Dr Vmil Kumar CE-228 1/5/2023 (3)

NATIONAL INSTITUTE OF TECHNOLOGY HAMIRPUR (H.P.)

End Semester Examination, May 2023

Branch: Architecture **Year & Sem.: 2nd Year 4th Sem.** **Time Duration: 3 Hrs.**

Subject: Design of RCC Structures **Subject Code: CE-228** **Maximum Marks: 50**

Notes: (1) Attempt any 5 questions. All questions carry equal marks.
(2) Assume suitable data and clearly mention it in the answer sheet, if missing.

Q1. Discuss about Working Stress Method (WSM) and Ultimate Load Method (ULM). Write the limitations of Working Stress Method (WSM) and Ultimate Load Method (ULM).

Q2. Design a RC slab for a room having inside dimensions 3 m x 7.5 m. The thickness of supporting wall is 300 mm. The slab carries 75 mm thick lime concrete at its top the unit weight of which may be taken as 20 kN/m^3. The live load on slab may be taken as 2 kN/m^2. Assume the slab to be simply supported at the ends. Use M20 concrete and Fe 415 steel.

Q3. A circular short column, 5 m high is effectively held in position at both the ends and restrained against rotation at one end. Design the column to carry an axial load 1200 kN. Use M20 concrete mix and FE 500 steel. Take 1.5% steel.

Q4. Design a rectangular beam section for the following data:

- Width of section: 300 mm
- Over all depth of section: 500 mm
- Factored BM- 90 kN-m
- Factored torsional moment 40 kN-m
- Factored shear force: 70 kN
- Bar dia: 20 mm
- Nominal cover: 25 mm
- Stirrups dia: 10 mm

Use M20 grade concrete and FE 500 steel.

Q5. Design a rectangular isolated footing of uniform thickness for RC column bearing a vertical load of 600 kN, and having a base size of 400 x 600 mm. Take the safe bearing capacity of soil 120 kN/m^2, M 20 concrete, and Fe 415 steel.

Q6. A rectangular concrete beam of 100 mm wide by 250 mm deep spanning over an 8 m span is prestressed by an effective prestressing force of 280 kN. The beam supports a live load of 1.2 kN/m. Calculate the resultant stress distribution for the center of span cross-section of the beam using load balancing method, if the tendon has a parabolic profile with maximum eccentricity at the centre is 40 mm and zero eccentricity at supports.

(Best of Luck)