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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: 16CV7DCDDG **Max Marks: 100**
Course: Design and Drawing of RCC and Steel structures

Instructions:
1. Answer One Full question from each part.
2. Missing data, if any, may be suitably assumed and state the same clearly.
3. Use of IS456 – 2000 is permitted
4. Use of IS800-2007 is permitted
5. Use of Structural Steel Hand Book is permitted.

PART A

1	a	Two ISMB 400 @ 61.6 Kg/m beams are to be connected to the web of main beam ISMB 600 @ 122.6 Kg/m. Two angles ISA 110x110x10mm are used for the connection on each side of web using two bolts of 20mm dia on each leg of angle. The top of all the beams are at the same level. Draw to a suitable scale: (i) Longitudinal view showing connection cross beam to main beam. (ii) Sectional elevation showing connection details of two secondary beams with main beam	**15**
	b	A column ISHB 450 @ 925kN/m is supported by a gusseted base. The dimensions of base plate are 1200mm x 760mm x 22mm thick with 1200mm edge placed parallel to the column flange. Gusset plate is 16mm thick and it tapers from 1200mm at bottom to width of column at top after accommodating the bolts. Gusset angle consists of ISA 150 mm x 115 x 15 mm with 150 mm leg connected to the gusset plate. Connection between column flange and gusset plate consists of 16 nos of 20 mm dia close tolerance and turned bolts. Connection between gusset plate and gusset angle consists of 16 nos of 20 mm dia close tolerance and turned bolts in two rows. On either sides of column, provide two web cleat angles of ISA 100x100x8 connected by 3 Nos of 20mm dia close tolerance turned bolts. Draw to a suitable scale: (i)Top view showing all details (ii)Side view showing connection details of column and gusset plate, gusset angle.	**15**

OR

2 The reinforcement details of two way corner slab 150mm thick of span 4mX 6m is as follows. **30**

The 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 Shorter span beam: 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. Longer span beam: Top bars 2 nos of 16mm diameter bars, Bottom bars- 2 nos of 16mm diameter bars – continuous + 2 nos of 16mm bars extra. Shear reinforcement - 2 legged 8mm dia bars @150mmc/c Cranking of slab bars at 1/5 th span.

Bend for top bars of beam = 100mm, bottom bars of beam=125mm. Draw to a suitable scale:

(i) Plan of slab with reinforcement details
(ii) Longitudinal section of shorter span
(iii) Longer span beam with a sectional view at center of span & at the support
(iv) Shorter span beam with a sectional view at center of span & at the support

PART B

3 Design a counterfort type retaining wall for the following particulars: **70**

Height of backfill = 4.5 m
Depth of foundation = 1.4 m
Angle of repose = 30^0
Coeff. of friction = 0.45
SBC of Soil = 180 kN/m2
Unit weight of soil = 18 kN/m3
Use M25 Concrete and Fe 500 steel

Draw to a suitable scale the following showing the reinforcement details:

a) Sectional elevation of the retaining wall midway between counterforts.
b) Sectional elevation though the counterfort
c) Sectional plan of the retaining wall at its mid-height.

OR

4 Design a welded plate girder of span 25 meters simply supported at ends to carry a super imposed load of 40kN/m. Provide bearing and intermediate stiffeners. Adopt elastic critical stress method. Assume the girder to be laterally supported through out. **70**

Draw to a suitable scale the following:

(i) Central section of the girder
(ii) Half longitudinal section showing details of stiffeners and connection
(iii) Half top view showing bearing stiffeners and intermediate stiffeners

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