10 CHAPTER

Members Carrying Combined Axial Load and Moments

Q.1 IS 800 allows amplifying the moments which involves computing the maximum flexural moment due to transverse loads using first order analysis followed by amplifying the moment by interaction ratio (k) to take into account
(a) Primary moment (b) Secondary moment
(c) Shear (d) None of these

Q.2 In a beam-column, the maximum moment depends on the variation of bending moment along the member. This distribution of moment is taken into account by a factor called as
1. Equivalent moment factor
2. Modification factor
3. Moment Reduction factor
4. Distribution factor

Choose the correct answer :
(a) 1 and 3 (b) 2 and 4
(c) 1, 2 and 3 (d) 2, 3 and 4

Q.3 A beam-column may fail by reaching their
(a) ultimate strength
(b) buckling strength
(c) either (a) or (b)
(d) both (a) and (b) simultaneously, always

Q.4 IS 800 recommends the following non-linear interaction relation for plastic and compact I-sections:

$$\left(\frac{M_y}{M_{ndy}}\right)^{\alpha_1}+\left(\frac{M_y}{M_{ndz}}\right)^{\alpha_2}\le 1$$

The values of constant, α_1 and α_2, for a circular tube respectively are :
(a) 2 and 2
(b) 1 and 2
(c) 1.66 and 1.73
(d) 2 and 1.73

Q.5 Secondary moments arise due to:
(i) Member effect δ
(ii) Structure effect Δ

For the design of member carrying combined axial load and moment, the secondary moments to be considered in design are:
(a) δ only (b) Δ only
(c) $\delta-\Delta$ (d) $\delta+\Delta$

Q.6 A beam-column bent in double curvature as compared to beam-column bent in single curvature:
(a) will have less secondary moments
(b) more secondary moments
(c) equal secondary moments
(d) data insufficient

Q.7 Failure of a beam-column occurs due to:
(i) Local failure of the section
(ii) Overall instability failure due to flexural yielding
(iii) Overall instability due to flexural-torsional buckling

Of the above statements, the correct ones are:
(a) (i) and (iii)
(b) (i) and (ii)
(c) (ii) and (iii)
(d) (i), (ii) and (iii)

Q.8 In a typical framed structure, the columns of the frame should be designed as:
(a) Compression member
(b) Tension member
(c) Beam column
(d) Beam

Q.9 The interaction equation for beam-column as given in IS Code, takes into account:
(i) the moment amplification factor
(ii) additional stresses produced due to secondary moments
(iii) the second order analysis

Of the above statements, the correct ones are:
(a) (i) and (ii) (b) (i) and (iii)
(c) (ii) and (iii) (d) (i), (ii) and (iii)

Q.10 A typical beam-column member in a framed structure is subjected to:
(a) Axial compressive force only
(b) Axial tension and bending
(c) Axial compression and bending
(d) Axial tension and shear

Q.11 The interaction equation for checking the bolts for combined shear and tension is;
(a) $\frac{V}{V_{sd}}+\frac{T_e}{T_{nd}}\le 1$
(b) $\frac{V}{V_{sd}}+\frac{T_e}{T_{nd}}\le 1.4$
(c) $\left(\frac{V}{V_{sd}}\right)^2+\left(\frac{T_n}{T_{nd}}\right)^2\le 1$
(d) $\left(\frac{V}{V_{sd}}\right)^2+\left(\frac{T_e}{T_{nd}}\right)^2\le 1.4$

where V, V_{sd} = applied shear and design shear capacity.
T_e, T_{nd} = applied tension and design tension capacity.

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Answers Members Carrying Combined Axial Load and Moment

1. (b) 2. (c) 3. (c) 4. (a) 5. (d) 6. (a) 7. (d) 8. (c) 9. (d) 10. (c)
11. (c)

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11. (c)
The interaction equation for checking the bolts for combined shear and tension is

$$\left(\frac{V}{V_{sd}}\right)^2+\left(\frac{T_e}{T_{nd}}\right)^2\le 1$$

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