[01 – 3211]

III/IV B.E. DEGREE EXAMINATION.

Second Semester

Civil Engineering

REINFORCED CONCRETE STRUCTURES – II

(Common with Civil Environmental Engineering and Dual Degree Programme in Civil Engineering)

(Effective from the admitted batch of 2006–2007)

Time : Three hours Maximum : 70 marks

Question No.1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

Use of IS – 456 – 2000, IS – 1343 – 1982 and IS – 3370 Part – IV is allowed.

1. (a) Distinguish between active and passive earth pressure.

(b) Give the design requirements for the stagging of an overhead water tank.

(c) Give the different checks to be adopted in the design of retaining wall.

(d) Briefly explain Courbon's theory of distribution of live load on longitudinal beams.

(e) List out the different types of bridges.

(f) Give the advantages of pre-stressed concrete over reinforced concrete.

(g) What is a pile cap?

2. Design a counterfort retaining wall to retain earth 5.0 m above the basement level. The density of earth is 16000 N/m^3 and the angle of repose of soil is 30°. The bearing capacity of the soil is 125 kN/m^2. Use M20 concrete and Fe500 steel.

3. Design a circular tank for a capacity of 400 kiloliters with flexible base. Use Fe415 steel bars for reinforcement and M25 concrete.

4. Design a slab bridge with carriage way of 12 m with kerbs only for all effective span of a 6 m for IRC 70 loading. Use M25 concrete and Fe415 steel.

5. Design a pile cap for a system of 3 piles supporting a column 500mm square carrying an axial load of 600 kN. Assume that the diameter of the pile is 400 mm. Take $f_{ck} = 20$ N/mm^2 and $f_y = 415$ N/mm^2.

6. A prestressed concrete beam 300 × 600mm is ore-stressed by tendons of area 250 mm^2 at a constant eccentricity of 100 mm with an initial stress of 1050 N/mm^2. Span of the beam is 10.5 m. Data regarding losses are modular ratio = 6, friction coefficient = 0.0015/m, anchorage slip = 1.5 m, ultimate creep strain = 40×10^{-6}, shrinkage of concrete = 300×10^{-6} relaxation of steel = 2.5%. Calculate the losses for prestressing case.

7. Design the deck slab of a RCC T-beam girder bridge for the following data:

   Clear width of road way = 7.5 m

   Span = 16 m centre to centre of bearing

   Live load = IRC class AA

   Average thickness of weaving coat 80 mm.

   Use M25 grade concrete and Fe415 steel.

8. A simply supported beam of span 10 m and section 500 × 750 mm is prestressed by a parabolic cable having an eccentricity of 100 mm at centre of span and zero at support with a pre-stressing force of 1600 kN. If the beam supports and udl of 40 kN/m, find the extreme stress at mid span section.