

JK Lakshmipat University, Jaipur Institute of Engineering and Technology

End Term – Examination
B.Tech.[3rd YEAR]/[5th Sem.]/[2013-14]



Course Name: CONCRETE STRUCTURES – I
Course Code: CE502

Max Marks: 40
Time: 03.00 hr

Instructions:

1. Attempt all sections.
2. IS CODE 456 : 2000 is allowed.

Section A

Q.1. Attempt all five questions. Each question carry equal marks.

(5 MARKS)

(a) In reinforced cement concrete structures, the steel reinforcement consists of

- | | |
|--|------------------------|
| (i) deformed bars | (ii) cold twisted bars |
| (iii) mild steel and medium tensile steel bars | (iv) all of these |

(b) Compressive strength of concrete is about 10 to 15% of its tensile strength.

- | | |
|----------|------------|
| (i) True | (ii) False |
|----------|------------|

(c) A long column is one whose ratio of effective length to its least lateral dimension exceeds

- | | | | |
|-------|---------|----------|---------|
| (i) 5 | (ii) 10 | (iii) 12 | (iv) 20 |
|-------|---------|----------|---------|

(d) The diameter of longitudinal bars in a column should not be less than

- | | | | |
|---------|----------|------------|-----------|
| (i) 4mm | (ii) 8mm | (iii) 12mm | (iv) 16mm |
|---------|----------|------------|-----------|

(e) In a singly reinforced beam, the effective depth is measured from the compression edge to the

- | | |
|--------------------------------|--------------------------------------|
| (i) tensile edge | (ii) centre of tensile reinforcement |
| (iii) neutral axis of the beam | (iv) none of these |

Q.2 Write short on the following ?

(5 MARKS)

(a) Define singly and doubly reinforced beam with diagram?

(b) Write the criteria for check of lateral stability and draw a diagram of reinforced circular column with helical reinforcement ?

Section B

Note :- Attempt any four question? Each question carry equal marks?

Q.3 Design a singly reinforced beam to take a bending moment at collapse 80KN/m. If $b=225\text{mm}$, concrete grade M-20, steel grade Fe-415. Design should be balanced, also check the designed beam for spacing between bars as per codal provision ? (5 MARKS)

Q.4 A simple beam is to be design for a clear span of 5.6m length , it is supported on bearing at each end of width = 500mm.

Super-imposed dead load = 20KN/m

Live load = 12KN/m

Estimated self weight = 4.5KN/m

Keep $b/d = 0.5$, use M-15 and Fe-415.

Also provide shear reinforcement with checking the beam in shear ? (5 MARKS)

Q.5 Identify whether the section is balanced or otherwise. Hence calculate its bending strength if width of beam (b) = 250mm, total depth $D = 535\text{mm}$, effective depth $d = 500\text{mm}$, area of steel reinforcement $A_{st} = 18\text{mm}$ diameter bars-4 No's.

(i) concrete grade M-20 , Steel grade Fe-500

(ii) concrete grade M-15 , Steel grade Fe-415 (5 MARKS)

Q.6 Design the reinforced concrete slab over a clear opening in plan $3.75\text{m} \times 9\text{m}$. Plain concrete tile flooring on top of slab is 50 mm thick. Live load is 4KN/m^2 . Bearing of slab along all the edges is 150mm. Concrete grade : M15 and steel grade : Fe 415. (5 MARKS)

Q.7 Determine the cross-sectional dimensions and the reinforcement for an axially loaded column for the following data : - (5 MARKS)

Collapse load = 2500 KN

Unsupported length = 4m

End condition : both the ends are pinned

Concrete grade : M20

Steel grade : Fe415

Adopt a circular section for the column.

Section C (Compulsory to attempt internal choice)

Q.8 Dtermine the cross sectional dimension and the reinforcement required for an axially loaded column of rectangular section if the collapse load is 2550KN. Ratio $D/b = 1.5$. Concrete grade M20 and steel grade Fe 415. Unsupported length of column is 3.05m. The column may be assumed to be pinned at both the ends. (10 MARKS)

OR

Q.8 A simple beam rest over a clear span of 5.1m. Bearing at each end is 150mm. Superimposed dead load is 18KN/m and live load is 12KN/m. The overall dimensions of beam are restricted to $275\text{mm} \times 550\text{mm}$. Concrete grade M : 15 and steel grade Fe : 415. Design the beam. Also check the beam in shear, deflection and lateral stability? (10 MARKS)