BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: CIVIL

SEMESTER : VI
SESSION : SP/2024

**SUBJECT: CE435 – ADVANCED CONCRETE STRUCTURES DESIGN**

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
6. IS:456 is allowed in the examination hall.

		CO	BL

Q.1 Design flight of a dog legged staircase for an office building as shown in the following figure. Floor to floor height is 3.5 m, risers are 150 mm and treads are 300 mm. Take live load as 5 kN/m2, M20 grade concrete and Fe415 steel. Assume effective cover as 25 mm.   **[10] 1 K3**
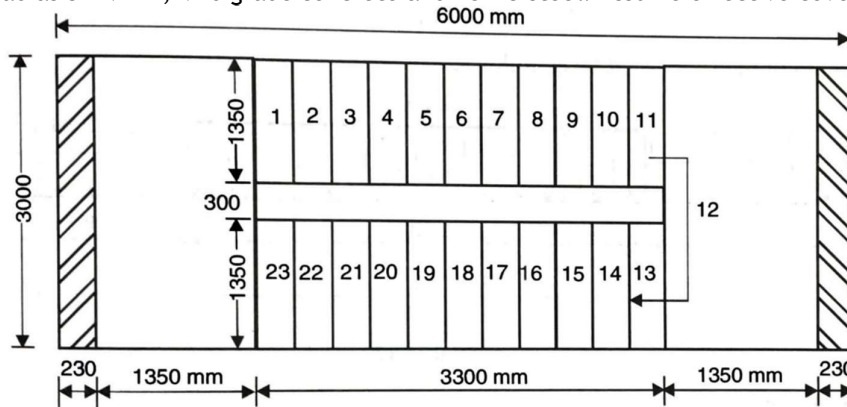
Q.2 A RCC cantilever retaining wall is having 5.5 m tall stem with base raft of width 2.8 m as shown in the following figure. The wall retains soil level with its top. Soil density is 16 kN/m³ and has angle of repose = 30 degree. The safe bearing capacity of soil is 210 kN/m². Check the stability of the retaining wall against overturning, sliding and bearing pressure.   **[10] 1 K2**
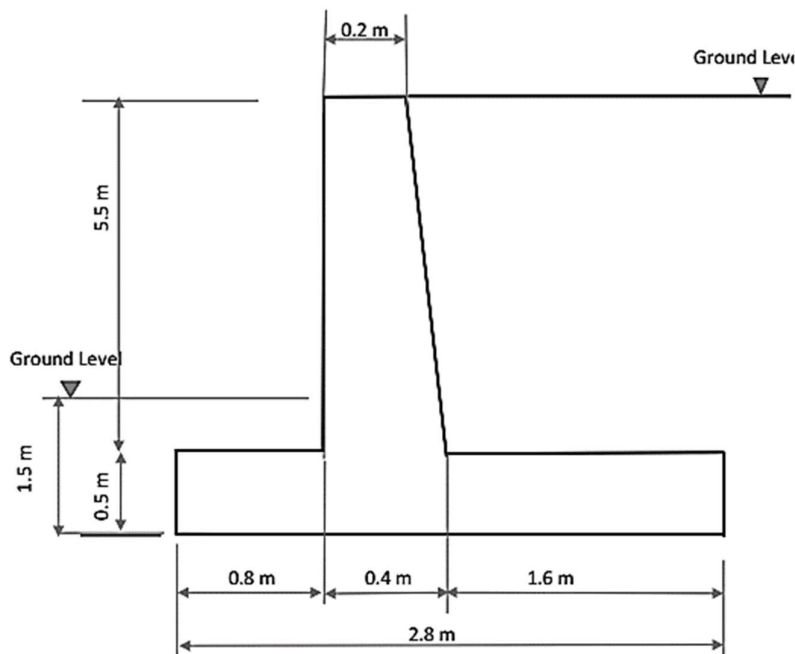
Q.3	Design a column of size 400 mm x 500 mm for the following data: Pu = 2000 kN, bending moment about major axis, Mux = 150 kN-m and bending moment about minor axis, Muy = 100 kN-m, unsupported length of column = 8.5 m, effective lengths, lex = 7.5 m and ley = 6 m, M20 concrete and Fe 415 steel and effective cover = 50 mm.	[10]	2	K3
Q.4	Design the roof dome and ring beam of an elevated circular water tank of 500 kL capacity with a top dome and flat bottom. The tank is supported on a masonry tower. Depth of water in tank is 5 m. Show the reinforcement detail in sketch. Take live load on dome as 1.0 kN/m². Use M30 concrete and Fe415 steel.	[10]	3	K3
Q.5	A footing of size of 2.5 m x 3 m supporting a column carrying a vertical load and uniaxial moment. Check for bearing pressure and design the footing for the following data: Vertical load, P = 500 kN, Moment about major axis, Mx = 400 kN-m, SBC of soil = 210 kN/m² at a depth of 1.5 m below ground level, unit weight of soil = 18 kN/m³, Grade of concrete = M20, Grade of steel = Fe415, clear cover = 50 mm.	[10]	1	K3

:::::29/04/2024 M:::::