B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E.   **Semester: VII**
Branch: Civil Engineering   **Duration: 4 hrs.**
Course Code: 21CV7PCDDG   **Max Marks: 100**
Course: Design and Drawing of RCC and Steel Structures   **Date: 05.03.2023**

Instructions: 1. **Part A: Qn No 1 is compulsory. Internal choice is provided between Qn No 2 and 3.**

Part B: Qn No 4 is compulsory. Internal choice is provided between Qn no 5 and 6.

2. Use of IS 456-2000, IS 800-2007 and structural steel hand book is Permitted

3. Assume missing data if any suitably and state the same clearly.

PART-A

1. Draw to a suitable scale reinforcement details of a slab of thickness 150 mm and with internal dimension of 7m x 3m and rests on beams of size 230mm width x 450mm depth on all four sides. The reinforcement details of the slab are as follows: 10mm dia @150mm C/C as main steel and 8mm dia @ 200mm C/C as distribution steel. Beam reinforcement:
   i) Top bars 2 numbers of 12 mm dia bars
   ii) Bottom bars 2 numbers of 16 mm dia bars + 2 numbers of 16 mm dia bars extra
   iii) shear reinforcement: two legged 8 mm dia bars at 150 mm c/c
   Draw to a suitable scale
       i)   Plan of slab
       ii)   Longitudinal section of longer beam   **10**

2. Design a stem and base slab of a cantilever retaining wall to retain earthen embankment with a horizontal top 5 meters above the ground level, Density of earth=19kN/m^3, Angle of internal friction=30^0, SBC of soil=180kN/m^2. Co–efficient of friction between soil and concrete=0.5. Adopt M25 concrete and Fe 415 HYSD steel
   Draw to a suitable scale.
   Cross section of retaining wall stem and base slab with reinforcement details.   **40**

OR

3. Design a beam – slab type combined footing to support two columns carrying axial loads as follows: Column A=750kN with dimensions 400mmX400mm and Column B=1400kN with dimensions 500mmX500mm, where column A is on the left side of footing whose center line is at 0.5 m from edge of site. The center to center distance between the two columns is 4 meters. SBC of soil = 200kN/m^2. Assume M20 concrete and Fe500 steel.   **40**

Draw to a suitable scale the following details:
(i)Longitudinal section of the footing beam showing reinforcement details
(ii)Plan of footing slab showing reinforcement details.

PART-B

4 A framed bolted connection is used to connect a column ISMB500 with a beam ISLB400. Angles ISA 100x100x8 mm are used for the connections. Connection of the angle with the beam is with 3 bolts of 20mm diameter. Connection of the angle with column is with 4 bolts of 20 mm diameter, 2 on each angle. Draw to a suitable scale: **10**
    i)   Side elevation
    ii)   Longitudinal view

5 Design the central section and end bearing stiffener of a welded plate girder of span 24 meters to carry a superimposed load of 30kN/meter. Assume an intermediate stiffener of size 120mm x10mm on either side of the web plate at suitable intervals. Assume intermittant filet weld of size 6 mm at intervals of 60mm to connect the flange with the web and stiffeners. Adopt elastic critical stress method. **40**

   Draw to a suitable scale the following:
   (i)Central section of the girder
   (ii)Half longitudinal section showing details of stiffeners and connection

OR

6 The centerline of a roof truss is shown in figure 1. The magnitude and nature of forces under service conditions are given below. **40**
   Top Chord members = 120 kN Compression
   Bottom Chord members = 100 kN Tension
   use M16 turned bolts of grade 4.6
   Design top chord and bottom chord members and support A. Assume left support to be hinged and right support to be on roller. The reaction at each support = 70kN. Draw to a suitable scale
       1. Support A and its joint details
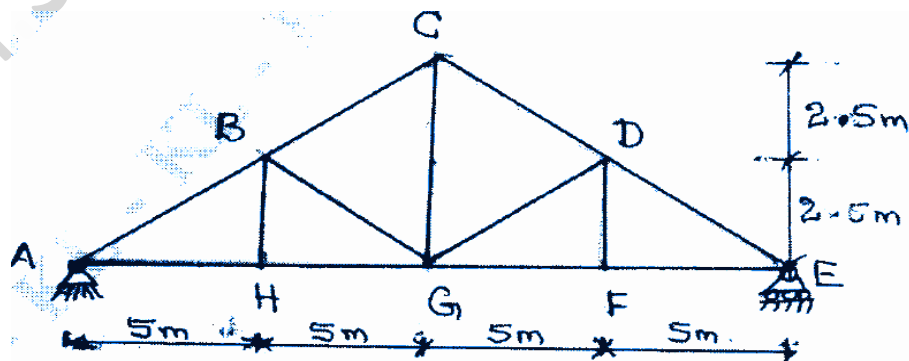   2. Half longitudinal view with all connection details

Figure 1

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