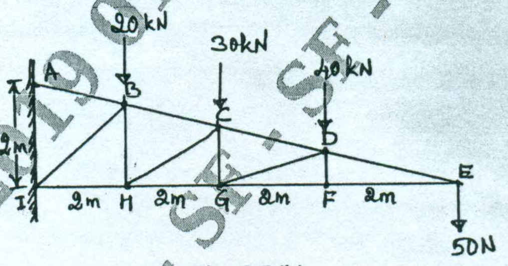

Fig.Q5(b)

OR

6 a. Differentiate statically determinate and indeterminate structures with examples for each. **(06 Marks)**

b. Determine member forces in the truss shown in Fig.Q.6(b). **(14 Marks)**

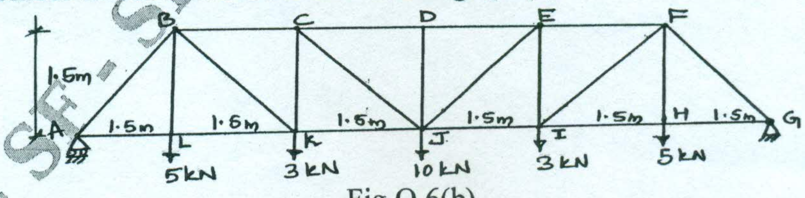

Fig.Q.6(b)

Module-4

7 a. Derive the expression for centroid of a semi-circle from first principle. **(06 Marks)**

b. Determine the centroid of shaded area of composite shown in Fig.Q.7(b) with respect to origin 'O'. **(14 Marks)**

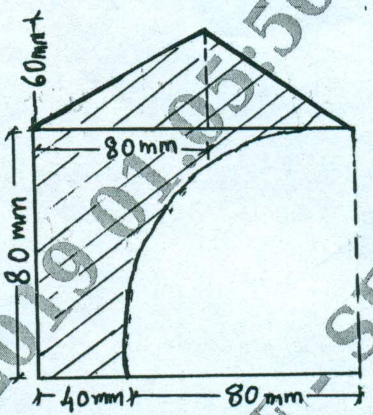

Fig.Q.7(b)

OR

8 a. State and prove Parallel axis theorem. **(06 Marks)**

b. Find radius of gyration of plane lamina about its horizontal centroidal axis shown in Fig.Q.8(b). **(14 Marks)**

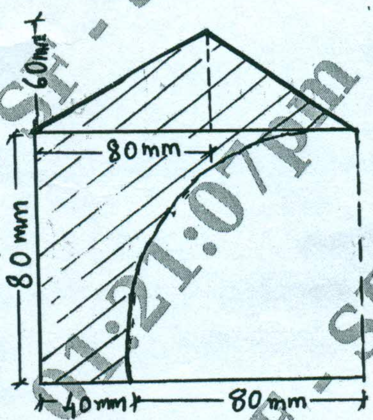

Fig.Q.8(b)

Module-5

9 a. Two cars P and Q accelerates from a standing start. The acceleration of P is 1.3 m/s^2 and that of Q is 1.6 m/s^2. If Q was originally 6m behind P, how long it takes to overtake P? **(10 Marks)**

b. A stone 'A' is dropped from top of a tower 50m heigh. At the same time another stone 'B' is thrown up from the foot of the tower with the velocity of 25m/s. At what distance from top and after how much time the two stones will cross each other. **(10 Marks)**

OR

10 a. State D' Alembert's principle and write significance of it structural dynamics. **(06 Marks)**

b. A cricket ball is thrown by a fielder in the ground from a height of 3m at an angle of 40° with the horizontal. The velocity with which the ball is thrown is 30m/s. The ball hits the wicket at a height of 0.3m from ground. Determine the distance of the fielder from the wicket when the ball is thrown. **(14 Marks)**

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