SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR-517 583

Siddharth Nagar, Narayanavanam Road – 517583

(AUTONOMOUS)

QUESTION BANK (DESCRIPTIVE)

Subject with Code : Advanced Structural Design (19CE0141) **Course & Branch**: B.Tech & CE

Year & Sem: IV-B.Tech & II-Sem **Regulation:** R19

UNIT –I
FLAT SLAB

1	Design an interior panel of a flat slab with panel size 5 x 5 m supported by size of column is 500mm x 500mm.Without Provide suitable drop. Take live load as 4 kN/m^2.Take floor finishing load as 1kN/m^2 Use M20 steel and Fe415 steel. Draw the reinforcement details by showing cross section at column strip	[L4][CO1]	[12M]
2	Design an interior panel of a flat slab with panel size 6 x 6 m supported by columns 500mm x 500mm.Provide suitable drop. Take live load as 5 kN/m^2. Use M20 steel and Fe 415 steel. Draw plan and sectional elevation	[L4][CO1]	[12M]
3	Design an interior panel of a flat slab floor system for a warehouse 24 m x 24 m divided into panels of 6 m x 6 m for a live load of 5 kN/m^2 And column size is 500mm. Use M25 grade concrete and Fe415 steel respectively. Draw the reinforcement details.	[L4][CO1]	[12M]
4	Design an interior panel of a flat slab 8 m x 8 m for a live load of 10 kN/m^2. Use M20 grade concrete and Fe415 steel respectively. Draw the reinforcement details	[L4][CO1]	[12M]
5	Design a flat slab with drop panels for a large single storey warehouse flat slab roof with a panel size of 6 m x 6 m supported by columns of size 500 mm x 500 mm. The height of the columns is 5 m. Take live load as 3.0 kN/m^2. Use M25 concrete and Fe 415 steel. Draw the reinforcement details	[L][CO1]	[12M]
6	Design an interior panel of a flat slab floor system for a warehouse 20 m x 20 m divided into panels of 5 m x 5 m for a live load of 4 kN/m^2 And column size is 500mm. Use M25 grade concrete and Fe415 steel respectively. Draw the reinforcement details.	[L4][CO1]	[12M]
7	Design an interior panel of a flat slab 5 m x 5 m for a live load of 10 kN/m^2. Use M20 grade concrete and Fe415 steel respectively. Draw the reinforcement details	[L4][CO1]	[12M]
8	Design an interior panel of a flat slab with panel size 5 x 5 m supported by size of column is 500mm x 500mm.With Provide suitable drop. Take live load as 4 kN/m^2.Take floor finishing load as 1kN/m^2 Use M20 steel and Fe415 steel. Draw the reinforcement details by showing cross section at column strip	[L4][CO1]	[12M]
9	Design an interior panel of a flat slab with panel size 5 x 5 m supported by size of column is 500mm x 500mm.Without Provide suitable drop. Take live load as 10 kN/m^2.Take floor finishing load as 1kN/m^2 Use M20 steel	[L4][CO1]	[12M]

	and Fe415 steel. Draw the reinforcement details by showing cross section at column strip		
10	Design an interior panel of a flat slab with panel size 6 x 6 m supported by columns 500mm x 500mm.without Provide suitable drop. Take live load as 5 kN/m^2. Use M20 steel and Fe 415 steel. Draw plan and sectional elevation	[L][CO1]	[12M]

