1 What are the reasons the longitudinal bars in the columns are enclosed with lateral ties or spirals?

Ans There are three reasons for this:

1. Holding main reinforcement in particular position.
2. It also give shear strength to column.
3. Premature buckling of bars

2  Determine the minimum eccentricities in both the directions to be considered while designing a short column having a section 250 mm x 550 mm and an unsupported length of 4000 mm.

Ans Leff =.4000

emin=(L/500)+(D/30)

=(4000/500)+(550/30)

=24.33 >20mm

Therefore min eccentricity is 20mm when D=550

When D=250

emin=(4000/500)+(250/30)

=16.33 <20mm

Hence provide a min eccentricity of 16.33mm

3 Why does the code require all columns to be able to resist minimum eccentricity of loading?

Ans One of the main reason is that we can not ensure 100% verticality during the construction of column. If we take very much care during the formwork then also there might be chances that those plumb will get slightly disturbed during placing of concrete and also due to column is subjected to purely compression and no bending moments.Here loads are considered as pure axial which may not true in actual case.

4 Slenderness effects are not applicable to members under combined bending and axial tension members. Explain the reason.

Ans It is because slenderness effects are only applicable in columns .And columns are not members coming under axial tension they are composed of compression.Slenderness effects are necessary when the structural members fail in buckling

5 What is the main structural behavioural difference between a short column and a slender column?

Ans **Short Column:**

Ratio of effective length to least lateral dimension doesn't exceed 12.

* In short column, it fails by compression(crushing).

**Slender Column:**

Ratio of effective length to least lateral dimension equal or exceed 12.

* In slender Column, it fails by buckling.

6 Why there is a codal specification regarding the maximum and minimum reinforcements in columns?

Ans The limit of minimum .8 to reinforcement is there to prevent buckling of column due to any accidental eccentricity causing moment. The use of 6%steel may involve practical difficulties because of congestion thus causing problem in placing and compacting concrete. Therefore the code recommends a lower value of 4 % instead of 6%for practical purposes. To avoid compression failure, congestion of reinforcement and also to ensure ductility in structural systems

7  Consider a square column, 500 mm x 500 mm, with 8-32 http://202.88.229.62/qeee/coursepack/filedirectory/2363/666/1520343768944.JPG bars placed at the corners with a clear cover of 45 mm, and Lex = Ley = 10D, subjected to axial compression. Determine the maximum factored load Pu and factored moment Mu that the column can safely withstand. Consider M20 grade concrete and Fe415 grade steel.

Ans D=500mm d=45mm Diameter of bars =32mm

(d/D)=.09

ASC=8\*3.14\*322

=6430mm2

AG=5002 =250000mm2

P=5002 (6430/250000)\*100 =2.572%

P /fck =.1286

Pu =0.4fck Ac + 0.67fy Asc

Pu= 0.4fck(5002 –[2.52/100]\* 5002 ) + 0.67\*415\*6434

= 3738573.7N

Pu/fck b\*d = 3738573.7/20\*5002

P/fck = 0.12

Corresponding Mu = 0.04\*20\*5003

=100000000Nmm

= 100KNm.