CIVIL ENGINEERING (Code – 05)
Time: 3 Hours
Maximum Marks: 150

Note: Attempt FIVE questions in all. All questions carry equal marks. Question No. 1 is compulsory. Answer any two questions from Part-I and any two questions from Part-II. The parts of the same question must be answered together and must not be interposed between answers to other questions.

1. Attempt any four of the following: (4 x 7.5)

   a) A fixed beam A B of length L carries a concentrated load W at mid span. The moment of inertia of the beam from either end to a distance of L /4 is I and 2I over the remaining length . Calculate the fixed end moments.

   b) What are the assumptions made in the Slope Deflection method for analysis of structures?

   c) A cohesive soil has an angle of shearing of 15 ° and cohesion of 35 kN/ m². If the specimen of this soil is subjected to a triaxial compression test, find the value of lateral pressure in the cell for failure to occur at a total stress of 300 kN/m².

   d) What is consumptive use of water by a crop? Enlist the factors affecting it.

   e) How will you implement a proper drainage system in a residential building?

   f) Explain the salient points which should be kept in mind for the maintenance of a railway track.

PART – I

2. a) A bar 40 mm in dia. is subjected to a tensile force of 40 kN . The extension of the bar measured over a gauge length of 200 mm was 0.318 mm. The decrease in diameter was found to be 0.02 mm. Calculate values of Young's modulus of elasticity and modulus of rigidity of the material. (15)

   b) Explain the various post-tensioning systems with neat sketches. (15)

3. a) A rivet group consists of 10 rivets, 22mm dia. arranged in two rows of 5 rivets each at a pitch of 80 mm centre to centre. The horizontal distance between the rows is 100 mm. Which rivet is most heavily loaded and what is its value if the joint carries a load of 10 kN at an eccentricity of 200 mm. (15)

   b) List and discuss assumptions in Terzaghi's theory of one dimensional consolidation. Derive the equation of consolidation. (15)

4. a) Determine the dimensions of an economical trapezoidal section of an open channel with sides slopes 2H : 1V laid on a slope of 1 in 1600 to carry a discharge of 36 m³/sec., assuming Chezy's Coefficient C = 50 (15)

   b) What are the general design requirements to be satisfied by a RCC retaining wall in order to avoid its failure? (15)

PART – II

5. a) Describe the various characteristics of good building stones. (15)

   b) What is meant by Super-elevation and why is it essential on curves? What do you understand by side friction in this connection? (15)

6. a) The following observations were taken during the testing of dumpy level.

Instrument at	Staff reading on	
	A	B
A	1.275	2.005
B	1.040	1.660

Is the instrument in adjustment? To what reading should the line of collimation be adjusted when the instrument was at B. (15)

b) Write short notes on: (3 x 5)
   (i) Cross Drainage Works   (ii) Hygroscopic water, Capillary water and Gravity water
   (iii) Water logging and salinity of soils.

7. a) What are the most commonly terms used in PERT analysis? Draw a PERT network for the following Project:
   i)   A is the first or start event and K the end event
   ii)   J is a successor event to F
   iii)   C and D are successor events to B
   iv)   D is preceding event to G
   v)   E and F occur after event C
   vi)   E precedes F
   vii)   C restrains the occurrence of G , and G precedes H
   viii)   H precedes J
   ix)   F restrains the occurrence of H
   x)   K succeeds event J

b) What are the different methods of raw water treatment? Explain. (15)