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5th Sem / Civil, Brick Tech., Constr. Mgmt., Civil Engg (Spl Highway Engg)

Subject:- Reinforced Cement Concrete Design and Drawings

Time : 6Hrs. M.M. : 150

SECTION-A

Note: Multiple choice questions. All questions are compulsory (10x1=10)

Q.1 Minimum grade of concrete to be used in plain concrete used under sea water as per IS: 456 - 2000 is

a) M15 b) M20
c) M25 d) M30

Q.2 For a reinforced concrete section, the shape of shear stress diagram is

a) Wholly parabolic
b) Wholly rectangular
c) parabolic above neutral axis and rectangular below neutral axis
d) rectangular above neutral axis and parabolic below neutral axis

Q.3 The compressive strength of concrete determined from 150 mm x 150 mm cylinder as compared to that determined from 150 mm x 300 mm cylinder is

a) more b) less
c) equal d) none of above

Q.4 A doubly reinforced beam is considered less economical than a singly reinforced beam because.

a) tensile steel required is more than that for a balanced section
b) shear reinforcement is more
c) concrete is not stressed to its full value
d) Compressive steel is under stressed

Q.5 Limit state of serviceability for deflection including the effect due to creep, shrinkage and temperature occuring after erection of partition and application of finisher as applicable to floors and roofs is restricted to

a) span/150 b) span/200
c) span/250 d) span/350

Q.6 Minimum clear over (in mm) to the main steel bars in beams provided as compared to IS 456:2000 is

a) 10 b) 15
c) 25 d) 40

Q.7 Percentage of steel for balanced design of singly reinforced rectangular section by limit state method depends on

a) Characteristic strength concrete
b) yield strength of steel
c) modulus of elasticity of steel
d) all of these

Q.8 Beams are designed for

a) Shear force only
b) bending moment only
c) both shear force and bending moment
d) bearing

Q.9 If the depth of actual neutral axis in a beam is more than the depth of critical neutral axis, then beam is called

a) balanced beam b) under reinforced beam
c) over reinforced beam d) none of above

Q.10 A strand is made of

a) 6 wires b) 7 wires
c) 8 wires d) 9 wires

SECTION-B

Note: Objective type questions. All questions are compulsory. (10x1=10)

Q.11 Explain Limit state of durability.

Q.12 Write any two cause of losses in prestress.

Q.13 What is characteristic load?

Q.14 Write the minimum grade of concrete to be used in prestressed concrete members.

Q.15 Explain Over-Reinforced Sections for an RCC section.

Q.16 Define the term modular ratio.

Q.17 Write the formula of Moment of resistance for under reinforced section.

Q.18 Define the term Beam.

Q.19 Write the weight and volume of 1 bag of cement.

Q.20 Define two way slab .

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 A singly reinforced beam 300 mm X 600 is reinforced with 2 bars of 25 mm diameter. Find the ultimate moment of resistance of the beam section. Use M 20 concrete and Fe 415 Steel.

Q.22 Write the significance of development length in the design of reinforced concrete structures.

Q.23 A short RCC column 400 mm X 400 mm is provided with 8 bars of 16 mm diameter. If the effective length of the column is 2.25 meter, find the ultimate load for the column. Use M20 concrete and Fe 415 steel.

Q.24 A reinforced concrete slab is supposed to lay over a room having inside dimensions 3 m x 7 m. Thickness of the supporting wall is 300 mm. live load over the slab is 2 kN/m^2. Use M20 concrete and Fe 415 steel. Compute the depth of the slab.

Q.25 What are the considerations that govern thickness of one way and two way slabs?

Q.26 A short RCC column 450 mm X 450 mm is reinforced with 8 bars of 20 mm diameter. The effective length of the column is 2.75 meter. Find the ultimate load for the column. Use M20 concrete and Fe 250 steel.

Q.27 Describe various steps involved in the design of Axially loaded column.

Q.28 How shear is resisted in the beams? Explain.

Q.29 Explain at least four assumptions which are used for designing of concrete structure by Limit State method.

Q.30 Enlist three advantages and disadvantages of pre-stressed concrete as compared to reinforced concrete.

Q.31 Write two cases of critical sections for shear design as per IS: 456-2000.

Q.32 Define bond stress and development length.

Q.33 Write the three necessary conditions for T-beam action?

Q.34 An RCC beam 250mm wide and 500 mm deep (effective) is reinforced with Fe415, 4 bars of 20 mm dia also 8 mm dia 2 legged vertical stirrups of Fe 415 steel provide at 200 mm C/C spacing. Calculate the ultimate shear strength of the beam section. M20 Grade of concrete is used.

Q.35 Main steel is provided along which span in a one way slab and why?

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

Q.36 Design a circular column to carry an axial load of 1650 kN. The column has an effective length of 3 meter. Use M 25 concrete and Fe 415 steel.

Q.37 Design a slab over a room 4.5 m x 6 m as per IS code. The slab are simply supported on masonry walls all round, and corners are not held down. The live load on the slab is 3 kN/m^2. The slab has a bearing of 150 mm on supporting walls. Use M20 concrete and Fe415.

Q.38 Determine the ultimate moment of resistance of a rectangular beam 300 mm x 600 mm reinforced with 5 bars of 25 mm diameter in tension zone and 2 bars of 25 mm diameter in compression zone. Use M20 concrete and Fe 415 steel. Take d' = 60 mm

SECTION-E

Note: Attempt any two questions out of three questions. (2x25=50)

Q.39 Draw the sectional plan and elevation of a column with the following data :
Column Size : 600 mm X 600 mm
Longitudinal bar : 8@20 mm dia
Transverse bars : 6 mm dia bars @ 300 mm
Base Reinforcement - 12 mm dia bars @ 200 mm C/C both ways.
Footing size : 3m x 3m
Footing thickness at free end is 200 mm and at column face is 500 mm, depth below G.L is 1.5 m

Q.40 Draw the L-section and two cross sections of a simply supported RCC beam with the followings data:
Clear span: 3m
Beam Size : 300 mm x 300 mm
Bearing on the wall : 150 mm
Main reinforcement : 6-12 mm dia bars out of which two bars are bent up at 1/7 from centre of support.
Stirrups 6 mm dia @ 200 mm C/C
Anchor bars: 2 No's- 10 mm diameter

Q.41 Draw the sectional plan and elevation of a slab with the following data:
Room size : 3.5m X 7 m
Thickness of slab : 175 mm
Wall thickness : 300 mm
Main reinforcement : 12 mm dia @ 150 mm C/C, alternate bar bent up.
Distribution reinforcement : 10 mm dia @ 200 mm C/C