01   TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Ashwin

Exam.		**Back**	
Level	BE	**Full Marks**	80
Programme	BCE	**Pass Marks**	32
Year / Part	IV / I	**Time**	3 hrs.

Subject: - Design of RCC structure *(CE702)*

✓ Candidates are required to give their answers in their own words as far as practicable.
✓ Attempt **All** questions.
✓ The figures in the margin indicate **Full Marks**.
✓ Use of IS 456, IS 13920 are allowed. IS 456 SP-16 is allowed to design column only.
✓ Assume suitable data if necessary.

1. a) A rectangular R.C beam of size 230×350 mm overall is reinforced with 4-16 mm dia bars at tension zone in bottom, determine the moment of resistance of that beam section if the permissible stresses in concrete and steel does not to exceed 7.0 Mpa and 140 Mpa respectively. Take Nominal cover to re-bar as 25 mm and m =13.33.   [7]

   b) Define anchorage bond and flexural bond stress. Prove that flexure bond stress is the function of shear force (V) and $L_d \leq 1.3\dfrac{M_1}{V_u} + L_0$ at supply support end, where symbol have their usual meaning.   [7]

   c) With the help of neat sketch, describe the requirement for confining reinforcements in RC columns for earthquake resistant design.   [6]

2. a) A Reinforced concrete beam has an effective depth of 600 mm and a breadth of 400 mm. It contains 5 no of 25 mm dia bars out of which two bars are to be bent up at 45° near end of the support. Calculate shear resistance of bent up bars and additional stirrups needed if the factored shear force diagram is 250 kN at support and 0 kN at mid span of 6 m span beam. Use M20 grade steel and Fe 415 steel.   [14]

   b) Describe the step-by-step procedure used for the design of RC bean subjected to shear moment and torsion.   [6]

3. a) A rectangular slab panel 5 m × 4 m (clear span) is continuous over three edges and discontinuous over one short edge. The slab carries a floor finish of 1.20 KN/m^2 and live load of 4.0 KN/m^2. Design the slab panel with detailing the top and bottom reinforcements. Sketches the re-bar details clearly. The width of slab supported beam as 225 mm. Take M20 concrete and Fe 415 steel.   [14]

   b) Explain different category of limit state design with necessary details.   [6]

4. a) Determine the longitudinal and transverse reinforcement in bi-axialy loaded column having a following parameters: [15]

   Unsupported length of column = 3.10 m

   Size of column = 500 mm×600 mm

   Factored moment, Mux = 125 kN.m;

   Factored load, p_u = 1300 KN

   Factored moment, M_{uy} = 200 KN.m

   Use M25 concrete and Fe 500 steel. Take reinforcement in four side. Sketch the details.

   b) Describe the design procedure for mat foundation.   [5]

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