Course Code: 20CE1017 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK (DESCRIPTIVE)

Subject with Code: Design Of Advanced Concrete Structures (20CE1017) Course & Branch: M.Tech - SE

Regulation: R20 **Year & Sem:** I-M.Tech & II-Sem

UNIT –I
ESTIMATION OF CRACK WIDTH AND REDISTRIBUTION OF MOMENTS IN REINFORCED CONCRETE BEAMS

1	A simply supported rectangular beam 300 mm x 500 mm, having an effective span of 6 m, is subjected to UDL o 16 KN/m, inclusive of its self weight. The beam is reinforced with 3 bars of 20 mm diameter, at an effective cover of 50 mm. Assuming M20 concrete and Fe415 steel. Calculate the surface Crack with at the following locations. At a point 'A 'directly under a bar on tension face At the bottom corner 'B 'of the beam At a point 'C 'distant 2(d-x)/3 from N.A, where crack width is likely to be maximum.	[L3][CO1]	**[12M]**
2	a) Advantage and disadvantages of moment redistribution b) Explain the conditions for moment redistribution	[L1][CO1] [L2][CO1]	**[6M]** **[6M]**
3	a) How to do the Estimation of Crack width in Beams by IS456? b) Explain the Factors affecting Crack width in beams with neat sketch	[L2][CO1] [L1][CO1]	**[6M]** **[6M]**
4	A beam AB of 4 m span and fixed at the ends, carries an UDL of 30 KN/m at collapse. Draw maximum bending moment diagram as per IS code recommendations for redistribution of moments.	[L3][CO1]	**[12M]**
5	A simply supported T-beam span of 5 m is subjected to a moment of 85 KN/m at mid span. The section of beam is as shown in figure. Calculate the crack width at corner A, directly under tension reinforcement B & the center tension face C. the materials are M20 grade concrete and Fe415 steel. .	[L3][CO1]	**[12M]**
6	Explain about moment curvature relation of reinforcement concrete sections.	[L2][CO1]	**[12M]**
7	A beam of AB span 4 m fixed at one end and freely supported at other end carrying a UDL of 30 KN/m at collapse. Draw maximum BM as per recommendation of code IS 456-2000 for redistribution of moment.	[L3][CO1]	**[12M]**
8	A beam of width 450 mm, depth 700 mm cover of reinforcement 40 mm is reinforced with 3 rods of 40 mm diameter. Determine the crack width when the section is subjected to a BM of 490 kN m at the following points. a. At a point on the side of the beam 250 mm below the neutral axis. b. At a point mid way between the bars at tension face. c. At the bottom corner.	[L3][CO1]	**[12M]**
9	A beam AB of 6 m span and fixed at the ends, carries an UDL of 40 KN/m at collapse. Draw maximum bending moment diagram as per IS code recommendations for redistribution of moments.	[L3][CO1]	**[12M]**
10	Enumerate about the shrinkage and thermal cracking in concrete beam.	[L2][CO1]	**[12M]**

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UNIT –II
DESIGN OF DEEP BEAMS AND CORBELS

1	Determine the thickness and reinforcement for a simply supported transfer girder of length 5.25m is loaded from two columns at 1.75m from each end with 3750kN. The total depth of the beam is 4.2m and width of the support is 520mm. Assume M40 and Fe415 grades.	[L3][CO2]	**[12M]**
2	Draw the detailing of deep beam with neat sketches as per IS 456 – 2000 for different loading conditions	[L2][CO2]	**[12M]**
3	A Simply supported beam of 250 mm wide and 1500 mm overall depth & 2300 mm clear span is simply supported on 200 mm wide support on either side it carries UDL of 200KN/m inclusive of its self weight. Design the beam using M20 concrete and Fe415 Grade.	[L3][CO2]	**[12M]**
4	Explain the procedure for continuous deep beam and draw the reinforcement details	[L2][CO2]	**[12M]**
5	Design a continuous deep beam having more than 3 spans and loaded a UDL of 180KN/m inclusive of self weight for the beam the clear span 5m , width of supports 300 mm beam thickness 250 mm. Overall thickness of beam is 3.5m. The material used are M20 HYSD bars of 415..	[L4][CO2]	**[12M]**
6	Write the procedure for the design of corbel with neat detailing diagram.	[L2][CO2]	**[12M]**
7	Design a corbel to carry a load of 500kN at a distance of 200mm from the face of a 300mm x 300mm column. Assume the grade of M30 used for the construction.	[L3][CO2]	**[12M]**
8	A simply supported deep beam 200 mm wide x 1800 mm overall depth and 2750 mm clear span is simply supported on 250 mm wide supports on either sides. It carries a characteristic UDL of 260KN/m inclusive of its self weight. Design and details the beam. The materials are M20 Grade concrete and HYSD reinforced of grade Fe415.	[L3][CO2]	**[12M]**
9	The reinforced concrete beam girder is continuous over spans of 9 m apart from c/c. It is 4.5 m deep and 300 mm thick and supports of column 900 mm width. If the girder supports a UDL of 200KN/m inclusive of its own weight. Design Deep beam using M20 Grade concrete and Fe415 Grade steel.	[L3][CO2]	**[12M]**
10	Design a 3 span continuous deep beam carrying a characteristic load of 210KN/m inclusive of its self weight for the beam, clear span is 4.5 m width of support 250 mm. thickness of the beam 230 mm and Overall depth of 2.7 m. the materials are M20 Grade concrete and HYSD reinforced of grade Fe415.	[L3][CO2]	**[12M]**

