Code No.: 3066

FACULTY OF ENGINEERING

B.E. III/IV Year (Civil) II Semester (Main) Examination, May/June, 2011

STRUCTURAL ENGINEERING DESIGN & DETAILING – I (RCC)

Time : 3 *Hours*] [*Max. Marks* : 75

Note : *1. Answer all questions from Part A.Answer one question from each unit. (i.e. Total 3 questions in Part B)*

2. Use of relevant codes and tables permitted.

3. Assume reasonably any data found essential and not given.

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Part A – (Marks : 25)

1. Multiple choice (Write the correct answer) (3 × 1 = 3)

(i) Combined footings are provided in

(a) sandy soils. (b) clayee soils.
(c) where individual footings overlap. (d) over hard rock.

(ii) In a cylindrical water tanic with flexible base the vertical walls are to be designed for

(a) Hoop compression. (b) Hoop tension.
(c) Tension & bending. (d) Compression & bending.

(iii) Minimum width of a single lane bridge is

(a) 3.8 m. (b) 4.25 m.
(c) 5.0 m. (d) 2.0 m. (3 × 1 = 3)

2. Fill up the Blanks :

(a) The critical section for beam shear with reference to footings is at a distance of kd from the face of the column where k =

(b) The top ring beam of an intze tank is to be designed for.....

(c) In a highway bridge slab supported on opposite edges only (abutments or piers) the method of design to be adopted for the slab is.....

3. Indicate the design forces (with sketch) formulae with notation for the design of a spherical dome of an intze tank. 3

4. What are the stability requirements of a retaining wall. 3

5. Give Courbon's formula with notation, indicate where it is used w.r.t.R.C. girder bridges. 3

6. On what basis do you arrive at the thickness of a combined footings under R.C. columns. 2

7. Sketch neatly the cross section of a cantilever retaining wall and show clearly the reinforcement details in all the components. 2

8. What are the forces for which the bottom-most ring girder in an intze tank is to be designed. 2

9. How is the behaviour of stem different in cantilever and counterfort retaining walls under lateral earth pressure.

10. Sketch the details of class 2A tracked loading and mark the important values including ground contact dimensions. 2

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Part B – (Marks : 50)

Unit I

11. (a) Design a rectangular combined footing for two columns 4.5m apart and carrying loads of 750 KN on Column A of size 300 × 300 mm and 900 kn on column B of size 400 × 400 mm. SBC of soil is 180 KN/m^2. Use M20 concrete and Fe415 steel. 5

(b) Sketch the reinforcement details in elevation and plan. 15

Or

12. (a)Design the base slab (Toe & heel) for a cantilever retaining wall to retain earth for 3.5m above ground level. Depth of foundation is 1m. Unit weight of earth is $17KN/m^3$. Angle of repose is 30^0. Use M20 grade concrete and Fe 415 steel. 5

(b) Sketch neatly the reinforcement details in section and elevation. 4

Unit II

13. (a)Design the spherical dome and top ring beam of an Intze tank of roof base diameter 10m. The top of dome above roof base is 1.5m. Use M20 grade concrete and Fe415 steel.

(b) Sketch neatly the reinforcement details in the top ring beam and the spherical roof. 15

Or

14. (a) Design a R.C. rectangular water tank of dimensions 3.5m × 5m and 2.5m height. The tank is resting on the ground. Adopt M20 grade concrete and Fe415 steel.

(b) Sketch neatly the reinforcement details.

Unit III

15. (a) An R.C. slab bridge is to be designed for the following data.

Clear carriage way width = 7.5m

Width of Kerbs 1m each.

Thicknen of wearing coat (avc) 10cm.

Loading IRC Class A

Use M20 concrete and Feb 415 steel.

(b) Sketch neatly the longitudinal and cross section of the bridge, showing clearly the reinforcement details.

Or

16. (a) An interior longitudinal girder for a T beam bridge has to be designed for the following data. Clear width of Road way 7.5m. Live load class AA tracked. Spam c/c of bearings 16m. Average thickness of wearing coat 80mm. Use M20 grade concrete and Fe 415 steel. Assume spacing of cross girders suitably. Width of kerbs 1m each.

(b) Draw to a suitable scale the reinforcement details in cross section and longitudinal section of the girder. 20