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18CIV14/24

First/Second Semester B.E. Degree Examination, June/July 2019
Elements of Civil Engineering and Mechanics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume missing data suitably.

Module-1

1 a. Briefly explain the role of civil engineers in the infrastructure development of the country. **(06 Marks)**

b. Explain briefly the scope of civil engineering in (i) structural engineering (ii) geotechnical engineering. **(08 Marks)**

c. A 200 N vertical force is applied to the end of the lever which is attached to a shaft as shown in Fig.Q1(c). Determine: (i) Moment of force about '0' (ii) Horizontal force applied at 'A' which creates same moment about '0' (iii) Minimum force which creates the same moment about '0'.

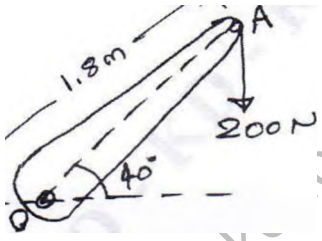

Fig.Q 1(c) **(06 Marks)**

OR

2 a. Determine the resultant of the force system acting on a body as shown in the Fig.Q2(a) with respect to point '0'.

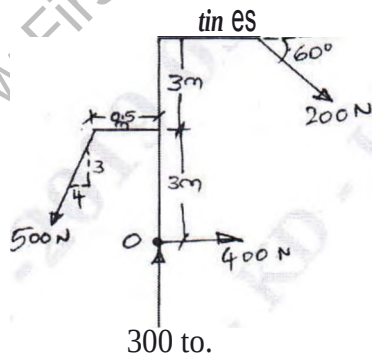

Fig.Q2(a) **(08 Marks)**

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

c. 2 kN force is the resultant of a system of forces acting along positive y-axis as shown in Fig.Q2(c). Determine the value of F and 0.

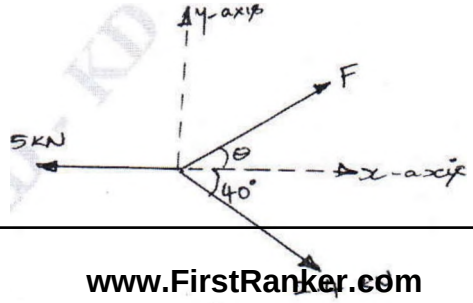

Fig.Q2(c) (06 Marks)

Module-2

3 a. What is meant by equilibrium? State the conditions of static equilibrium for both coplanar concurrent and non-concurrent force system. **(05 Marks)**

b. State and prove Lami's theorem. **(05 Marks)**

c. Determine the force `P' required to cause the motion of the blocks to impend. Take the weight of A as 90 N and weight of B as 50 N. Take coefficient of friction for all contact surfaces as 0.30 as shown in Fig.Q3(c) and consider the pulley being frictionless.

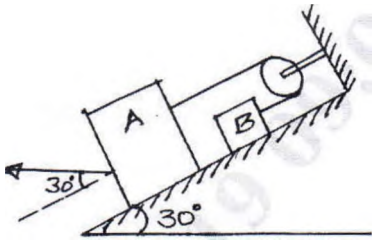

Fig.Q3(c) **(10 Marks)**

OR

4 a. Briefly explain: (i) Angle of friction (ii) Cone of friction. **(04 Marks)**

b. Calculate the tension in the strings. Also calculate '0' in Fig.Q4(b).

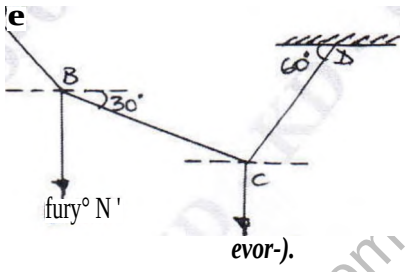

Fig.Q4(b) **(10 Marks)**

c. Prove that angle of repose is equal to angle of friction. **(06 Marks)**

Module-3

5 a. What are the different types of beams? How do you differentiate them? **(06 Marks)**

b. List the steps followed in the analysis of truss by method of joints. **(06 Marks)**

c. Find the length 'X' so that the reactions at both the supports are equal for the beam as shown in Fig.Q5(c).

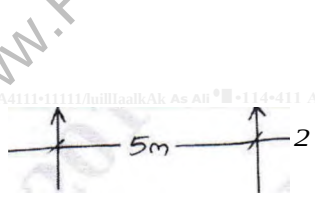

Fig.Q5(c) **(08 Marks)**

OR

6 a. List the assumptions made in the analysis of trusses. **(04 Marks)**

b. What are the different types of supports and mark their reaction lines. **(06 Marks)**

c. Analyze the frame and tabulate the member forces for the frame shown in Fig.Q6(c).

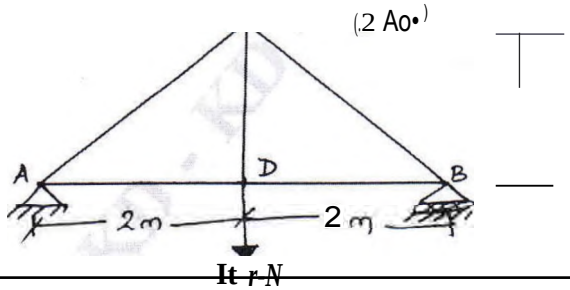

Fig.Q6(c) **(10 Marks)**