

## BE Semester- VII (CIVIL ENGG.) Question Bank

### (Subject Name): DESIGN OF CONCRETE STRUCTURE

All questions carry equal marks (10 marks)

Q.1	Explain Loading standard as per IS Codes.
Q.2	Write down distribution & combination of loads.
Q.3	Explain uniaxial & biaxial bending design of long column.
Q.4	Explain torsion & shear design of column.
Q.5	Write down concept of pre-stressing, types of pre-stressing.
Q.6	Differentiate between post-tensioning & pre-tensioning.
Q.7	Write down about pre-stressing systems & losses.
Q.8	Write down concept of Ultimate design loading.
Q.9	Explain in brief <ul style="list-style-type: none"><li>• Canopy</li><li>• Cantilever shed</li><li>• Portal</li></ul>
Q.10	Explain in brief <ul style="list-style-type: none"><li>• Flat slab</li><li>• Retaining wall</li><li>• Ductile detailing</li></ul>
Q.11	Define the terms in detail <ul style="list-style-type: none"><li>• Isolated footing</li><li>• Combine footing</li><li>• Raft footing</li></ul>
Q.12	Differentiate between Underground Tank & Elevated Intze Tank
Q.13	Explain the given terms <ul style="list-style-type: none"><li>• Flexural design</li><li>• Shear design</li><li>• Anchorage design</li></ul>
Q.14	A 12 storied building having 8 frames at 3 m spacing in one direction and 10 frames at 4 m spacing in orthogonal direction is situated on a hill near Bhopal with upwind slope of $10^\circ$ and factor $s = 0.15$ . The storey height is 3.2 m. 1.2 m parapet is provided at top. Showing the variation of wind pressure, calculate the nodal forces due to wind in any one direction.
Q.15	Design and detail the <b>flat slab</b> interior panel with 4.8 m x 3 m dimensions. The slab carries live load of 3.5 kPa and floor finish of 1.2 kPa. The square columns are 0.4 m size.
Q.16	Design a slab type rectangular <b>combined footing</b> to support the columns carrying 900 kN and 1.1 MN at 4 m spacing. Their square column sizes are 450 mm and 500 mm respectively. The SBC of soil is 250 kPa and width of footing is 160 kPa.
Q.17	Detail neatly every terms of above example.
Q.18	Design a <b>counter fort type retaining wall</b> to retain 5 m high horizontal backfill above ground with 60 kPa live load on it. The unit weight of backfill, angle of internal friction, coefficient of friction, spacing of counterforts and soil bearing capacity are $18 \text{ kN/m}^3$ , $30^\circ$ , 0.62, 3.0 m and 200 kPa respectively.

Q.19	Detail with neat sketch every terms of above example.
Q.20	Design one bay single storey portal frame to support 120 mm slab. The slab carries a live load of 3.5 kPa and floor finish of 1 kPa. The portals are spaced at 4 m. The bay width is 12 m and height of column above ground is 4 m. Take SBC = 200 kPa. Consider fixed bases.
Q.21	Detail with neat sketch every terms of above example.
Q.22	Design the vessel for an Intze type container to store 1.2 Ml of water. The supporting system is made with 8 columns and bracings.
Q.23	Detail with neat sketch every terms of above example.
Q.24	Design the pre-tensioned slab to carry the live load of 16 kPa over a span of 4 m. Take $f_{ci} = 30$ MPa, $f_{ck} = 45$ MPa, $f_{pi} = 1.2$ GPa, $f_p = 1.5$ GPa and % loss in pre-stress = 15. No tension is allowed at any stage.
Q.25	Detail with neat sketch every terms of above example.
Q.26	Design reinforced concrete retaining wall with following data:- <ul style="list-style-type: none"> <li>• Height of wall = 4.0 m</li> <li>• Surcharge pressure = 15 KN/m<sup>2</sup></li> <li>• SBC of soil = 200 KN/m<sup>2</sup></li> <li>• Angle of repose = 30<sup>0</sup></li> <li>• Grade of concrete = M 20</li> <li>• Grade of steel = Fe 415</li> </ul>
Q.27	Show your details using neat & clear sketch.
Q.28	Two columns C <sub>1</sub> & C <sub>2</sub> are spaced at a c/c dist of 4 m. The column C <sub>1</sub> is positioned at the property line & the footing can not be constructed beyond this line. The dimensions of columns C <sub>1</sub> & C <sub>2</sub> are 300mm x 450mm resp & carry loads of 1000kn & 1500kn resp, design the combined footing under the columns if SBC of soil is 225 kn/m <sup>2</sup> . Use M20 & Fe415 .
Q.29	Design a corner (400mm x 450mm) of a building having a braced frame & carrying loads: <ul style="list-style-type: none"> <li>• Pu = 1400 kn</li> <li>• Mux = 200 kn-m</li> <li>• Muy = 100 kn-m</li> </ul> The unsupported length of the column is 3.5m. use Fe415 & M20.
Q.30	Show your details using neat & clear sketch.
Q.31	Differentiate between design methods of Isolated & Combine footing.
Q.32	A hall is 12m wide & 24,5m long. These are series of portal frames at 3.5m c/c dividing the length of the hall in seven equal parts. The portal frames are hinged at their bases & the height upto the centre of the horizontal member is 6m from lthe centre of the hinge. The safe bearing capacity of soil is 150 kn/m <sup>2</sup> . Use M20 mix. Design & detail intermediate beam of portal.
Q.33	In above example, Design & detail any one column connected to beam. Give detailed reinforcement everywhere.
Q.34	A combined rectangular footing for two columns spaced at 6m c/c. Face of one of the columns of 400mm x 400mm & subjected to a load of 1500kn at service state condition, with the property line & other column is of section 500mm x 500mm & subjected to a load of 2500kn at service consider. <ul style="list-style-type: none"> <li>• Weight of soil = 20 kn/m<sup>3</sup></li> <li>• Angle of repose = 30<sup>0</sup></li> <li>• Allowable bearing capacity of soil qs = 150 kn/m<sup>2</sup></li> </ul>

	<ul style="list-style-type: none"> <li>• Grade of concrete = M20</li> <li>• Grade of steel = Fe415</li> </ul> <p>Determine the Proportion the Footing.</p>
Q.35	In above Example , Design footing slab
Q.36	In above Example , Show reinforcement on neat skect.
Q.37	Post-tensioning prestressed concrete beam of rectangular cross-section 200mm wide is designed for impose load of 9 kn/m. Udl on simply supp over a span of 10m. The stress in concrete must not exceed 10N/mm <sup>2</sup> in compression & 1N/mm <sup>2</sup> in tension at any time. Calculate min possible depth of beam, if losses are 15%. Take $f_{ck} = 40 \text{ MPa}$ & $f_p = 1500 \text{ MPa}$ .
Q.38	Draw only neat sketches of sectional elevation of Domicial type overhead R.C. water tank showing tentative reinforcement with staging & appropriate dimensions for various components. Capacity = 5,00,000 litres.
Q.39	Design a short column to carry 900kn load & moment of 30kn-m. Unsupported length of column is 3.2m. consider both ends fixed.
Q.40	Draw a typical layout for a G+3 residential building, prepare structural layout & draw load distribution diagrams. Design & detail a typical slab, a typical continuous beam & columns at typical location.