BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2024)

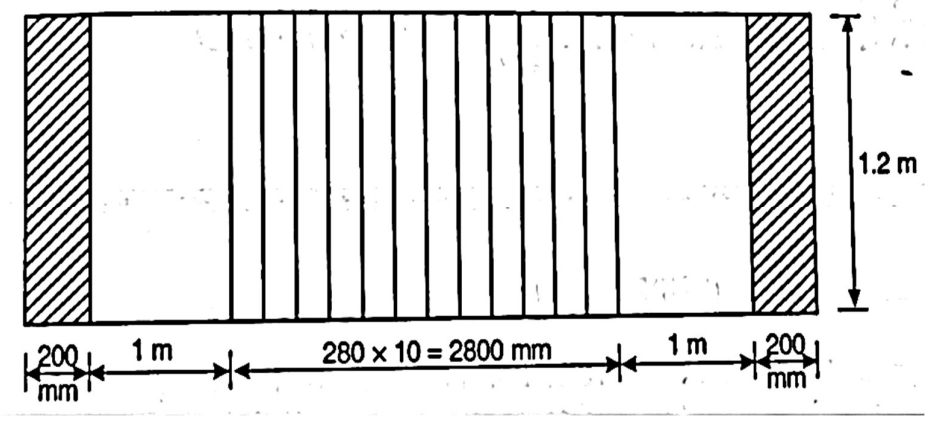
CLASS: B.TECH **SEMESTER : VI**
BRANCH: CIVIL **SESSION : SP/2024**

SUBJECT: CE435 ADVANCED CONCRETE STRUCTURES DESIGN

TIME: 02 Hours **FULL MARKS: 25**

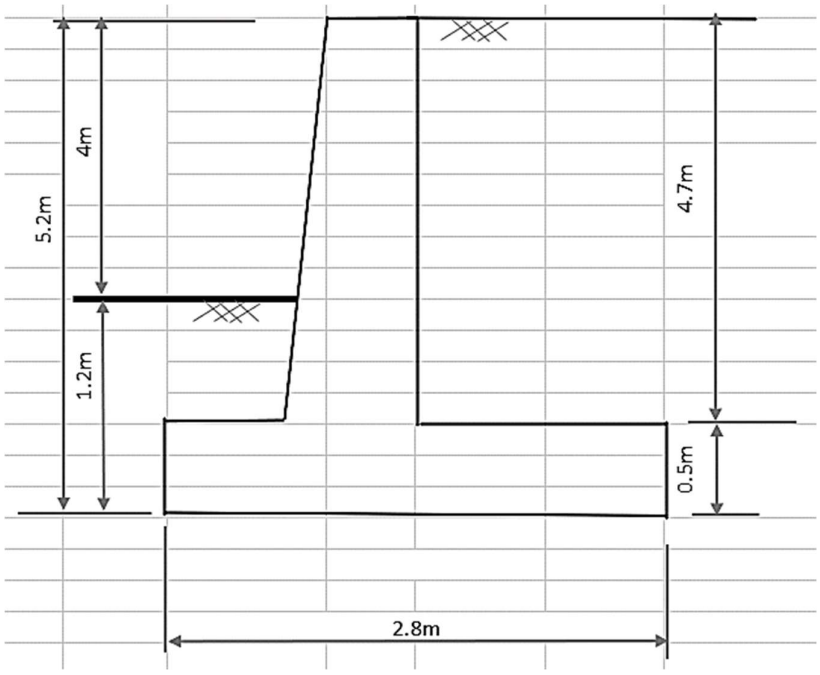
INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates.**
5. IS:456 is allowed in the examination hall.

			CO	BL
Q.1	Design a dog-legged staircase flight shown in the figure below, subjected to a superimposed load of 2.5 kN/m^2. Use M20 concrete and Fe 415 steel. Tread = 280 mm and Riser = 150 mm.	[5]	1	K3



Q.2	An interior panel of a flat slab 5 m x 6 m in size is supported on 500 mm x 500 mm columns and carrying a superimposed load of 4.0 kN/m^2. Determine the bending moments in column strips and middle strip along longer direction. Assume slab thickness as 200 mm.	[5]	2	K2
Q.3	Determine the bending moments in column strip and middle strip of an exterior panel for a live load of 5.0 kN/m2. The slab is provided with a floor finish of 1.0 kN/m^2. The panel is 6 m x 6 m and is supported on 600 mm x 600 mm columns. Floor to floor height is 4 m and thickness of slab is 250 mm.	[5]	2	K2
Q.4	Design the stem of the cantilever retaining wall shown in the following figure with the following data: Unit weight of soil = 18 kN/m^3 Angle of internal friction of soil = 30 degree Grade of concrete = M20 Grade of steel = Fe415 Clear cover = 40 mm	[5]	1	K3

PTO



Q.5 Design a corbel for a 250 mm square column to support a vertical factored load of 300 kN at a distance of 250 mm from the face of the column. Assume M20 grade of concrete and Fe 415 steel. [5] 2 K3

TABLE A SALIENT POINTS ON THE DESIGN STRESS-STRAIN CURVE FOR COLD-WORKED BARS

(Clause 1.4)

Stress Level	f_y = 415 N/mm²		f_y = 500 N/mm²	
(1)	Strain (2)	Stress (3) N/mm²	Strain (4)	Stress (5) N/mm²
0·80 f_{yd}	0·001 44	288·7	0·001 74	347·8
0·85 f_{yd}	0·001 63	306·7	0·001 95	369·6
0·90 f_{yd}	0·001 92	324·8	0·002 26	391·3
0·95 f_{yd}	0·002 41	342·8	0·002 77	413·0
0·975 f_{yd}	0·002 76	351·8	0·003 12	423·9
1·0 f_{yd}	0·003 80	360·9	0·004 17	434·8

NOTE -- Linear interpolation may be done for intermediate values.

::::::26/02/2024::::::M