

**B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)**

Term-End Examination

00615

June, 2017

ET-508(A) : STRUCTURAL DESIGN – I

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **four** questions. All questions carry equal marks. Use of code of practice IS : 456 and scientific calculator is allowed. Any missing data may be suitably assumed. Use limit state design method unless noted otherwise.

1. Determine U.D.L. inclusive self-weight for the 'T' beam section as shown in Figure 1. The beam has an effective span of 5 m and is simply supported on both the ends. Adopt M 20 grade of concrete and Fe 415 grade of steel. $17\frac{1}{2}$

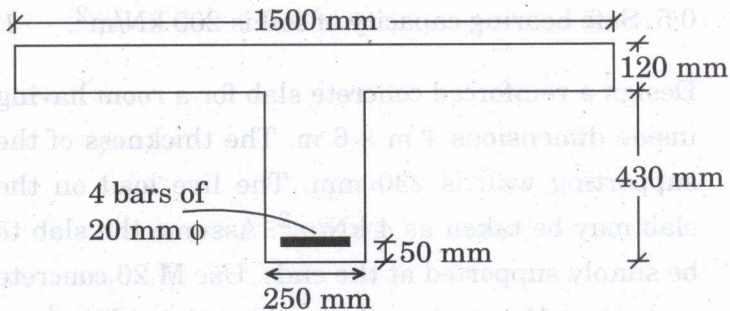


Figure 1

2. Design a rectangular beam for an effective span of 6 m. The superimposed load is 60 kN/m and the size of the beam is restricted to 300 mm × 700 mm. Adopt M 20 grade of concrete and Fe 500 grade of steel. Assume mild exposure conditions. $17\frac{1}{2}$

3. Design a rectangular isolated footing of uniform thickness for an RC column carrying a vertical load of 1200 kN. Size of the column is 400 mm × 600 mm and S.B.C. of soil is 150 kN/m². Use M 20 grade of concrete and Fe 415 grade of steel. $17\frac{1}{2}$

4. A cantilever retaining wall is to be designed to retain a 5 m high backfill. The density of the backfill is 16 kN/m³ and the angle of internal friction 30°. There is a surcharge load of 10 kN/m² on the backfill. Propose the cantilever retaining wall and perform its stability checks as per IS : 456. Take the depth of foundation as 1.5 m. Coefficient of friction between soil and concrete is 0.5. Safe bearing capacity of soil is 200 kN/m². $17\frac{1}{2}$

5. Design a reinforced concrete slab for a room having inside dimensions 4 m × 6 m. The thickness of the supporting wall is 230 mm. The live load on the slab may be taken as 4 kN/m². Assume the slab to be simply supported at the ends. Use M 20 concrete and Fe 415 steel and consider 1.2 kN/m² as superimposed dead load on the slab. $17\frac{1}{2}$

6. (a) Discuss the following briefly :
- (i) Design loads for masonry pipes 5
 - (ii) Characteristics of Yield lines 5
- (b) Explain various structural elements of an Intze tank. $7\frac{1}{2}$
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