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UNIT –III
DESIGN OF RIBBED (VOIDED) SLABS

1	A simply supported one way ribbed slab of 5 m span is to be used for 3 KN/m^2 live load. Design the slab using M20 grade concrete and HYSD bars of grade Fe 415.	[L3][CO2]	**[12M]**
2	Design a continuous ribbed slab with 3 equal spans of 5.8 m. the ribs supports on the beam with over span is 250 mm x 600 mm. take live load on the slabs is 3 KN/m^2 use M20 Grade concrete and Fe415 steel.	[L4][CO2]	**[12M]**
3	Explain the Analysis and Design procedure for ribbed Slabs	[L2][CO2]	**[12M]**
4	Write in detail about ultimate moment of resistance and design of slab in ribbed slab with neat sketch.	[L1][CO2]	**[12M]**
5	Design a waffle slab of 3.6m x 3.9m continuous over a two adjacent sides and simply supported over two adjacent sides if it is made of precise funicular shells so that the ribs are spaced at 1.2 x 1.2m as shown in figure. Assume the factored U.D.L. w = 10kN/m^2 M20 grade concrete and HYSD bars of grade Fe 415.	[L3][CO6]	**[12M]**
6	Find the suitable dimension of the simply supported slab of span 6.5m to be made from structural hollow clay block 300 x 300 x250 mm height with 20m wall thickness. Determine the reinforcement required if the slab is to carry an imposed load of 4.0kN/m^2.	[L3][CO2]	**[12M]**
7	A simply supported one way ribbed slab of 6m span is to be used for 5 KN/m^2 live load design the slab using M25 grade concrete and Fe 415 HYSD bars	[L3][CO2]	**[12M]**
8	Design a continuous ribbed slab with 3 equal spans at 9.0m the ribs support on the beam with over span is 300mm x 700mm. Take live load on the slab is 5 KN/m^2 use M25 grade concrete and Fe500 steel. .	[L4][CO6]	**[12M]**
9	A simply supported one way ribbed slab of 5m span is to be used for 3 KN/m^2 live load design the slab using M20 grade concrete and Fe 415 HYSD bars. . Ribs are spaced at 450mm c/c. The thickness of topping as 60 mm. Width of rib as 120mm. Over all depth is 300mm.	[L3][CO2]	**[12M]**
10	Find the suitable dimension of the simply supported slab of span 5m to be made from structural hollow clay block 300 x 300 x250 mm height with 15m wall thickness. Determine the reinforcement required if the slab is to carry an imposed load of 5.0kN/m^2.	[L3][CO2]	**[12M]**

