Q 1. An axially loaded column is of 300 x 300 mm size. Effective length of column is 3 m. What is the minimum eccentricity of the axial load for the column?

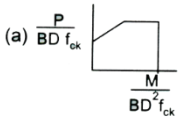
(a) 0

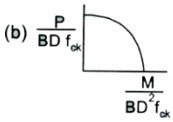
(b) 10 mm

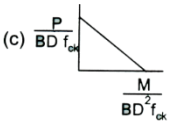
(c) 16 mm

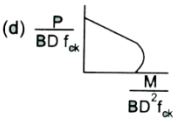
(d) 20 mm

Q 2. A rectangular reinforced column (8 x D) has been subjected to uniaxial bending moment M and axial load P. Characteristic strength of concrete = fck' Which one among the following column design curves shows the relation between M and P qualitatively?

(a) 

(b) 

(c) 

(d) 

Q 3. What is the minimum nominal percentage longitudinal reinforcement to be provided in a concrete pedestal as per relevant IS code?

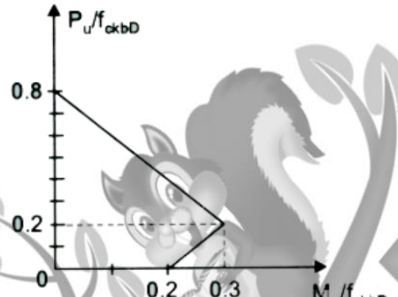
(a) 0.4

(b) 0.2

(c) 0.15

(d) 0.1

Q 4. A RC column of square cross-section (400 x 400 mm2) has its column load-moment interaction diagram as shown in figure below. What is the maximum uniaxial eccentricity at which a factored load Pu = 640 kN can be applied safely? (Take fck = 20 MPa)



(a) 300 mm

(b) 400 mm

(c) 600 mm

(d) 800 mm

Q 5. The purpose of lateral ties in short R.C. columns is to

(a) Increase the load carrying capacity of column

(b) Facilitate compaction of concrete

(c) Facilitate construction

(d) Avoid buckling of longitudinal bars

Q 6. According to IS 456, maximum slenderness ratio for a short concrete column is

(a) Less than 12

(b) Between 12 and 18

(c) Between 18 and 24

(d) More than 24

Q 7. Which one of the following represents the ratio of volume of helical reinforcement to volume of core?

(a) $0.36\left(\frac{A_g}{A_c}-1\right)\frac{f_{ck}}{f_y}$ (b) $0.36\left(\frac{A_g}{A_s}-1\right)\frac{f_{ck}}{f_y}$

(c) $0.36\left(\frac{A_s}{A_c}-1\right)\frac{f_{ck}}{f_y}$ (d) $0.36\left(\frac{A_c}{A_s}-1\right)\frac{f_{ck}}{f_y}$

where Ag, As and Ac are gross cross-sectional area of the member, area of steel and core area; and fCK and fY are characteristic strength of concrete and steel respectively.

Q 8. A wall carries an axial load, 12 kN/m and also an eccentric load of 27 kN/m at 72 mm from the central axis of the wall. The equivalent eccentricity e is nearly

(a) 65 mm

(b) 60 mm

(c) 55 mm

(d) 50 mm

Q 9. Given that φ is angle of internal friction, 'p' is the safe bearing capacity and 'y' is the unit weight of soil, the maximum depth of foundation of a masonary footing is given by

(a) $\frac{p}{y}\left(\frac{1+\sin\Phi}{1-\sin\Phi}\right)$

(b) $\frac{p}{y}\left(\frac{1-\sin\Phi}{1+\sin\Phi}\right)$

(c) $\frac{p}{y}\left(\frac{1+\sin\Phi}{1-\sin\Phi}\right)^2$

(d) $\frac{p}{y}\left(\frac{1-\sin\Phi}{1+\sin\Phi}\right)^2$

Q 10. The critical section for two-way shear of footing is at the

(a) Face of the column
(b) Distance d from the column face
(c) Distance d/2 from the column face
(d) Distance 2d from the column face

(Where d is the effective depth of the footing)

Q 11. In the case of isolated square concrete footing, match the locations at which the stress resultants are to be checked, where d is effective depth of footing and select the correct answer using the code given below the lists:

Stress Resultant	Location
A. Bending moment B. One way shear C. Punching shear	1. At face of column 2. At d/2 from face of column 3. At d from face of column

Codes:
a• A – 1, B – 2, C – 3
b• A – 3, B – 1, C – 2
c• A – 1, B – 1, C – 3
d• A – 1, B – 3, C – 2

Q 12. In an isolated reinforced concrete column footing of effective depth d, the stress in punching shear is checked

(a) at the centre of the column

(b) at the face of the column

(c) at a distance d/2 away from the face of the column

(d) at a distance d/2 away from the centre of the column

Q 13. The critical section for maximum bending moment in the footing under masonry wall is located at

(a) the middle of the wall

(b) the face of the wall

(c) mid-way between the face and the middle of the wall

(d) a distance equal to the effective depth of footing from the face of the wall

Q 14. A concrete column carries an axial load of 450 kN and a bending moment of 60 kNm at its base. An isolated footing of size 2 m x 3 m with the 3 m side along the plane of the bending moment is provided under the column. Centres of gravity of the column and the footing coincide. The net maximum and minimum pressures, in kPa, on the soil under the footing are, respectively

(a) 95 and 75

(b) 75 and 55

(c) 95 and 55

(d) 75 and 75