5 Sem. / Civil, Brick Tech, Constr, Mgmt., Civil Engg (Spl Highway Engg.)
Sub. : Reinforced Cement Concrete Design & Drawings

Time : 6 Hrs.   M.M. : 150

SECTION-A

Note: **Multiple type Questions. All Questions are compulsory.**

(10x1=10)

Q.1   Minimum grade of concrete to be used in Reinforced concrete as per IS:456-2000 is

a)   M15   b)   M20

c)   M25   d)   M30

Q.2   If the depth of actual neutral axis in a beam is less than the dept of critical neutral axis, then beam is called

a)   Balanced beam   b)   Under reinforced beam

c)   Over reinforced beam   d)   None of the above

Q.3   According to IS:456-2000 the maximum compressive stress in concrete for design purpose is taken as

a) $0.370 f_{ck}$ b) $0.416 f_{ck}$

c) $0.446 f_{ck}$ d) $0670 f_{ck}$

Q.4   According to IS: 456:2000 the maximum strain in concrete at the outermost compression fiber in the limit state design of flexural member is

a)   0.0020   b)   0.0035

c)   0.0050   d)   0.0065

Q.5   Prestresing can not be provided in :

a)   Beams   b)   Slabs

c)   Girders   d)   Arches

Q.6   In the limit state method, balanced design of a reinforced concrete beam gives

a)   Smallest concrete section and maximum area of reinforcement

b)   Largest concrete section and maximum area of reinforcement

c)   Smallest concrete section and minimum area of reinforcement

d)   Largest concrete section and minimum area of reinforcement

Q.7   Minimum live load (in kN/m^2) for the assessable roof is taken as :

a)   1   b)   1.5

c)   2   d)   4

Q.8   In a doubly reinforced rectangular beam, the allowable stress in compression steel is

a)   Equal to the permissible stress in tension in steel

b)   More than the permissible stress in tension in steel

c)   Less than the permissible stress in tension in steel

d)   No related to the permissible concrete compression stress

Q.9   The side face reinforcement, if required, in T-beam will be

a)   0.1% of the web area

b)   0.15% of the web area

c)   0.2% of 0.3% of the web area depending upon the breadth of the web

d)   Half the longitudinal reinforcement

Q.10   Minimum clear cover (in mm) to the main steel bars in slab provided as compared to IS 456:2000 is

a)   10   b)   15

c)   20   d)   40

Section-B

Note: **Objective type questions. All questions are compulsory.**

(10x1=10)

Q.11   Explain Limit state of serviceability.

Q.12   What is prestressed concrete?

Q.13   Define slabs and write different type of slabs.

Q.14   Explain Under-Reinforced Sections of an RCC section.

Q.15   What is Characteristic strength?

Q.16   Derive the formula of Moment of resistance for over reinforced section.

Q.17   Write partial factor of safety for concrete and steel and why it is more in case of concrete?

Q.18   What is TOR steel used in Reinforced concrete element.

Q.19   Define Neutral Axis.

Q.20   Write the circumstances under which doubly reinforced beams are used.

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

Q.21 A singly reinforced beam 250mm x 400mm is reinforced with 4 bars of 18mm diameter. Find the ultimate moment of resistance of the beam section. Use M20 concrete and Fe 415 steel.

Q.22 Find the area of steel required for a short reinforced concrete column 400mmx400 mm to carry an axial load of 1195kN. Use M 20 concrete and Fe415.

Q.23 Write the steps for the design of shear reinforcement.

Q.24 Write a short note on curtailment of bars.

Q25 Why a T-beam is considered better as compared to a rectangular beam?

Q.26 Write the 5 differences between LSM and WSM.

Q.27 Loss due to shrinkage of concrete occurs in pre-tensioning or post-tensioning or in both. Explain the loss for your answer.

Q.28 An RCC beam 330mm x 600mm (effective) is reinforced with Fe415, 6 bars of 18 mm dia also 8mm dia 2 legged vertical stirrups of Fe 415 steel are provided at 200 mm C/C spacing. Calculate the ultimate shear strength of the beam section. M20 grade of concrete is used.

Q.29 A short RCC column 300 mm x 300 mm is reinforced with 6 bars of 20 mm diameter. The effective length of the column is 3 meter. Find the ultimate load for the column. Use M20 concrete and Fe 415 steel.

Q.30 A reinforced concrete slab is supposed to lay over a room having inside dimensions 3m x 6m. The thickness of the supporting wall is 250 mm. Live load over the slab is 2.5kN/m^2. Use M20 concrete and Fe 415 steel. Compute the dept of the slab.

Q.31 Enlist the 5 difference between one way and two way slabs.

Q.32 Determine the maximum UDL a beam of 200 mm x 400mm reinforced with 4 bars of 20mm diameter can carry. Span of the beam is 3 meter. Use M20 concrete and Fe415 steel.

Q.33 Enlist five assumptions made in limit state of collapse.

Q.34 Why nominal cover to reinforcement is provided?

Q.35 Which type of slab is more economical one way or two way and why? Justify your answer.

Section-D

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

Q.36 Design a simply supported two-way slab for the roof of a room of clear dimension 3mx3m. Using M25 grade concrete and Fe415 grade steel. The corners are not prevented from lifting. If the Width of

supporting walls around is 320mm, Live load on the slab is 1.5kN/m^2,weight of weathering course in 1.75 kN/m^2.

Q.37 Design a circular column to carry an axial load of 1200kN. The column has an effective length of 2.75 meter. Use M25 concrete and Fe415 steel.

Q.38 Determne the ultimate moment of resistance of a rectangular beam 250mmx500mm reinforced with 6 bars of 20mm diameter in tension zone and 4 bars of 18mm diameter in compression zone. Use M20 concrete and Fe415 steel. Take d' = 50mm.

Section-E

Note: **Attempt any two question out of three Questions.** **(2x25=50)**

Q.39 Draw the L-Section and two cross sections of a simply supported doubly reinforced rectangular RCC beam with the following data:
Clear span : 3.5 m
Beam size : 250 mm x 500 mm
Bearning on the wall : 150 mm
Tension Reinforcement : 6No's 16mmdia.bars out of which two bars are bent up at ℓ/7 from centre of support.
Compressing Reinforcement : 4 No's 12 mm dia bars out of which two bars are bent up at ℓ/7 from centre of support.
Stirrups 8mm dia @ 200mm C/c
Anchor bars : 2No's 12 mm dia bars

Q.40 Draw the sectional plan and elevation of a one way slab with the following data:
Room Size : 3m X 7m
Thickness of slab : 150 mm
Bearing of slab : 250 mm
Main reinforcement : 12 mm dia @ 150 mm C/c, alternate bar bent up.
Distribution reinforcement : 10mm dia @ 200 mm C/c

Q.41 Draw the sectional plan and elevation of a column with the following data:
Column size : 500 mm x 500 mm
Longitudinal bar : 16@20 mm dia bars
Transverse bars : 10mm dia bar@300 mm
Base reinforcement - 10 mm dia bars @ 200 mm C/c both ways.
Footing size : 2.5 m x 2.5 m
Footing thickness at free end is 150 mm and at column face is 400 mm, depth below G.L. is 1m.