1. What is the slenderness ratio of a column?

a) The ratio of its length to its width
b) The ratio of its length to its cross-sectional area
c) The ratio of its length to its radius
d) The ratio of its length to its radius of gyration

Answer: d) The ratio of its length to its radius of gyration

Explanation: The slenderness ratio of a column is defined as the ratio of its effective length to its radius of gyration. It helps determine whether a column will fail due to buckling.

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2. Which formula is used to calculate the Euler’s buckling load for columns?

a) Rankin’s formula
b) Secant formula
c) Euler’s formula
d) Newton’s formula

Answer: c) Euler’s formula

Explanation: Euler’s formula is used to calculate the critical buckling load for columns. It is based on the column’s length, modulus of elasticity, moment of inertia, and end conditions.

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3. What is the Kern of a section in a column?

a) The central part of the section that carries the maximum load
b) The part of the section that experiences the least stress
c) The part of the section that remains unaffected by bending
d) The region where the load is assumed to act for design calculations

Answer: d) The region where the load is assumed to act for design calculations

Explanation: The Kern of a section is the region within the cross-section of a column where the load is assumed to act for design calculations, typically for simplification purposes.

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4. In which type of column failure does buckling play a significant role?

a) Tensile failure
b) Shear failure
c) Compression failure
d) Bending failure

Answer: c) Compression failure

Explanation: Buckling is a significant factor in compression failure of columns, where the

column deforms laterally under compressive load, leading to instability.

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5. What does Rankin’s formula determine in column design?

a) Buckling load for columns
b) Direct stress in columns
c) Bending stress in columns
d) Eccentric loads on columns

Answer: a) Buckling load for columns

Explanation: Rankin’s formula is used to determine the critical buckling load for columns, taking into account the column’s dimensions and material properties.

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6. The Secant formula is used to calculate stresses in columns under which type of load?

a) Tensile load
b) Compressive load
c) Shear load
d) Bending load

Answer: d) Bending load

Explanation: The Secant formula is used to calculate the stresses in columns under eccentric or bending loads, accounting for the combined effects of direct stress and bending stress.

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7. What type of vessel is considered in thin pressure vessel theory?

a) Thick-walled vessel
b) Spherical vessel
c) Reinforced vessel
d) Thin-walled vessel

Answer: d) Thin-walled vessel

Explanation: Thin pressure vessel theory applies to vessels with thin walls relative to their diameter, where stresses are assumed to be uniform across the thickness.

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8. Which theory is used to determine stress in thin pressure vessels?

a) Hooke’s Law
b) Poisson’s Ratio
c) Lame’s Theory
d) Thin Shell Theory

Answer: d) Thin Shell Theory

Explanation: Thin Shell Theory is used to determine stress in thin pressure vessels, taking into account the vessel’s geometry and internal pressure.

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9. What causes stress in thin pressure vessels?

a) External pressure
b) Internal pressure
c) Bending moment
d) Shear force

Answer: b) Internal pressure

Explanation: Stress in thin pressure vessels primarily arises due to the pressure exerted by the fluid or gas inside the vessel.

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10. What is the change in volume experienced by a thin pressure vessel under internal pressure?

a) Volume decreases
b) Volume increases

c) Volume remains constant
d) Volume depends on vessel material

Answer: c) Volume remains constant

Explanation: According to thin pressure vessel theory, the volume of the vessel remains constant under internal pressure, assuming the material is elastic and no permanent deformation occurs.

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11. Which theory of failure is commonly applied in analyzing the stability of columns?

a) Maximum Principal Stress Theory
b) Maximum Shear Stress Theory
c) Maximum Strain Energy Theory
d) Maximum Distortion Energy Theory

Answer: a) Maximum Principal Stress Theory

Explanation: Maximum Principal Stress Theory is commonly applied in analyzing the stability of columns, where failure is predicted based on the maximum principal stress exceeding the material’s strength.

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12. What is the primary failure mode considered in thin pressure vessel theory?

a) Tensile failure
b) Shear failure
c) Buckling failure
d) Yielding failure

Answer: a) Tensile failure

Explanation: In thin pressure vessel theory, the primary failure mode considered is tensile failure, where stresses exceed the material’s tensile strength, leading to rupture.

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13. Which parameter determines the stability of a column under compressive load?

a) Length
b) Cross-sectional area
c) Material density
d) End conditions

Answer: a) Length

Explanation: The length of a column significantly affects its stability under compressive load,

with longer columns being more prone to buckling.

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14. What is the primary difference between short and long columns in terms of stability?

a) Short columns are more prone to buckling
b) Long columns are more prone to buckling
c) Short columns experience higher direct stresses
d) Long columns experience higher bending stresses

Answer: b) Long columns are more prone to buckling

Explanation: Long columns are more prone to buckling due to their greater slenderness ratio compared to short columns.

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15. Which formula accounts for the combined effects of eccentric loads and direct stresses in columns?

a) Euler’s formula
b) Rankin’s formula
c) Secant formula
d) Kern formula

Answer: c) Secant formula

Explanation: The Secant formula accounts for the combined effects of eccentric loads and direct stresses in columns, providing a more accurate analysis of column behavior under bending.

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