

USN

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15CV72

Seventh Semester B.E. Degree Examination, June/July 2023
Design of RCC and Steel Structures

Time: 3 hrs.

Max. Marks:80

- Note:1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Use of IS 456 : 2000, SP16, IS 800 : 2007 SP(6)(1) - 1984 or Steel Tables is permitted.

Module-1

- 1 Design a cantilever type retaining wall to retain a soil of height 3.5m and above ground level. The angle of repose = 30 degrees = phi, SBC of soil = 180 kN/m^2. Density of soil = 16 kN/m^3, coefficient of friction between wall and ground = 0.5. Use M25 and Fe-415 Steel. Sketch the details of cross section of retaining wall and longitudinal section showing reinforcement details. (40 Marks)

OR

- 2 A single bay portal frame has an effective span of 7m and an effective height of 4.2m. Spacing of portal frame is 4.2m. Consider an imposed load of 3 kN/m^2 on the slab. Column is 400 x 400mm shall be adopted. Design the continuous slab and portal frame, considering M20 grade concrete and Fe 415 Steel. SBC of soil is 130 kN/m^2. Sketch the details of half sectional elevation of the portal frame showing the details of reinforcement in footing, column and beam. (40 Marks)

Module-2

- 3 Design a roof truss in figure shown below Fig.Q3 with forces in each member along with its nature of forces in different members of the truss are given in table Q3. The size of the column supporting the truss is 300 mm x 300 mm. Use M20 concrete for column. Design the truss using bolts of M16 property class 5.6 for connections and also design anchor bolts for an uplift force of 15 kN @ each support. Draw sketches of the details.

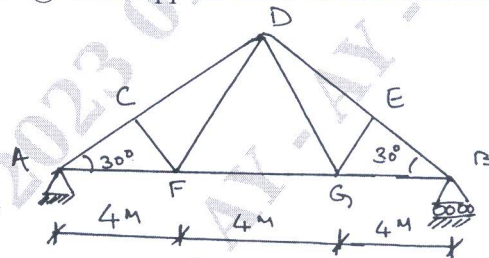


Fig.Q3

Table with 3 columns: Member, Factored Force, Length cm. Rows include AC, EB; CD, DE; AF, GB; FG; CF, EG; DG, DF.

C = Compression
T = Tension
AC = CD = DE = EB
reaction S @ A and B
RA = RB = 50 kN.

(40 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.

OR

- 4 Design a simply supported crane gantry girder for the following data. The girder is electrically operated. Yield stress of steel is  $250 \text{ N/mm}^2$ . Use 16mm diameter bolts of grade 4.6.

Span of crane girder (effective) = 20M

Effective span of gravity girder = 7M

Capacity of crane = 220 kN

Self weight of crane excluding crab = 200 kN

Weight of crab = 60 kN

Wheel base distance = 3.4 M

Minimum hook distance approach = 1.1M

Self weight of rail = 0.3 kN/m

Height of rail = 75 mm

Gantry Girder is to be supported on RCC column bracket of size  $300 \times 450 \text{ mm}$  size of column  $3000 \times 600 \text{ mm}$ . Sketch the design details. (40 Marks)

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