

BE Civil Engineering examination(Part time) - 2018
(4th year – 2nd semester)
Design of Structures III

Time: 3 hours

Full marks : 100

The figures in the margin indicate full marks

Assume reasonable value of any data if required

IS 1893, IS 875 – Part III, IS 456 and SP 16 are allowed in the examination hall

Answer any Three question

- 33¹/₃**
1. Design a Cantilever T-type retaining wall to retain a soil of full height 6.5 m and an uniformly distributed surcharged load of 20 KN/m² at top surface level . Safe bearing capacity of cohesionless soil = 250 KN/m². $\gamma_s = 18 \text{ KN/m}^3$, $\phi = 30^\circ$. Grade of concrete M25. Grade of steel Fe 415. Show detail of reinforcements through neat sketches.

33¹/₃
 2. Design a short RCC column with a suitable Pile cap against an axial compressive force of $P=1600 \text{ KN}$ and biaxial moments $M_x=155 \text{ KN-m}$ and $M_y= 135 \text{ KN-m}$. Use 500 dia. RCC piles of capacity 350 KN. Grade of concrete M25. Grade of steel Fe 415. Apply Limit State Method of design as per IS 456. Partial safety factor against load and moments may be considered 1.5. Show detail of reinforcements through neat sketches.

33¹/₃
 3. Calculate the base shear and inertia forces at floor levels of a G+4 RCC office building to be constructed at Agartala on pile foundation in medium soil as per IS 1893. It is a framed structure 20m x 20m (4 columns on both sides) . Floor to floor height =3.3m. First floor to pile cap = 6m .All column sizes = 400mm x 400mm , All beam sizes = 300mm x 500mm. Dead load for floor slab and roof slab are 6 KN/m² and 6.5 KN/m². Live load = 4KN/m². Peripheral walls = 280 mm thick including plaster ,Internal walls = 150 mm thick including plaster and Parapet walls = 280 mm thick including plaster, 1m high. Water tank load = 350KN and lift load=80KN. Draw also BMD of an internal frame at first floor level using "Cantilever method".

33¹/₃
 4. Design a pre-stressed concrete girder of span 20m against a live load of 30KN/m . Allowable bending compressive stress in transfer and service are 140N/mm² and 120N/mm² respectively. Allowable bending tensile stress = 12N/mm².