UNIT –II
WATER TANKS

1	Design a rectangular RC water tank resting on the ground with an open top for a capacity of 80,000 litres.The inside dimension of the tank may be taken as 6m x 4m. Design the side walls of the tank using M20 grade concrete and Fe 250 grade . Draw plan and sectional elevation	[L4][CO2]	[12M]
2	Design a circular water tank with flexible base for a capacityof 4 lakhs litres of water. The depth of tank may be kept 4m including a free board of 200mm. Use M20 concrete and Fe 415 steel. Draw plan and sectional elevation	[L4][CO2]	[12M]
3	Design a circular water tank with rigid base resting on the ground to store 5 lakhs litres of water. The depth of tank may be kept 4m. Use M20 concrete and Fe 415 steel. Draw plan and sectional elevation	[L4][CO2]	[12M]
4	Design a circular water tank flexible base resting on the ground to store 50,000 litres of water. The depth of tank may be kept 4m. Use M20 concrete and Fe 415 steel	[L4][CO2]	[12M]
5	Design a rectangular tank resting on ground with internal dimensions 7.0 x 5.5 x 2.75 m high. Take the free board as 300 mm. Use M25 grade concrete and HYSD steel of grade Fe415. Draw plan and sectional elevation	[L4][CO2]	[12M]
6	Design a circular water tank with flexible base for a inside diameter of the tank is 11.7m. The depth of tank may be kept 4m including a free board of 200mm. Use M20 concrete and Fe 415 steel. Draw plan and sectional elevation	[L4][CO2]	[12M]
7	Design a rectangular tank resting on ground with dimensions 6 x 4 m.height of side wall is 3.5 Take the free board as 150 mm. Use M20 grade concrete and Fe250. Draw plan and sectional elevation	[L4][CO2]	[12M]
8	Design a circular water tank with flexible base for a capacityof 5 lakhs litres of water. The depth of tank may be kept 4m including a free board of 200mm. Use M20 concrete and Fe 415 steel. Draw plan and sectional elevation	[L4][CO2]	[12M]
9	Design a rectangular RC water tank resting on the ground with an open top for a capacity of 60,000 litres.The inside dimension of the tank may be taken as 6m x 4m. Design the side walls of the tank using M20 grade concrete and Fe 250 grade . Draw plan and sectional elevation	[L4][CO2]	[12M]
10	Design a circular water tank with flexible base for a inside diameter of the tank is 12.6m. The depth of tank may be kept 4m including a free board of 200mm. Use M20 concrete and Fe 415 steel. Draw plan and sectional elevation	[L4][CO2]	[12M]

UNIT –III
RETAINING WALLS

1	Design a cantilever retaining wall to retain earth for a height of 3.5m. The density of soil is 18 kN/m^3 . Safe bearing capacity of soil is (q_o)=200 kN/m^2. Take the coefficient of friction between concrete and soil as 0.5. The angle of repose is 30degrees. Use M20 concrete and Fe415 steel.	[L4][CO3]	[12M]
2	Design a cantilever retaining wall, which is required to support a bank of earth 4.0 m high above the ground level on the toe side of the wall. Consider the backfill surface to be inclined at an angle of 15 with the horizontal. with a safe bearing capacity of 160 kN/m^2. Further assume the backfill to comprise granular soil with a unit weight of 16 kN/m^3 and an angle of shearing resistance of 30. Assume the coefficient of friction between soil and concrete to be 0.5.	[L4][CO3]	[12M]
3	Design and detail the various elements of counter fort retaining wall if the height of the wall above the ground level is 5.5. safe bearing capacity of soil(q_o) is180kN/m^2.and angle of friction is 30^0.keep spacing of counter fort is 3m. the coefficient of friction between concrete and soil as 0.5. Unit weight of the back fill is 18 kN/m^3.use M20 and Fe415.	[L4][CO3]	[12M]
4	A counterfort-type retaining wall is to be designed to support a soil embankment with sloping discharge. Height of fill retained by wall = 9 m, surcharge angle = 10, density of soil 16 kN/m^3, angle of internal friction is 30^0 , coefficient of friction between soil and base slab = 0.5, SBC of soil= 200 kN/m^2. Use M20 grade concrete and Fe415 grade HYSD bars.	[L4][CO3]	[12M]
5	Design the stem of a cantilever retaining wall to retain an earth embankment with a horizontal top 3.75 m above ground level. Density of earth = 19 kN/m^3. Angle of internal friction ϕ =30^0. SBC of soil =180 kN/m^2. Coefficient of internal friction between soil and concrete = 0.5. Adopt M20 grade concrete and Fe 415 grade steel	[L4][CO3]	[12M]
6	Design a cantilever retaining wall to retain earth for a height of 3m. The density of soil is 18 kN/m^3 . Safe bearing capacity of soil is (q_o)=250 kN/m^2. Take the coefficient of friction between concrete and soil as 0.5. The angle of repose is 15degrees. Use M20 concrete and Fe415 steel.	[L4][CO3]	[12M]
7	Design and detail the various elements of counter fort retaining wall if the height of the wall above the ground level is 5. safe bearing capacity of soil(q_o) is200kN/m^2.and angle of friction is 25^0.keep spacing of counter fort is 2.5m. the coefficient of friction between concrete and soil as 0.5. Unit weight of the back fill is 18 kN/m^3.use M20 and Fe415.	[L4][CO3]	[12M]
8	Design a cantilever retaining wall to retain earth for a height of 4m. The density of soil is 18 kN/m^3 . Safe bearing capacity of soil is (q_o)=200 kN/m^2. Take the coefficient of friction between concrete and soil as 0.3. The angle of repose is 30degrees. Use M20 concrete and Fe415 steel.	[L4][CO3]	[12M]
9	Design and detail the various elements of counter fort retaining wall if the height of the wall above the ground level is 4. safe bearing capacity of soil(q_o) is250kN/m^2.and angle of friction is 20^0.keep spacing of counter fort is 3m. the coefficient of friction between concrete and soil as 0.3. Unit weight of the back fill is 18 kN/m^3.use M20 and Fe415.	[L4][CO3]	[12M]

