USN ☐☐☐☐☐☐☐☐☐☐

First Semester B.Arch. Degree Examination, June/July 2013
Structures – I

Time: 3 hrs.
Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Missing data may be assumed suitably.

1 a. Distinguish between scalar and vector quantities giving atleast two examples for each. (05 Marks)
   b. Define force and classification of force system with neat sketches. (07 Marks)
   c. The system of coplanar concurrent forces shown in Fig.Q1(c) are in equilibrium. Find the value of P and θ. (08 Marks)
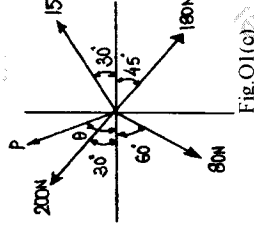
Fig.Q1(c)
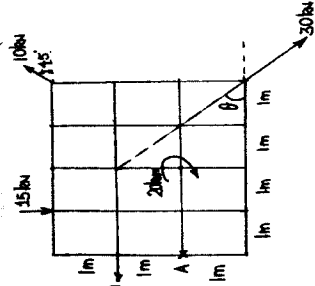
2 a. Define principle of transmissibility of force? (04 Marks)
   b. Define: (i) Resultant (ii) Moment (iii) Equilibrant (04 Marks)
   c. Determine the magnitude, direction and position with respect to point A as shown in Fig.Q2(c). (12 Marks)

Fig.Q2(c)

3 a. Explain the different types of loads and supports with neat sketches. (08 Marks)
   b. Explain different types of beams with neat sketches. (04 Marks)
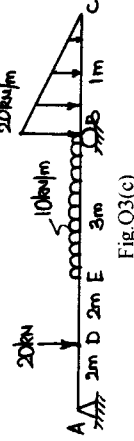   c. Determine the support reactions for the beam shown in Fig.Q3(c). (08 Marks)

Fig.Q3(c)

4 a. Explain the different types of friction? (03 Marks)
   b. State and explain the laws of friction. (07 Marks)
   c. A 4 m ladder weighing 250 N is placed against a smooth vertical wall with its lower end 1.5m away from the wall as shown in Fig.Q4(c). If the coefficient of friction between the ladder and the floor is 0.3, show that the ladder will remain in equilibrium in the position. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.
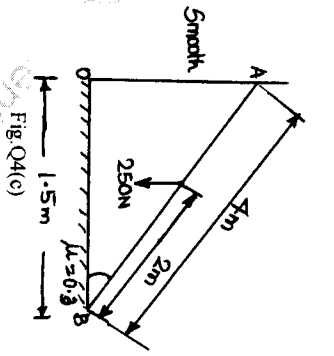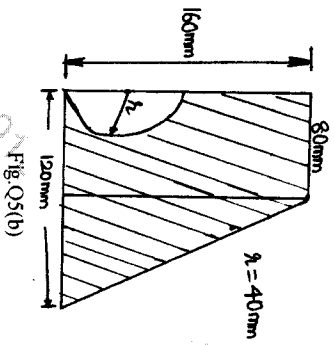
5 a. Derive an expression for a right angled triangle from first principles? **(10 Marks)**

   b. Find the centroid of shaded area shown in Fig.Q5(b). **(10 Marks)**

Fig.Q4(c)

Fig.Q5(b)

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

   b. Find I_{xx} and I_{yy} through centroid shown in Fig.Q6(b) with uniform thickness of 30 mm throughout. **(12 Marks)**
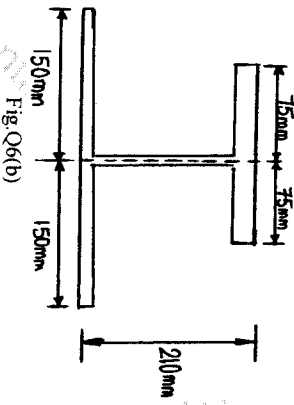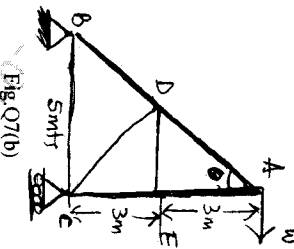
Fig.Q6(b)

7 a. Define perfect, deficient and redundant truss. **(08 Marks)**

   b. Explain the steps adopted to solve the given truss in Fig.Q7(b), by method of joints. **(12 Marks)**

Fig.Q7(b)

8 Write short notes on any four:

   a. State and prove Varignon's theorem

   b. Define resolution of force system

   c. Define coefficient of friction and angle of repose

   d. Explain method of section in analysis of truss

   e. Explain polar moment of inertia. **(20 Marks)**

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