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18ENG15

First Semester B.Arch. Degree Examination, Feb./Mar. 2022

## Building Structures - I

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Follow written dimension do not scale.

### Module-1

- What are the ingredients used in "Plane Cement Concrete". Indicate the properties of the ingredients. (10 Marks)
  - What is workability of concrete? What are the tests conducted in the laboratory to determine the workability, explain slump test in detail. (10 Marks)

OR

- Explain Dead load, Live load, Impact load and Earthquake load. (10 Marks)
  - Name five major construction materials indicate the properties of steel and bricks. What are tests conducted to evaluate the quality of cement as per IS standards. (10 Marks)

### Module-2

- Differentiate between
    - Coplanar force system and Concurrent force system
    - Resultant of a force and equilibrant
    - Law of triangle of forces and law of polygon of forces. (10 Marks)
  - Determine the magnitude and direction of Resultant force from Fig.Q3(b).



Fig.Q3(b)

(10 Marks)

OR

- State and prove "Varignon's Theorem" (05 Marks)
  - What are statically determinate and statically indeterminate beams? Give examples. (05 Marks)
  - Determine the magnitude, direction and position of the "Resultant Force". Refer Fig.Q4(c).

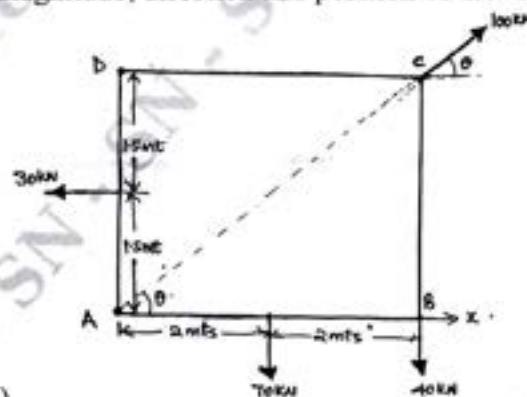


Fig.Q4(c)

(10 Marks)

**Module-3**

- 5 a. With neat sketches explain the different types of supports. (10 Marks)  
 b. For the beam shown in Fig.Q5(b) determine the support reactions.

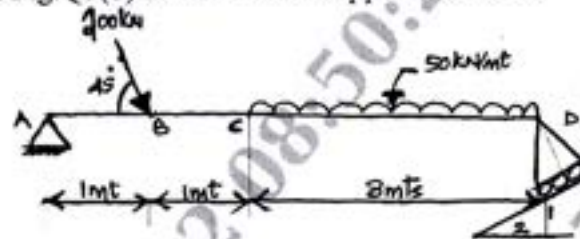


Fig.Q5(b)

(10 Marks)

OR

- 6 a. Explain briefly with sketch : (i) Free body diagram (ii) Lami theorem. (05 Marks)  
 b. A wire is fixed at 2 points A and D. 2 weights 20 kN and 25 kN are supported at B and C. When equilibrium is reached, it is shown that inclination of AB is  $30^\circ$  and inclination of CD is  $60^\circ$  to the vertical. Determine the tension in AB, BC, CD and also inclination of BC to the vertical. Refer Fig.Q6(b).



Fig.Q6(b)

(15 Marks)

**Module-4**

- 7 a. Locate the centroid of composite sections shown about 'A'. Refer Fig.Q7(a).

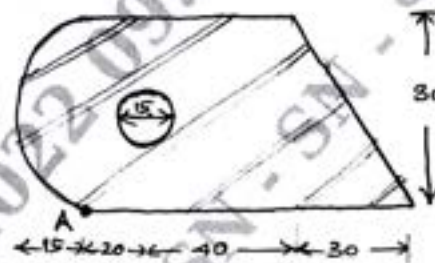


Fig.Q7(a)

(10 Marks)

- b. Locate the centroid of shaded area as shown in Fig.Q7(b).

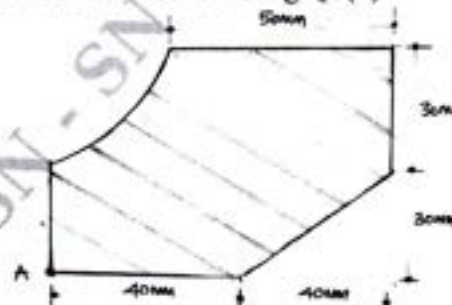


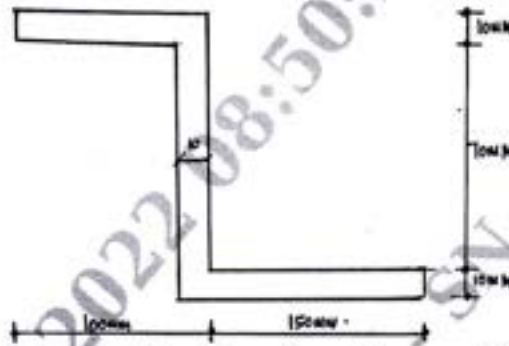
Fig.Q7(b)

(10 Marks)

OR

- 8 a. State and prove "Parallel Axis Theorem". (05 Marks)

- b. For the composite section shown in Fig.Q8(b), determine the moment of inertia about its horizontal and vertical centroidal axis.



(Follow written dimensions do not scale)

Fig.Q8(b)

(15 Marks)

**Module-5**

- 9 a. With neat sketches explain :  
 (i) Perfect frame (ii) Deficient frame (iii) Redundant frame (09 Marks)  
 b. For frame shown in Fig.Q9(b) determine the support reactions. (06 Marks)

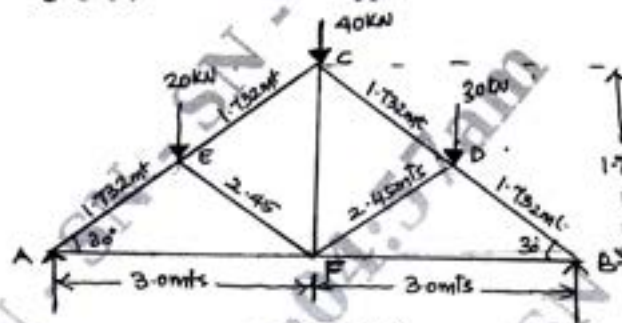


Fig.Q9(b)

- c. If the frame is provided with single angle of 50mm x 50mm x 6mm @ 4.5 kg/mt for each angle. (05 Marks)
- OR**
- 10 Analyse the frame shown in Fig.Q10 by the method of Joints. (20 Marks)

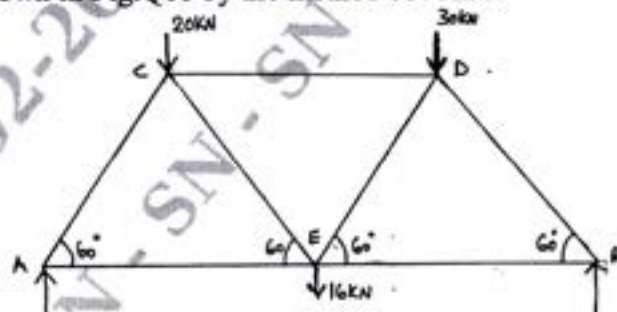


Fig.Q10

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