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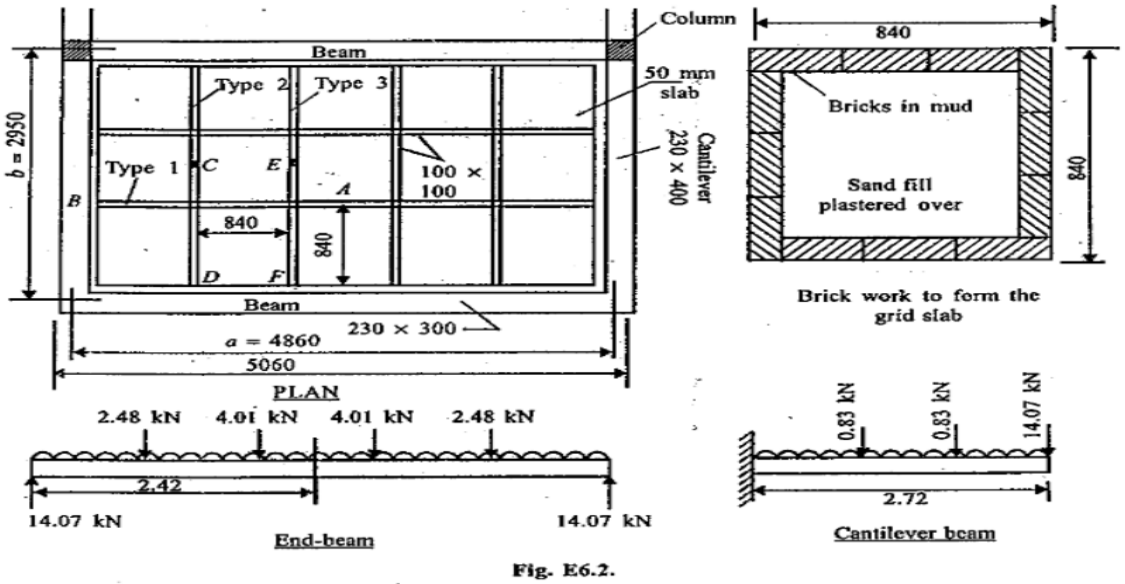
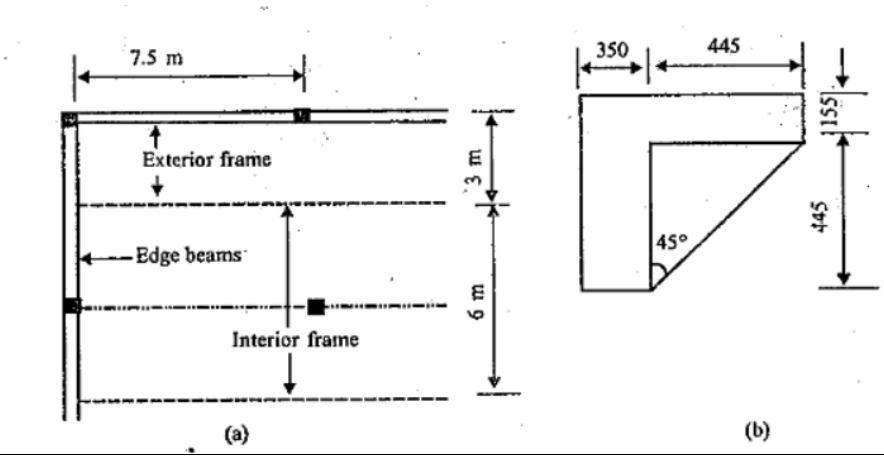
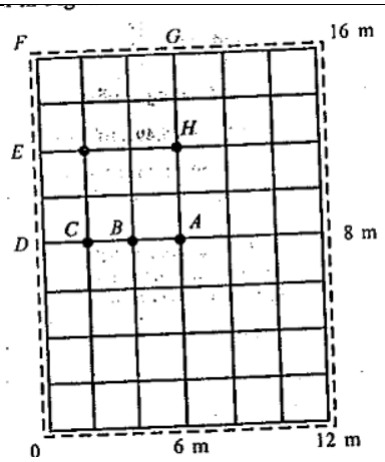
UNIT –IV
DESIGN OF GRID FLOORS & DESIGN OF FLAT SLABS

1	Design the interior panel of the flat slab floor system for a warehouse 24m x 24m divided into panels of 6m x 6m. Live load = 5kN/m^2, materials M20 and Fe415 HYSD bars, Column size = 400mm Ø. Sketch the reinforcement details in an interior panel of the flat slab.	[L3][CO3]	**[12M]**
2	A cantilever canopy for a residential building consists of a grid flab as shown in figure. Assume that the total load on the slab is a UDL of 3.5kN/m^2, indicates how an approximate design of the structure can be made. Neglect torsional effects in the slab. a=4.83m: b=2.95m, a_1=b_1=0.94m.  Fig. E6.2.	[L4][CO3]	**[12M]**
3	Determine the minimum thickness of a flat plate having edge beam with 7.5m x 6m panels on 500mm square column as shown in figure assume 415 grades of steel. 	[L4][CO3]	**[12M]**
4	. a. Write in detail about grid floor slab? With functions, characteristics and failure of grid slab? b. write the operational design procedure of the grid floor slab?	[L1][CO3] [L1][CO3]	**[6M]** **[6M]**
5	a. Explain about the flat slab with its types, advantages and disadvantages? b. Write about action of flat slab and flat plate with diagram?	[L1][CO3] [L2][CO3]	**[6M]** **[6M]**
6	Estimate the dimensions of the flat slab systems(with drops) for a four storey building with 5 span of 7.5m in the longer directions, 5 span of 6m in the shorter directions, and a storey height of 3m.	[L3][CO3]	**[12M]**
7	Write the analysis of rectangular grid floors by Timoshenko's plate theory?	[L2][CO3]	**[12M]**
8	A reinforced rectangular grid floor is 12m x 16m with the centre to center span spacing of the ribs at 2m both ways, as shown in figure. Determine the bending moment and shear force at the cellular. As usual slab thickness is approximately 1/20th span, total load including self weight is 6.5 kN/m^2. Use M20 grade concrete and its simply supported on all the four sides.	[L4][CO3]	**[12M]**

