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Anna University Exams Nov / Dec 2016 – Regulation 2013
Rejinpaul.com Unique Important Questions – 5th Semester BE/BTECH
CE6505 Design of RC Elements I

Unit I

1. Explain the limit state philosophy as detailed in the current IS code
2. Design a R.C beam to carry a load of 6 kN/m inclusive of its own weight on an effect span of 6m keep the breadth to be $\frac{2}{3}$ rd of the effective depth .the permissible stressed in the concrete and steel are not to exceed 5N/mm^2 and 140N/mm^2 .take $m=18$.
3. Design a doubly reinforced beam of section 240X500mm to carry a bending moment of 80kNm.Assume clear cover at top a bottom as 30mm and take $m=18$.adopt working stress method.
4. Design a beam subjected to a bending moment of 40kNm by working stress design. Adopt width of beam equal to half the effective depth.
5. Determine the moment of resistance of a singly reinforced beam 160X300mm effective section, if the stress in steel and concrete are not to exceed 140N/mm^2 and 5N/mm^2 .effective span of the beam is 5m and the beam carries 4 nos of 16mm dia bars. Take $m=18$.find also the minimum load the bam can carry. Use WSD method.
6. Differentiate between working stress method and limit state method. Derive the expressions for the depth of Neutral axis and Moment of resistance of a Rectangular Singly reinforced balanced beam section under flexure and obtain the design constants K, j and Q for M 20 grade concrete and Fe 415 grade steel. Use working stress method.

Unit II

1. Design a one way slab with a clear span of 5m, simply supported on 230mm thick masonry walls and subjected to a live load of 4kN/m^2 and a surface finish of 1kN/mm^2 .Assume Fe 415 steel. Assume that the slab is subjected to moderate exposure conditions
2. Design a simply supported RC beam having an effective span of 5m.the beam has to carry a load of 25 kN/m. sketch the reinforcement details.
3. Design a RC beam 350X700mm effective section, subjected to a bending moment of 300kNm.Adopt M20concrete and Fe415 steel.
4. Deign a rectangular beam of cross section 230 x 600 mm and of effective span 6m.imposed load on the beam is 40 kN/m. Use M20 concrete and Fe415 steel.
5. Design a two way slab panel for the following data. Size = 7mx5m Width of Supports = 230 mm Edge condition = interior Live load = 4kN/m^2 Floor finish = 1kN/m^2 Consider M 20 grade concrete and Fe 415 grade steel.

Unit III

1. A beam of rectangular section 300 mm width and 500 mm effective depth is subjected to factored moment of 175 kN-m, factored shear force of 25 kN and factored twisting moment of 10kN-m. Determine the area of reinforcement to resist the above forces. Use M20 grade concrete and Fe 415 grade steel.
2. Derive the expression to determine the shear strength of RC Section
3. Design a rectangular beam section of 250 mm width and 500 mm overall depth subjected to ultimate values of ending moment of 40 KN-m, shear force of 40 KN, Torsion moment of 30 KN-m. Adopt effective cover of 50 mm on top and bottom. Use M20 concrete and Fe415 steel.
4. A rectangular beam 350 mm wide and 550 mm effective depth is reinforced with 4 numbers of 25 mm bars as main tension steel. Two of its four main bars are symmetrically bent at the ends of the beam at 45° . Find the stirrups required for resistance against shear failure at the ends, if the factored shear force at the critical section is 250 KN. Assume M25 grade of concrete and Fe415 steel bars.
5. (i) Calculate the development length of 10 mm diameter bars in M25 concrete if the steel is (a) Mild steel with $s \sigma = 230\text{N/mm}^2$, (b) Tor steel with $s \sigma = 415\text{N/mm}^2$. (ii) Give some examples for structural elements, which will be subjected to torsional moment. (iii) Discuss whether development length will be different for bars in tension and compression If yes, elaborate.

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Unit IV

1. Determine the steel required to carry a load of 980kN on a rectangular column of size 300 x 400 mm. The grade of concrete and steel are M20 and Fe 415 respectively. Assume that the column is short.
2. Design a square or circular column to carry a working load of 980kN. The grade of concrete and steel are M20 and Fe 415 respectively. Assume that the column is short.
3. Discuss various assumptions used in the limit state methods of design of compression members.
4. Design a circular column with ties to carry an ultimate load of 2500kN. The unsupported length of the column is 3m. The ends of the column are effectively held in position but not against rotation. The grade of concrete and steel are M20 and Fe 415 respectively.
5. Design the reinforcement in a column of size 450 mm × 600 mm, subject to an axial load of 2000 kN under service dead and live loads. The column has an unsupported length of 3.0m and its ends are held in position but not in direction. Use M 20 concrete and Fe 415 steel.
6. Determine the reinforcement to be provided in a short column subjected to biaxial bending, with the following data: size of column = 400 x 600 mm Concrete mix = M15 Characteristic strength of reinforcement = 415 N/mm² Factored load, P_u = 1600 kN Factored moment acting parallel to the larger dimension, M_{ux} = 120 kNm Factored moment acting parallel to the shorter dimension, M_{uy} = 90 kNm Moments due to minimum eccentricity are less than the values given above.

Unit V

1. Design an isolated footing for an R.C. column of size 230 mm x 230 mm which carries a vertical load of 500 kN. The safe bearing capacity of soil is 200 kN/m². Use M20 concrete and Fe 415 steel.
2. Design an isolated footing for an R.C. column of size 300 mm x 300 mm which carries a vertical load of 800 kN together with an uniaxial moment of 40 kN-m. The safe bearing capacity of soil is 250 kN/m². Use M25 concrete and Fe 415 steel.
3. (i) Write down the different types of footings and their suitability. (ii) Enumerate the procedure for the design of combined rectangular footing for two columns only.
4. A rectangular column 600 x 400 mm carries a load of 800 kN. Design a rectangular footing to support the column. The safe bearing capacity of the soil is 200 kN/m². Use M20 grade concrete.
5. Sketch the standard detailing of the following: (i) Two spans one-way continuous slab with curtailment details. (8)
(ii) Curtailment details in a tapered cantilever beam.

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