02 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
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**.*
- ✓ *Assume suitable data if necessary.*
- ✓ *Use of IS: 456-2000; IS 1893 and SP16 are allowed. But, use of SP 16 is allowed only for column design.*

1. a) Using working stress method, design a rectangular section 300 mm width and 450 mm height carrying 30KN/m load in the effective span 3.6m. Use mild steel and M20 grade of concrete. [4]

   b) Enlist and make sketch of three kind of mechanical splices. [2]

   c) Design a short rectangular column of size 450mm×300mm and unsupported length 3 m subjected to an axial ultimate load of 1500KN and ultimate moments 150KNm and 80KNm a long major and minor axes respectively. Adopt M30 grade of concrete and Fe500 grade of steel. Sketch the final design. [14]

2. a) Write down the steps of design of a beam subjected to BM, SF and Torsion. [4]

   b) Design slab of a room of size 6.5m×4m for a live load of 4.5 KN/m^2 and floor finish of 1 KN/m^2 of slab are rigidly fixed with beam. Take width of beam 230 mm. Use M20 concrete and TMT bars. Draw top and bottom reinforcement detailing with sections. Carry out all checks required for slab design. [16]

3. a) Write provisions of ductile detailing of column with neat sketches. [6]

   b) Design an isolated footing to carry a column load of 1300 KN and BM of 100 KN-m from both axes of column. Column is 500 mm×500mm in size with 25 mm diameter longitudinal steel. The bearing capacity of soil is 220 KN/m^2. Consider depth of foundation as 1.70 m. Take unit weight of soil as 18.5 KN/m^3. Use M25 grade concrete and Fe415 steel. [14]

4. a) Discuss in detail the working stress method versus limit state method of design with their respective advantages and disadvantages. Compare balance, under reinforcement and over reinforced sections in limit state and working stress design methods. [8]

   b) A RC beam 300 mm× 500 mm is reinforced with 5-25 mm bars in tension and 5-12 mm bars in compression each at a clear cover of 25 mm. If effective span of the beam is 4.30 m. find the moment of resistance of the beam at ultimate state. Use M25 concrete and Fe 415 grade steel. [12]

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