			
9	Design the interior panel of the flat slab floor system for a warehouse 12m x 12m divided into panels of 4m x 4m. live load = 5kN/m^2, materials M20 and Fe415 HYSD bars, Column size = 400mm Ø. Sketch the reinforcement details in an interior panel of the flat slab.	[L3][CO3]	**[12M]**
10	Estimate the dimensions of the flat slab systems(with drops) for a four storey building with 5 span of 7.5m in the longer directions, 5 span of 6m in the shorter directions, and a storey height of 3m.	[L3][CO3]	**[12M]**

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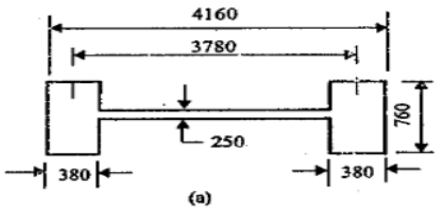
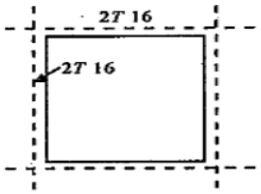
UNIT –V
DESIGN OF PLAIN CONCRETE WALLS & DESIGN OF SHEAR WALLS

1	Briefly explain the classification of the shear walls with neat sketches?	[L2][CO4]	**[12M]**
2	A plain brace concrete wall of dimensions 8m x 5m long and 200mm thick is restrained against rotations at its base and restrained at the base. It has to carry a factored total gravity load of 180kN and factored horizontal load of 8.45kN at the top. Check the safety of the wall. Assume fck = 20N/mm^2, fy = 415 N/mm^2.	[L3][CO4]	**[12M]**
3	Design a shear wall subjected to Pu = 12000kN and Mu= 11000kN-m, the materials used are M30 grade concrete and steel to be 415 N/mm^2 and thickness of wall 200mm and length of 6m. Design the shear wall.	[L4][CO5]	**[12M]**
4	a. Explain about the slenderness of the plain concrete wall as per IS 456-2000? b. Write about the eccentricities of vertical loads at right angles to wall.	[L2][CO4] [L1][CO4]	**[6M]** **[6M]**
5	a. Write in detail about rules for detailing for longitudinal steel in plain concrete wall? b. Elaborate about coupled shear wall with sketches?	[L1][CO4] [L2][CO5]	**[6M]** **[6M]**
6	Write in detail about general dimensions of rectangular shear walls, vertical and horizontal reinforcements, strength Requirements shear wall.	[L1][CO5]	**[12M]**
7	Design a shear wall of length 4.16m and thickness of 250mm subjected to the following forces as mentioned. Assume fck = 25N/mm^2 and fy = 415 N/mm^2 and the wall is a high wall with following loadings. *Loading* | *Axial force* (kN) | *Moment* (kNm) | *Shear* (kN) 1. DL + LL | 1950 | 600 | 20 2. Seismic load | 250 | 4800 | 700  (a)  (b) Step 14	[L4][CO5]	**[12M]**
8	A bar bell type shear wall with central part 3600 x 150mm and two 400 x 400mm strong bands at each end is supported on a footing 8m x 4m, which rests on soil whose modulus is 30000kN/m^3. Determine the lateral stiffness of the wall. Assume fck = 20 and height of the wall as14m.	[L3][CO5]	**[12M]**
9	A plain brace concrete wall of dimensions 10m x 6m long and 230mm thick is restrained against rotations at its base and restrained at the base. It has to carry a factored total gravity load of 230kN and factored horizontal load of 8.45kN at the top. Check the safety of the wall. Assume fck = 20N/mm^2, fy = 415 N/mm^2.	[L3][CO4]	**[12M]**
10	Design a shear wall subjected to Pu = 15000kN and Mu= 13000kN-m, the materials used are M30 grade concrete and steel to be 415 N/mm^2 and thickness of wall 230mm and length of 6m. Design the shear wall.	[L3][CO5]	**[12M]**

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