CBCS SCHEME

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15CV72

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Design of RCC and Steel Structures

Time: 3 hrs. Max. Marks: 80

Note: 1.Answer any TWO full questions, choosing ONE full question from each module.
2. Use of IS456-2000, SP16, IS 800, Steel Tables or SP6(1) is permitted.

Module-1

1 Design a cantilever retaining wall to retain an earth embankment with a horizontal top 4m high above ground level. The density of earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at top The safe bearing capacity of soil is 200 kN/m^2. The co-efficient of friction between soil and concrete is 0.5. Adopt M_{20} Grade concrete and Fe 415 grade steel and draw sketches of longitudinal section of footing and cross-section of footing. **(40 Marks)**

OR

2 Design a RCC portal frame having an effective span of 8 m and an effective height of 5m. The portal frames are spaced at 4mc/c, the live load on slab is 3 kN/m^2. Assume SBC of soil as 120 kN/m^2. The base of column are fixed. Use M_{20} grade concrete and Fe415 steel. Assume floor finish is 1 kN/m^2 and draw sketches of half portal frame showing the details of steel in beam, column and footing. **(40 Marks)**

Module-2

3 The centre line of a roof truss is as shown in Fig.Q3. The magnitude and nature of forces in each member under service load condition is shown against each member. Design the top chord member, bottom chord member and interior members. Design the truss using bolts of M16, properly class 4.6 for connections. Also design the bearing plate to support a reaction of 160 kN along with anchor bolts for a pull of 40 kN to connect the truss to a RCC column 300 × 300 mm of M_{20} grade concrete. Show design details elevation of the truss greater than Span (half span) and support details.

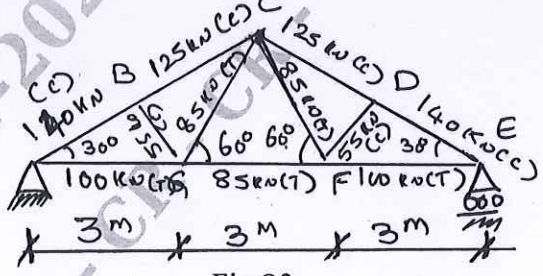

Fig.Q3

MEMBER	FORCE	NATURE
AB, DE	140	Compression
BC, CD	125	Compression
AG, FE	100 kN	Tension
GF	85 kN	Tension
BG, DF	55 kN	Compression
GC, CE	85 kN	Tension

(40 Marks)

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

(i) Span of crane girder (effective) = 20 m
(ii) Effective span of gantry girder = 7 m
(iii) Capacity of crane = 220 kN
(iv) Self weight of crane excluding crab = 200 kN
(v) Weight of crab = 60 kN
(vi) Wheel base distance = 3.4 M
(vii) Minimum hook approach = 1.1 m
(viii) Self weight of rail = 0.3 kN/m
(ix) Height of rail = 75 mm

Draw sketches of C/S of gantry girder and its attachment to supporting column of the bracket and plan details. **(40 Marks)**

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