10	Design a cantilever retaining wall to retain earth for a height of 5m. The density of soil is 18 kN/m^3 . Safe bearing capacity of soil is (q_o)=250 kN/m^2. Take the coefficient of friction between concrete and soil as 0.5. The angle of repose is 25degrees. Use M20 concrete and Fe415 steel.	[L4][CO3]	[12M]

UNIT –IV
PLATE GIRDERS

1	Design a welded plate girder of span 24 m to carry a super imposed load of 35 kN/m. avoid end stiffners and intermediate stiffers. Use Fe - 415 &(Fy250) grade steel.	[L4][CO4]	[12M]
2	A plate girder simply supported at a span of 24m consists of a web plate 1000 mm x 16 mm and a flange plate 480 mm x 40 mm for each flange. The girder carries an super imposed load of 35kN/m. avoid end stiffners and intermediate stiffers. Use 10 mm fillet welds. Permissible shear stress in weld is 110 N/mm	[L4][CO4]	[12M]
3	Design a welded plate girder of span 24 m to carry a super imposed load of 35 kN/m. f_u = 415 MPa. using end stiffners,but avoid intermediate stiffers.Use Fe - 415 &(Fy250) grade steel.	[L4][CO4]	[12M]
4	A plate girder simply supported at a span of 24m consists of a web plate 1200 mm x 12 mm and a flange plate 440 mm x 36 mm for each flange. The girder carries an super imposed load of 35kN/m. using end stiffners but avoid intermediate stiffers. Use 10 mm fillet welds. Permissible shear stress in weld is 110 N/mm	[L4][CO4]	[12M]
5	Design a welded plate girder of span 24 m to carry a super imposed load of 35 kN/m. using intermediate stiffers. f_u = 415 MPa .Use Fe - 415 &(Fy250) grade steel.	[L4][CO4]	[12M]
6	A plate girder simply supported at ends having a span of 15 m consists of a web plate 700 mm x 12 mm and a flange plate 300 mm x 18 mm for each flange. The girder carries an all inclusive load of 45 kN/m run. Find the size of the weld required for connecting the flange plates to the web plates, near the supports. Use 10 mm fillet welds. Permissible shear stress in weld is 110 N/mm	[L4][CO4]	[12M]
7	Design a welded plate girder of span 18 m to carry a super imposed load of 30 kN/m. Avoid end stiffners and intermediate stiffers Use Fe - 415 (fy250) grade steel	[L4][CO4]	[12M]
8	Explain step by step procedure how to design a plate girder as per IS code.	[L4][CO4]	[12M]
9	A plate girder simply supported at a span of 24m consists of a web plate 1500 mm x 8 mm and a flange plate 400 mm x 32 mm for each flange. The girder carries an super imposed load of 35kN/m. using end stiffners but avoid intermediate stiffers. Use 10 mm fillet welds. Permissible shear stress in weld is 110 N/mm	[L4][CO4]	[12M]
10	Design a welded plate girder of span 20m to carry a super imposed load of 30 kN/m. avoid end stiffners and intermediate stiffers. Use Fe - 415 &(Fy250) grade steel.	[L4][CO4]	[12M]

