SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : DDRCS(13A01502) **Course & Branch**: B.Tech - CE

Year & Sem: III-B.Tech & I-Sem **Regulation:** R13

UNIT-4

COLUMNS

1. (a) How is the problem be solved if the point of application of load and the centre of gravity of the section do not coincide.
   (b) What is the main difference, in terms of structural behaviour between a 'short column' and a 'slender column'?
2. Design a circular column with helical reinforcement subjected to 1600 kN. The column has unsupported length of 3.6 m and is effectively held in position at both ends but not restrained against rotation. Use M25 grade concrete and Fe415 steel.
3. Design the reinforcement in a column of size 400 mm × 600 mm, subjected to a factored axial load of 2500 kN. The column has unsupported lengths of 3.0 m and is braced against side way in both directions. Use M20 concrete and Fe415 steel.
4. A corner column 275 mm × 600 mm located in the multi storey of a system of braced frame, is subjected to factored loads Pu = 2000 kN, Mux = 150 kN-m and Muy = 75 kN-m. The unsupported length of the column is 3.0 m. Design the reinforcement in the column, assuming M30 concrete and Fe 415 steel.
5. Design a circular column with helical reinforcement subjected to 1600 kN. The column has unsupported length of 4.2 m and is effectively held in position at both ends but restrained against rotation at one end. Use M20 grade concrete and Fe415steel.
6. Design a column 450 mm × 550 mm of effective length 7.2 m and unsupported length 7.8 m is subjected to a factored load of 1500 kN and factored moments about major axis 42 kN-m at top and 30 kN-m at bottom. The factored moments about minor axis are 32 kN-m at top and 22 kN-m at bottom. The column is bent double curvature. Use M 25 concrete and Fe 415 steel.
7. Design a short column, with effect length 3.6 m, capable of safety resisting the following factored loads effects (under uniaxial eccentricity):
   a. Pu = 1665 kN, Mu = 85 kN-m
   b. Pu = 385 kN, Mu = 206 kN-m
   Assume M25 concrete and Fe415 steel. Draw the cross section and elevation details.
8. A short RCC square column is required to carry a factored load of 1900 kN. Design the column. Assume $e_{min} < 0.05D$ and use M20 concrete and Fe415.
9. Design an reinforced concrete square column of 500 mm side to carry an ultimate load of 2000 kN at an eccentricity of 180 mm. Use M20 concrete and Fe415.
10. Design a short column of size 500 mm x 600 mm subjected an axial load P_u = 200 kN and biaxial bending moment as follows:
    M_{ux} = 150 kN-m
    M_{uy} = 120 kN-m
    Use M20 concrete and Fe 415 steel.

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QUESTION BANK (OBJECTIVE)

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Year & Sem: III-B.Tech & I-Sem **Regulation:** R13

1.If a compression member whose effective length is greater than 3 times the least dimension of the member then that is called as [ ]
a) Column b) beam c) pedestal d) beam-column
2. A R.F concrete member is subjected to combined action of compressive axial force and B.M. if 'E_c' is the least compressive strain in the member, 'fy' is the yield stress of steel and 'E_s' the modulus of elasticity of steel, the maximum permissible compressive strain in concrete member will be [ ]
a) 0.002 b) $0.002(fy/1.15E_s)$ c) $0.0035-0.75E_c$ d) 0.0035
3. The allowable compressive load on a long composite R.F concrete column is [ ]
a) $1.05\ (\sigma_{cc}A_c+ \sigma_{sc}A_{sc})$ b) $Cr\ (\sigma_{cc}A_c+ \sigma_{sc}A_{sc})$ c) $1.1(\sigma_{cc}A_c+ \sigma_{sc}\ A_{sc})$ d) $(\sigma_{cc}A_c+ \sigma_{sc}\ A_{sc})$
4. Which one of the following statements is correct [ ]
a) Maximum longitudinal R.F in an axially loaded short column is 6% of c/s
b) Column with circular section are provided transverse R.F of helical type only
c) Spacing of lateral ties cannot be more than 16 times the diameter of the tie bar
d) Longitudinal R.F bar need not be in contact with lateral ties
5. The maximum compressive strain in an RC column when the minimum strain at one edge is 0.001 should not be [ ]
a) < 0.0035 b) >0.0025 c) <0.00275 d) >0.00275
6. The minimum number of bars in a circular RC column is [ ]
a) 4 b) 6 c) 8 d) 10
7. The thickness of a footing at the edge of should not be less than [ ]
a) 100mm b) 150mm c) 200mm d) 250mm
8. The effective length of a column in building frames given in IS: 456-2000 is based on [ ]
a) Wood's tables b) wreslers's tables c) moh's tables d) bresler's tables
9. The elements that are normally subjected to combined bending and axial force are [ ]
a) Struts in reinforced concrete members b) Space truss members
c) The members in long span bridges d) Columns in framed structures
10. In an axially loaded column the maximum strain in concrete is not exceeding to [ ]
a) 0.002 b) 0.00035 c) 0.0003 d) 0.0035
11. The ratio of effective length to unsupported length of a column when effectively held in position in both ends, to restrained against rotation at one end is [ ]
a) 0.8 b) 0.65 c) 1.2 d) 1.0
12. The use of lateral ties in a column is [ ]
a) To keep main R.F in position b) take care of shear developing due to buckling
c) To give confinement in the core d) to increase ductility to the column
13. The lateral ties in a R.F column under pure axial compression are due to [ ]

a) To avoid buckling of the longitudinal R.F b) to provide adequate shear capacity
c) Provide adequate confinement to concrete d) reduce the axial deformation to the column

