

# Civil Engineering



## Paper-I

Time allowed : Three hours

Maximum Marks: 300

### INSTRUCTIONS

Please read each of the following instruction carefully before attempting questions:

There are total SEVEN questions. Candidates should attempt any FIVE questions.

All questions carry equal marks. The number of marks carried by a part of question is indicated against it.

Answer must be written in ENGLISH only.

Unless otherwise mentioned, symbols and notations have their usual standard meanings.

Assume suitable missing data, if necessary and indicate the same clearly.

Neat sketch may be drawn, wherever required.

All parts and sub-parts of a question are to be attempted together in the answer book.

Any page left blank in the answer book must be clearly struck out.



1. a. What are Veneers? Whether Veneers are linked with Plywood? Write advantages of Plywood. 30
- b. What are various chemical constituents available in bricks? Explain their functions. 30
2. a. Why do we provide combined footing? If a column is present at boundary of the property, how would you provide footing for such column? 20
- b. How many types of windows are there? Explain each of them in brief? 40
3. a. How many types of estimates are there? Explain each of them in brief. 30
- b. Carry out the rate of analysis for 1: 1½: 3 cement concrete. Assume suitable rate of materials and man power. 30
4. a. A cylindrical buoy, diameter 1.50 m and height 1.20 m weighing 450 kg is floating in sea water with its axis vertical. Find the maximum permissible height (above top of the buoy) of the centre of gravity of a 35 kg load which is placed centrally on the top of the buoy. Sea water weighs  $1025 \text{ kg/m}^3$ . 30
- b. A 40 cm diameter concrete pipe, 4100 meters long conveys water at  $10 \times 10^6$  litres per day. The pipe line is gradually closed by a valve at the down-stream end in an interval of 15 seconds. Is there any risk of pipe burst? Test pressure of concrete is given to be 25m. 30
5. a. The moisture content of a soil is 35% and the relative density 'G' of its particle is 2.7. Find the void ratio 'e' and the porosity 'n' of the soil. What will be the degree of saturation and the air content, if moisture content of the soil reduces to 5% on drying? 20

- b. During a constant head permeameter test, a flow  $Q$  of  $160 \text{ cm}^3$  is measured in 5 minutes under a constant head of 15 cm. The specimen is 6 cm long and has a sectional area  $50 \text{ cm}^2$ . The porosity  $n_1$  of the specimen is 42%. Determine the permeability, the flow velocity ' $v$ ' and the seepage velocity ' $v_s$ '. Estimate  $k_2$  for  $n_2 = 35\%$ . 40

- 6 a. A dumpy level was set up exactly mid-way between two pegs A and B, 80 m apart. The reading on the staff when held on the pegs A and B were 1.865 and 1.780 respectively. The instrument was then removed and set up at a point C on the line BA produced and 16 m from A. The respective readings on A and B were 1.620 and 1.550. Calculate the staff readings on A and B to give a horizontal line of sight. 30

- b. Examine the following notes on a compass survey for local attraction. Determine correct bearings. Also determine the included angles at A, B, C, D and E:

| Station | Fore Bearing   | Back Bearing   |    |
|---------|----------------|----------------|----|
| A       | S $10^\circ$ W | N $85^\circ$ E |    |
| B       | S $77^\circ$ E | N $10^\circ$ E |    |
| C       | N $5^\circ$ E  | N $75^\circ$ W |    |
| D       | N $54^\circ$ W | S $2^\circ$ W  |    |
| E       | S $88^\circ$ W | S $50^\circ$ E | 30 |

7. a. What are various oxide compounds present in an ordinary Portland cement? Explain their rate of hydration, heat release on hydration and strength contribution etc. 30
- b. What are admixtures? Explain various types of admixtures along with examples. 30