UNIT –V
DESIGN OF GANTRY GIRDER

1	Design a gantry girder to be used in an industrial building carrying a manually operated overhead travelling crane, for the following data: (i) Crane capacity 250 kN. (ii) Self -weight of the crane girder excluding trolley 200 kN. (iii) Self -weight of the trolley, electric motor, hook, etc. 50 kN (iv) Approximate minimum approach of the crane hook to the gantry girder 1.0 m. (v) Wheel base 3.5 m. (vi) c/c distance between gantry rails 16 m. (vii) c/c distance between columns (span of gantry girder) 6.5 m. (viii) Self -weight of rail section 300 N/m. (ix) Diameter of crane wheels 150 mm. (x) Steel is of grade Fe410. The support bracket connection need not be designed.	[L4][CO5]	[12M]
2	Determine the moment and forces due to the vertical and horizontal loads acting a simply supported gantry girder given the following data (i)Simply supported span =6m (ii)Cranes wheel centres=3.6 (iii)Self-weight of the girder=1.6kN/m (iv)Maximum crane wheel load=220kN/m (v)Weight of crab/trolley=60kN (vi)Maximum hook load=200kN Calculate also the serviceability deflection(working load)	[L4][CO5]	[12M]
3	Design a gantry girder.without lateral restraint along its span , to be used in an industrial building carrying an overhead travelling crane, for the following data: (i)Crane capacity 200 kN. (ii) Self -weight of the crane girder excluding trolley 200 kN. (iii) Self -weight of the trolley, electric motor, hook, etc. 40 kN (iv) Approximate minimum approach of the crane hook to the gantry girder 1.20 m. (v) Wheel base 3.5 m. (vi) c/c distance between gantry rails 15 m. (vii) c/c distance between columns (span of gantry girder) 7.5m. (viii) Self -weight of rail section 300 N/m. (ix) Yield stress of steel =20Mpa Checks for buckling and deflections are not required.	[L4][CO5]	[12M]
4	Design a gantry girder.without lateral restraint along its span , to be used in an industrial building carrying an overhead travelling crane, for the following data: (i)Crane capacity 200 kN. (ii) Self -weight of the crane girder excluding trolley 200 kN. (iii) Self -weight of the trolley, electric motor, hook, etc. 45 kN (iv) Approximate minimum approach of the crane hook to the gantry girder 1.20 m. (v) Wheel base 4 m. (vi) c/c distance between gantry rails 15 m. (vii) c/c distance between columns (span of gantry girder) 8.5m.	[L4][CO5]	[12M]

	(viii) Self -weight of rail section 300 N/m. (ix) Yield stress of steel =20Mpa Checks for buckling and deflections are not required.		
5	Design a simply supported gantry girder to carry an electric over head travelling crane,given: (i)Crane capacity 250 kN. (ii) Self -weight of the crane girder excluding trolley 200 kN. (iii) Self -weight of the trolley, electric motor, hook, etc. 50 kN (iv) Approximate minimum approach of the crane hook to the gantry girder 1.0 m. (v) Wheel base 3.5 m. (vi) span of ctane girder 16 m. (vii) c/c distance between columns (span of gantry girder) 6.5 m. (viii) Self -weight of rail section 300 N/m. Checks for buckling and deflections are not required.	[L4][CO5]	[12M]
6	Explain step by step procedure how to design a gantry girder as per IS code.	[L4][CO5]	[12M]
7	Design a hand operated travelling crane simply supported by gantry girder for the given data: Span of gantry girder = 5 m, span of crane girder = 15 m, crane capacity = 200 kN, self -weight of crane girder excluding trolley = 200 kN, self –weight of trolley = 30 kN, minimum hook approach = 1 m, distance between wheels = 3.5 m c/c, self-weight of rails = 0.3 kN/m. Checks for buckling and deflections are not required.	[L4][CO5]	[12M]
8	(a) Explain design principles of gantry girder. (b) Write about the loads on a gantry girder.	[L4][CO5]	[12M]
9	Determine the moment and forces due to the vertical and horizontal loads acting a simply supported gantry girder given the following data (i)Simply supported span =5m (ii)Cranes wheel centres=3.6 (iii)Self-weight of the girder=1.4kN/m (iv)Maximum crane wheel load=200kN/m (v)Weight of crab/trolley=60kN (vi)Maximum hook load=200kN Calculate also the serviceability deflection(working load)	[L4][CO5]	[12M]
10	Design a gantry girder, to be used in an industrial building carrying a manually operated overhead travelling crane, for the following data: (i)Crane capacity 200 kN. (ii) Self -weight of the crane girder excluding trolley 200 kN. (iii) Self -weight of the trolley, electric motor, hook, etc. 40 kN (iv) Approximate minimum approach of the crane hook to the gantry girder 1.20 m. (v) Wheel base 3.5 m. (vi) c/c distance between gantry rails 16 m. (vii) c/c distance between columns (span of gantry girder) 8 m. (viii) Self -weight of rail section 300 N/m. (ix) Diameter of crane wheels 150 mm. (x) Steel is of grade Fe410. Checks for buckling and deflections are not required.	[L4][CO5]	[12M]