

Time : 3 hours

Full Marks : 100+100=200

Instructions :

- (1) The figures in the right-hand margin indicate full marks for the questions.
- (2) All questions are compulsory.

SECTION—A

1. (a) What are the different types of bricks? Discuss them briefly. 4
- (b) What are the constituents of ordinary Portland cement (OPC)? Why the OPC is so called? 4
- (c) How do you choose good stones for construction of a high-rise building? 3
- (d) Differentiate between surkhi and mortar. 3
2. (a) Describe dog-legged staircase with the help of a neat sketch. 3+3=6
- (b) What type of roof will you suggest for a house to be constructed in a rainfed area? Justify your answer. 3
- (c) What is the difference between painting and varnishing? 3
- (d) Why is DPC important in construction? Where is it provided? 3
3. Choose the correct answer from the following options available : 1×4=4
- (a) Compression members always tend to buckle in the direction of the
 - (i) axis of load
 - (ii) perpendicular to the axis of load
 - (iii) minimum cross-section
 - (iv) least radius of gyration
- (b) When a thin cylindrical shell is subjected to an internal pressure, there will be
 - (i) a decrease in diameter and length of the shell
 - (ii) an increase in diameter and decrease in length of the shell
 - (iii) a decrease in diameter and increase in length of the shell
 - (iv) an increase in diameter and length of the shell

- (c) A beam of uniform strength has
- (i) same cross-section throughout the beam
 - (ii) same bending stress at every section
 - (iii) same bending moment at every section
 - (iv) same shear stress at every section
- (d) The polar modulus for a solid shaft of diameter (D) is

(i) $\frac{nD^2}{4}$

(ii) $\frac{nD^3}{16}$

(iii) $\frac{nD^3}{32}$

(iv) $\frac{nD^4}{64}$

4. A metallic block of size 500 mm long, 150 mm breadth and 50 mm thick is subjected to 45 kN, 12 kN and 6 kN loads along X, Y and Z directions respectively. Assuming all the loads as tensile, determine the amount of change in volume of the block. 6

Take, $E = 2 \times 10^5 \text{ N/mm}^2$

Poisson's ratio = 0.20

5. Draw the shear force diagram and bending moment diagram for a beam as shown in Fig. 1. Also show the calculated values at the salient points. 10

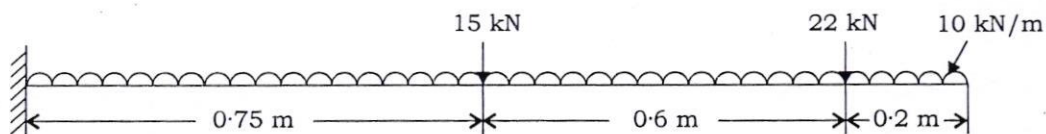


Fig. 1

6. (a) A bearing plate of size 300 mm square settles by 20 mm in plate load test on a cohesionless soil under an intensity of loading 0.20 N/mm^2 . The same intensity of loading is applied to a prototype shallow footing of size 1.2 m square. What will be the corresponding settlement for the prototype? 6
- (b) What are the factors responsible for slope failure? 3
7. Write the units of measurements for the following quantities : 6
- (a) DPC
- (b) Plaster with 1 : 4 mortar
- (c) Earthwork in excavation
- (d) Steel in slab
- (e) Floor tiles
- (f) Cistern
8. Estimate the quantity of brickwork required for completion of a single-storey RCC building as per the following line diagram (Fig. 2). The height of the storey may be assumed as 3.5 m and plinth height is 0.5 m. The size of column is 250 mm square. The building has no provision for staircase. Assume any other data if required. 10

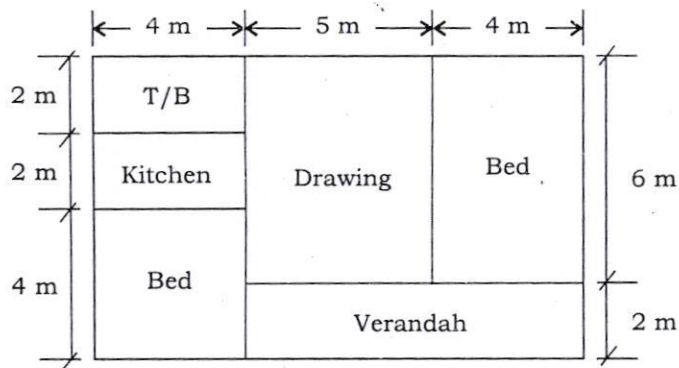


Fig. 2 : Line diagram of an RCC building (not to scale)