Printed Pages—3 **ECE021**

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

PAPER ID : 100655 **Roll No.** 1 2 0 3 2 0 0 9 0 2

B.Tech.

(SEM. VI) THEORY EXAMINATION 2013-14

ADVANCED CONCRETE DESIGN

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) The design must be supported by structural drawings.

1. Attempt any **two** parts of the following : **(10×2=20)**
   (a) Design a circular water tank with a spherical top dome to a capacity of 55 kl. The depth of storage may be taken as 4 m, free board is to be kept as 200 mm. Use M 30 grade concrete and Fe 415 grade steel.
   (b) Design a rectangular RC water tank of capacity of 80 kl. The inside dimensions may be taken as 6 m × 4 m. Use M 25 grade concrete and Fe 415 grade steel.
   (c) An Intze tank is to be provided for a capacity of 1000 kl, supported on elevated tower consisting of 8 columns. The base of tank is 15 m above ground and depth of foundation is 1.0 m below ground level. Determine the dimensions of all components of the tank. Also design the top dome, top ring beam and side wall. Use M 30 grade concrete and Fe 415 grade steel.

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2. Attempt any **one** part of the following : **(1×20=20)**

(a) Design the foundation for an Intze type water tank supported on an elevated tower consisting of 8 columns. The diameter of the beam is 10 m. The load on each column is 2500 kN. Safe bearing capacity of soil is 240 kN/m^2. Use M 25 grade concrete and Fe 415 grade steel. Take constants as $k_1 = 0.0083$, $k_2 = 0.0041$ and $k_3 = 0.006$.

(b) Determine the dimensions of all the components of an Intze tank for a capacity of 1500 kl. The tank is supported on an elevated tower of 15 m height consisting of 8 columns. Taking wind pressure of 1.8 kN/m^2 and vertical axial load on each column as 1600 kN, design the columns and braces. Use M 25 grade concrete and Fe 415 grade steel.

3. Attempt any **one** part of the following : **(1×20=20)**

(a) Determine the stiffness distribution factors and maximum bending moments in the beams and columns in the substitute frame shown in **Fig 1**. The T-beam is assumed to have a depth of 600 mm and web width is 350 mm.

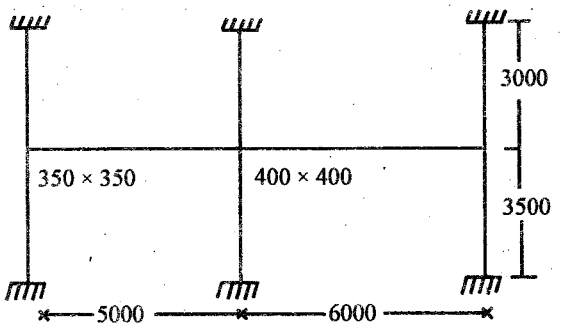

Fig 1

(b) Determine member forces in the frame shown in **Fig 2**. Assume area of each inner column = 1.5 times the area of each outer column. The intensity of dead load and live load is 20 kN/m and 25 kN/m respectively.

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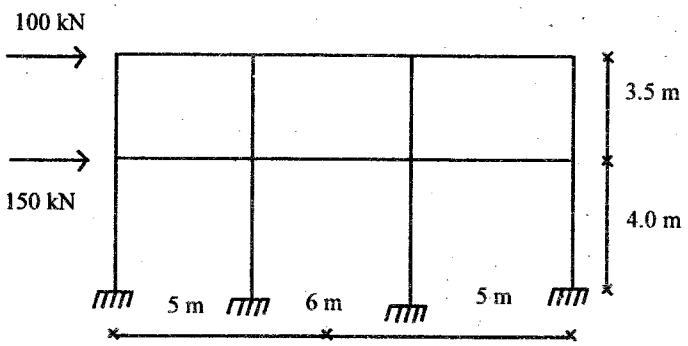

Fig 2

4. Attempt any **one** part of the following : **(1×20=20)**

   (a) Design a slab culvert for a clear span of 5 m having a clear roadway of 10 m between kerbs for a single vehicle of IRC class AA or two vehicles of class A loadings.

   (b) A T-beam bridge is to be designed for a span of 30 m. Plan the arrangement of longitudinal girders and cross-beams and design one slab panel for class AA loading. Use M 30 grade concrete and Fe 415 grade steel.

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

   (a) What do you understand by high performance concrete ? Explain in detail.

   (b) Explain different types of shear connectors used for composite construction.

   (c) Design a composite beam for the following data :

   Flage width = 1600 mm

   Thickness of slab = 120 mm

   Span = 10 m

   Load = 25 kN/m