U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary 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

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	The reinforcement details of two way corner slab 150mm thick of span 4mX 6m is given below. Four sides of the slab are resting on beams of size 230mmx450mm. Slab reinforcement: Shorter span 10mm bars at 125mmc/c Longer span 8mm bars at 175mmc/c Beam reinforcement Top bars 2 nos of 16mm diameter bars, Bottom bars-2 nos of 16mm diameter bars –continuous+2 nos of 12mm bars extra. Shear reinforcement -2 legged 8mm dia bars @150mmc/c Cranking of slab bars at 1/5 th span. Draw to a suitable scale: (i)Plan of slab with reinforcement details (ii)Longitudinal section of shorter span beam	**10**
2	Design the stem and heel slab of a cantilever retaining wall to retain earthen embankment with a horizontal top 4 meters above the ground level, Density of earth=18kN/m^3, Angle of internal friction=30^0, SBC of soil=200kN/m^2. Co–efficient of friction between soil and concrete=0.5. Adopt M20 concrete and Fe 415 HYSD steel Draw to a suitable scale. Cross section of stem and base slab of retaining wall with reinforcement details. Take reinforcement in toe slab to be 10mm dia at 200mm c/c both ways.	**40**

OR

3	Design a rectangular slab beam type combined footing to support two columns carrying axial loads as follows: Column A=800kN with dimensions 600mm X 600mm and Column B=1500kN with dimensions 750mmX750mm, where column -A is on the left side of footing. The center to center distance between the two columns being 4.5 meters. Clear spacing available from left column (A) and edge of site being 0.8meters. SBC of soil = 200kN/m^2. Assume M20 concrete and Fe415 steel. Draw to a suitable scale the following details: (i)Cross section of the footing beam showing reinforcement details (ii)Plan of footing slab showing reinforcement details.	**40**

PART-B

4	Two secondary beams ISLB 450 @653N/m each are to be connected to the flange of main beam ISLB 600 @995 N/m as a framed connection. Two angles ISA 100X100X8mm are used for the connection on each side of web of main beam with secondary beam. The secondary beams are flush with the top of main beam. Connection details: Three bolts of 20mm diameter are used for the connection of angle with web of secondary beam. Four bolts of 20mm diameter are used for the connection of angle with the web of main beam, two bolts on either sides of angle Draw to a suitable scale: (i) Side view (ii) Elevation showing connection details of two secondary beams with main beam	**10**
5	Design the central section and bearing stiffener of a welded plate girder of span 30meters to carry a super imposed load of 30kN/meter. Assume intermediate stiffener of size 120mm x 10mm on either sides of web plate. Assume intermittant fillet weld of size 4 mm at intervals of 40mm to connect the flange with the web and stiffeners. Adopt elastic critical stress method. Draw to a suitable scale the following: (i)Central section of the girder (ii)Half longitudinal section showing details of stiffeners and connection	**40**

OR

6	The center line of a roof truss is shown in figure 1. The magnitude and nature of forces under service conditions are given below. Design top chord, bottom chord members and support A. Assume the left support to be hinged and the right support to be on roller. Reaction at each support = 60kN. Draw to a suitable scale. 1. Enlarged view of joint A along with support details 2. Half Longitudinal view	**40**

Member	Magnitude (kN)	Nature
AB,HJ	45	T
BC,GH	35	T
CD,GD	25	T
BE,HF	15	T
CE,GF	12.5	T
DE,DF	17.5	C
AE,FJ	45	C
EF	30	C

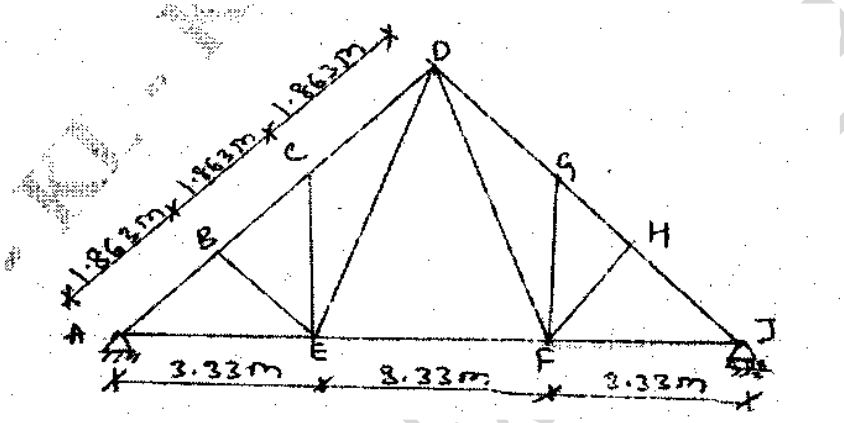

Figure 1

******