B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Final Year)

CIVIL ENGINEERING

Paper - I : Advanced Design of Structures

Time : 3 Hours   **Maximum Marks : 75**

Answer ONE question from each unit   *(5 × 15 = 75)*

UNIT – I

1) An R.C. Intz-type water tank supported on six columns is required to store 2,00,000 litres of water. Design the Intz type water tank with the following data :

Height of staging above ground level = 12 mts.

SBC = 150 kN/m^2

Basic wind pressure = 2 kN/m^2

Use M$_{20}$ grade concrete and Fe$_{415}$ grade steel.

OR

2) Design a circular tank of capacity 1,60,000 litres. The depth of tank is limited to 3.0 metres. The tank is resting on rigid base. The materials used are M$_{25}$ grade and Fe$_{415}$ steel. Assume μ = 0. Adopt of I.S. method of design.

UNIT - II

3) a) Describe briefly the main components of concrete bridge structure with a help of neat sketches.

b) List out the various loads, forces and stresses to be considered while designing road bridges and explain in detail any four (two forces, two loads) among them.

OR

4) Design a reinforced concrete slab culvert for a national highway to suit the following :

     a)   Carriage way : Two lane (7.5 m wide)

     b)   Foot paths : 1.2 m on either side.

     c)   Clear span = 5.5 m

     d)   Leading IRC class AA tracked vehicle Use M$_{20}$ grade concrete and Fe$_{415}$ steel.

UNIT - III

5) Design a T-beam bridge for the following data :

Clear width of roadway = 7 m

Span centre of centre of bearings = 16 m

Live load = one lane of class AA or two lanes of class A loading

Average thickness of wearing coat = 8 cm

Use M_{20} concrete fordeck slab and M_{15} concrete for Beams. Take unit weight of concrete as 24000 N/m^3.

OR

6) Explain in detail the following with the help of neat sketches.

a) Pigeaud's Method for computation of slab moments.

b) Courbon's method for computation of moments in girders.

UNIT – IV

7) Design a pier for the following data :

Superstructure : Simply supported T-beam of 22.3m span

Foundation : Well foundation

Dimensions : As shown in Fig.1

Dead load from each span : 2450 kN

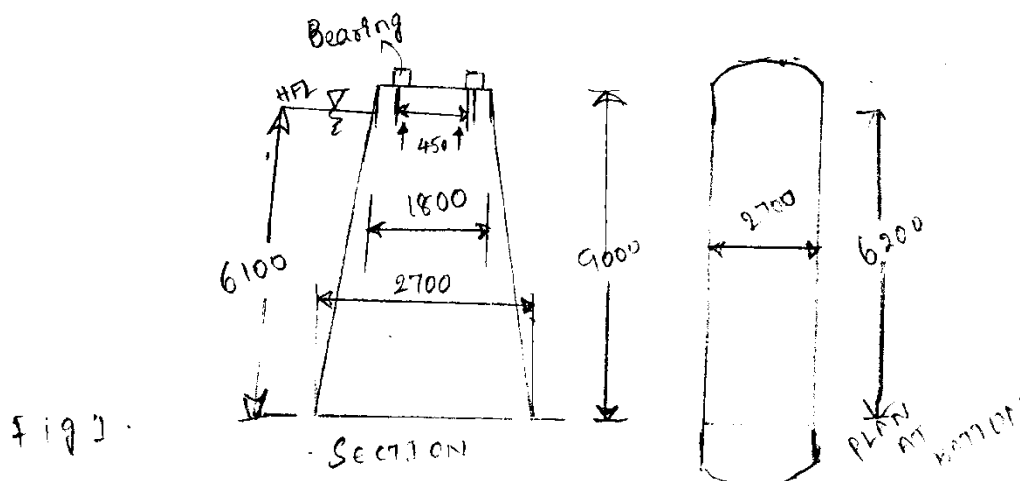Reaction due to live load on one span = 900 kN

Maximum mean velocity of current = 3.6 m/sec.

Material for plan : Cement concrete M_{20} grade

Live load : IRC class AA (or) class A whichever produces serve effect.

Only the straight portion of the pier will be considered in design.

It is required to check the adequacy of the dimensions.

Dimensions of pier

OR

8) Design a central pier for the following data :

Superstructure = T – beam bridge 25 m span.

Foundation = Well foundation

Dead load from each span = 2500 kN

Mean velocity of flowing water =1000 kN

Materials = 2.75 mps

Design straight length of pier.

UNIT – V

9) a) Distinguish between expansion and fixed bearings.

b) What are the general requirements that make electrometric bearings the most ideal for bridges?

OR

10) Write in a detailed manner about the various types of foundations for bridges.

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