Reg. No. : | | | | | | | | | | | |

Question Paper Code: U5103

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Fifth Semester

Civil Engineering

21UCE503 – DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulations 2021)

(IS 456:2000 code book is permitted)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Define Modular Ratio	CO1 –U
2.	Compare working stress method and limit state method.	CO1 –U
3.	What are the factors influencing durability of concrete	CO2 –U
4.	Determine the Ast reinforcement and modular ratio for the beam reinforced with 4 numbers 20 mm diameter. Use M25 grade concrete and HYSD bars are used.	CO2 –U
5.	Draw with neat sketch of singly and doubly reinforced beam.	CO3 –U
6	Compare singly reinforced beam and doubly reinforced of beam	CO3 –U
7	What is meant by compression member	CO4 –U
8	What is Meant by Slenderness Ratio	CO4 –U
9	Draw with neat sketch of any three footings.	CO5 -U
10	What do you meant by Development length of bar.	CO5 -U

PART – B (5 x 16= 80 Marks)

11. (a) Determine the moment of resistance of a rectangular beam   CO1- Ana   (16)
section of 300 mm width and 500 mm effective depth which is
reinforced with 3 – 16 mm dia. at tension zone by WSD method.
Consider concrete grade of M20 and steel grade Fe 415.

Or

(b) Determine the moment of resistance of a rectangular beam   CO1- Ana   (16)
section of 350 mm width and 600 mm effective depth which is
reinforced with 3 – 20 mm dia. at tension zone by WSD method.
Consider concrete grade of M20 and steel grade Fe 415.

12. (a) Design a two – way slab for an office floor of size 3.5 m by 4.5   CO2 -Ana   (16)
m, with discontinuous and simply supported edges on all the sides
with corners prevented from lifting and supporting a service live
load of 4 kN/m^2 . Adopt M – 20 grade concrete and Fe – 415
HYSD bars as per limit state method followed in
IS456:2000.Draw the reinforcement details.

Or

(b) A one – way slab with a clear span of 3.5 m and effective depth   CO2 -Ana   (16)
of 140 mm is simply supported on 200 mm thick concrete
masonry walls to support a ultimate moment of 23 kNm and a
shear of 20 kN. Adopt M – 20 grade concrete and Fe – 415
HYSD bars.The slab is provided with a main reinforcement of 10
mm dia. Bars at 160 mm c/c spacing and distribution steel of 8
mm dia. bars at 250 mm c/c spacing. Analyze the slab for shear
capacity, deflection control and adequacy of reinforcement using
SP16.

13. (a) A Reinforced concrete beam is to be designed over an effective   CO3 -App   (16)
span of 5m to support a design service load of 8KN/m adopt M20
grade concrete and fe415 grade steel .Design the beam to satisfy
the collapse and serviceability limit state.

Or

(b) Design a reinforced concrete beam to suit the following data: CO3- App   (16)
Clear Span =   7 m
Width of support = 360 mm
Overall depth = 600 mm
Service Load (DL + LL) = 41 kN / m Effective cover = 50 mm
Materials : M – 25 Grade Concrete,Fe415 HYSD bars

14. (a) Design a short square column using M20 grade concrete and   CO4 -App   (16)
fe415 grade steel to carry an axial load of 1000 KN by limit state
method.

Or

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(b) Determine the reinforcement to be provided in a column   CO4 -App   (16)
subjected to uniaxial bending, with the following data:
Size of column 300 x 500 mm
Concrete mix M 20
Characteristic strength of reinforcement 415 N/mm^2
Factored load 500 kN
Factored moment 200 kNm

15. (a) Write the design procedure of square footing with neat sketch.   CO5 -U   (16)

Or

(b) Write the design procedure of rectangular footing with neat   CO5 -U   (16)
sketch.

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