(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100601 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VI) THEORY EXAMINATION 2013-14

DESIGN OF CONCRETE STRUCTURES–2

Time : 3 Hours *Total Marks : 100*

Note :– (1) Attempt **all** questions.

(2) All questions carry equal marks.

(3) Use of IS 456 and IS 3370 is permitted.

(4) Assume any data suitably, if missing.

(5) All designs must be supported by structural details.

1. Attempt any **two** parts of the following : **(2×10=20)**

(a) A flat slab is supported on 500 mm diameter circular columns spaced 6 m × 5 m apart in both directions. The column head has a diameter of 1000 mm. The live load on the flat slab is 5 kN/m². Determine the moments in the flat slab along its 6 m span in exterior panel.

(b) A flat slab is supported on columns spaced at 5 m centre to centre in both directions. The sizes of the columns and column heads are 450 mm × 450 mm and 700 mm × 700 mm respectively. The superimposed dead

load and live loads are 2 kN/m^2 and 4 kN/m^2 respectively. The height of floor is 4.5 m. Design the interior panel of slab.

(c) Design an interior panel of a flat slab for a live load of 5 kN/m^2. The slab is provided with a floor finish of 1 kN/m^2. The panels are 5.5 m × 5.5 m. Provide drops. Use M 20 grade concrete and Fe 415 grade steel.

2. Attempt any **two** parts of the following : **(2×10=20)**

(a) A 500 mm × 700 mm rectangular ring beam curved in plan is supported on 5 columns located equi-distant on a circle of 9.0 m mean diameter. If the service load is 100 kN/m and diameter of columns is 350 mm, design the beam at a support. Use M 20 grade concrete Fe 415 grade steel. The coefficients for maximum positive bending maximum negative bending moment and torsion moment and are 0.033, 0.066 and 0.005.

(b) Design a square spread footing to carry an axial load of 1500 kN from a 400 mm square tied column containing 20 mm bars as the main reinforcement. The bearing capacity of soil is 100 kN/m^2. Consider base of footing at 1.2 m below the ground level. The unit weight of soil is 20 kN/m^3. Use M 20 grade concrete and Fe 415 grade steel.

(c) Design a footing for the foundation of brick wall 400 mm thick and transmitting a load of 120 kN/m of its length. The bearing capacity of soil is 65 kN/m^2. The unit weight of earth is 17 kN/m^3. Use M 20 grade concrete and Fe 415 grade steel.

3. Attempt any **two** parts of the following : **(2×10=20)**

(a) Determine the dimensions of a T-shaped retaining wall for a height of 5 m above the ground level. The top of the earth is surcharged at 200 with the horizontal. The angle of repose of earth is 30° and its density is 20 kN/m^3. The safe bearing capacity of soil is 90 kN/m^2 and coefficient of friction between concrete and soil is 0.55.

(b) Design the vertical stem of a T-shaped retaining wall for a height of 3.5 m above the ground level. The top of earth retained is horizontal. The angle of repose of earth is 300 and its density is 20 kN/m^3. the safe bearing capacity is 100 kN/m^2. Use M 25 grade concrete and Fe 415 grade steel.

(c) A slab culvert has a span of 4.5 m and a clear roadway between Kerbs is 10 m. Determine the value of maximum bending moment for a single vehicle of IRC Class A or two vehicles of Class A loading.

4. Attempt any **two** parts of the following : **(2×10=20)**

(a) A circular water tank of 8 m diameter is 4.5 m high. The floor slab is monolithic with the walls. Design the wall of the tank.

(b) An Intze tank is to be provided for 1000 kl capacity. Determine the dimensions of all the components of the tank.

(c) Write short notes on the following :

(i) Minimum reinforcement in water tank.

(ii) Causes of cracking and its controlling.

5. Attempt any **two** parts of the following : **(2×10=20)**

(a) A beam is prestressed by a cable carrying an initial prestress of 600 N/mm^2. Calculate the percentage loss of prestress due to shrinkage of concrete if the beam is :

(i) pre-tensioned

(ii) post-tensioned.

Age of concrete at transfer is 7 days.

(b) A beam of 200 mm × 400 mm is prestressed by a force of 400 kN by steel cables at an eccentricity of 60 mm. Determine the loss of prestress due to creep of concrete using following data :

σ_{ck} = 45 N/mm^2, cables 6 nos – 7 mm,

creep coefficient θ = 2, E = 200 kN/mm^2.

(c) Calculate and draw the stress distribution at mid span for a rectangular beam 250 mm × 300 mm that is prestressed with a force of 500 kN at a constant eccentricity of 75 mm. The beam is supporting a 50 kN concentrated load at the mid span of 4 m span beam; neglect dead weight of the beam.