14. The effective length of a circular electrical pole of length 'l' and constant diameter erected on ground is, where l is un supported length of the column [ ]
a) 0.8l b) 1.2l c) 1.5l d) 2.0l

15. The axial load carrying capacity of a column of a given material, cross sectional area and length is governed by [ ]
a) Strength of its material only b) its flexural rigidity only
c) Its slenderness ratio only d) both flexural rigidity and slenderness ratio

16. The effective length of a column In a R.F concrete building frame as per IS: 456-2000, is independent of the [ ]
a) Frame type b) Span of the beam c) height of column d) loads acting on frame

17. All columns are designed for a minimum eccentricity of [ ]
a) 5mm b) 15mm c) 20mm d) 25mm

18. The purpose of lateral ties in a short column is to [ ]
a) Increase the load carrying capacity of the columns b) avoid buckling of longitudinal bars
c) Facilitate construction d) Increase shear strength of concrete

19. The load carrying capacity of a helically reinforced column as compared to that of a tied column is about [ ]
a) 5%less b) 10%less c) 5%more d) 10%more

20. A 5m long square RCC column is fixed at one end and hinged at the other end has minimum radius of gravity as 100mm, its slenderness ratio is [ ]
a) 50mm b) 40mm c) 32.5mm d) 20mm

21. Which of the following statement is correct? [ ]
a) Maximum longitudinal R.F in an axially loaded short column is 6% of the c/s
b) Columns with circular section are provided with helical R.F only
c) Circular columns is not useful in concrete
d) Columns designed in RCC are long columns only

22. A column has more c/s area than that required to carry the load, then minimum % of steel is calculated based on [ ]
a) Actual area b) Area required to carry the load c) Area excluding clear covers d) none

23. The maximum limit of 60% of reinforcement for columns is specified in IS456 is based on [ ]
a) Column with more reinforcement than 6% is unsafe
b) Column with more reinforcement will be uneconomical
c) More reinforcement will create difficulties in placing and compaction of concrete
d) None

24) An axially loaded column is of 300mm and square in section. The effective length of the column is 3m.What is minimum eccentricity of the axial load for the column? [ ]
a) 0 b) 10mm c) 16mm d)20mm

25) A square column section of size 350x350mm is reinforced with four bars of 25mm diameter and four bars of 16mm diameter; then the transverse steel should be [ ]
a) 5mmφ@240mmc/c b) 6mmφ@250mmc/c c) 8mm φ@250mmc/c d) 8mmφ@350mmc/c

26).If a compression member whose effective length is greater than 3 times the least dimension of the member then that is called as [ ]

A) Column B) beam C) pedestal D) beam-column

27). The minimum number of bars in a circular RC column is [ ]

A) 4 B) 6 C) 8 D) 10

28. The thickness of a footing at the edge of should not be less than [ ]

A) 100mm B) 150mm C) 200mm D) 250mm

29. The effective length of a column in building frames given in IS: 456-2000 is based on [ ]

A) Wood's tables B) wreslers's tables C) moh's tables D) bresler's tables

30. The elements that are normally subjected to combined bending and axial force are [ ]

A) Struts in reinforced concrete members B) Space truss members

C) The members in long span bridges D) Columns in framed structures

31. In an axially loaded column the maximum strain in concrete is not exceeding to [ ]

A) 0.002 B) 0.00035 C) 0.0003 D) 0.0035

32. All columns are designed for a minimum eccentricity of [ ]

A) 5mm B) 15mm C) 20mm D) 25mm

33. The load carrying capacity of a helically reinforced column as compared to that of a tied column is about [ ]

A) 5% less B) 10% less C) 5% more D) 10% more

34. A 5m long square RCC column is fixed at one end and hinged at the other end has minimum radius of gravity as 100mm, its slenderness ratio is [ ]

A) 50mm B) 40mm C) 32.5mm D) 20mm

35. The effective length of a column In a R.F concrete building frame as per IS: 456-2000, is _____ independent of the [ ]

A) Frame type B) Span of the beam C) height of column D) loads acting on frame

36 .An axially loaded column is of 300 mm and square in section. The effective length of the column is 3 m. What is the minimum eccentricity of the axial load for the column? [ ]

A) 0 mm B) 10 mm C) 16 mm D) 20 mm

37. A square column section of size 350 x 350 mm is reinforced with four bars of 25 mm diameter and four bars of 16 mm diameter; then the transverse steel should be [ ]

A) 5 mm dia @ 240 mm c/c

B) 6 mm dia @ 250 mm c/c

C) 8 mm dia @ 250 mm c/c

D) 8 mm dia @ 350 mm c/c

38. The minimum number of bars in a circular RC column is_____ [ ]

A) 4 B) 6 C) 8 D) 10

39. The effective length of a column in building frames given in IS : 456 – 2000 are based on [ ]

A) Wood's tables

B) Wresler's tables

C) Mohr's tables

D) Bresler's tables

40. In an axially loaded column the maximum strain in concrete is not exceeding to [ ]

A) 0.002 B) 0.00035 C) 0.0003 D) 0.0035

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