



1. IBC requires fall arrest and lifeline anchorages be designed for a live load of:
  - a. 2,000 lb.
  - b. 3,000 lb.
  - c. 3,100 lb.
  - d. 5,000 lb.
  
2. What two types of analysis are applicable to design of steel framed supports when considering vibrating equipment:
  - a. Equivalent lateral force procedure and response spectra analysis
  - b. Frequency analysis and forced response analysis
  - c. Response spectra analysis and a time history analysis
  
3. For a project that has a bridge crane, where do you find information such as bridge weight, trolley weight, bumper forces and clearance dimensions?
  - a. ASCE 7-16
  - b. AIST Tech Report No. 13
  - c. AISC 360-16
  - d. Crane data sheet
  - e. Architect's drawings
  
4. The layout for an industrial facility is typically established by whom?
  - a. Industrial Architect
  - b. Structural Engineer
  - c. Owner
  - d. Process Engineer
  
5. Why are "wind columns" sometimes used in industrial building?
  - a. Reduce amount of wind load on main frame columns
  - b. Reduce span of wall girts
  - c. Reduce maintenance costs
  - d. Increase stability of building



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6. The following duties describe which team member?
  - Development of site plan
  - Development of exiting requirements
  - Determination of height restrictions of building
  - a. Owner
  - b. Process Engineer
  - c. Structural Engineer
  - d. Industrial Architect
  - e. Contractor
7. The equations for lateral-torsional buckling in AISC *Specification* Chapter F are based on the assumption that the loads are applied...
  - a. Above the shear center
  - b. At the level of the shear center
  - c. Below the shear center
8. If a load is moved from the bottom flange to the top flange, the lateral-torsional buckling strength...
  - a. Increases
  - b. Is not affected
  - c. Decreases
9. For effective bracing against lateral-torsional buckling, what is the lowest position on the cross-section that a lateral brace can be connected?
  - a. The required brace height is dependent on the load height
  - b. For top flange loading, the brace must be in the top 15% of the beam depth
  - c. Lateral bracing must always be attached to the compression flange
  - d. Both a and b
10. True or False: Since the mass of the crane itself is a moving load it must be treated as a live load
  - a. True
  - b. False
11. Regarding crane runway beams and support columns, which of the following is considered poor practice?
  - a. Knee braces
  - b. Loads above the shear center
  - c. Intermittent fillet welds to cap plates
  - d. Articulated links
  - e. Shims under beams
  - f. All of the above
  - g. a and c only



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12. Crane runway beam horizontal deflection is typically limited to:
- Span/240
  - Span/360
  - Span/400
  - Span/1000
13. AISC 360-16 Appendix 3 is applicable when the number of cycles of application of live load exceeds:
- 10,000 cycles
  - 15,000 cycles
  - 20,000 cycles
  - 30,000 cycles
14. Which of the following are “stress risers” for fatigue behavior? (check all that apply)
- Surface discontinuity
  - Weld Flaw
  - Hole
  - Instability
  - Geometry
  - High seismic forces
  - a, b, and c only
  - a, b, c, and e only
15. The strength reduction factor for welds can be assumed to be the same as that of the base metal if...
- Creep performance is not critical
  - Metallurgical changes are minimized
  - The service temperature is less than 900 °F
  - The weld filler metal is selected to match the base metal
16. At temperatures equal to or less than 700 °F, member stability calculations can be based on the equations in AISC *Specification* Chapters B, E and F if...
- Reduced material properties are used in place of  $E$  and  $F_y$
  - The natural frequency is less than 18 Hz
  - A steel with at least 0.5% chromium is used
  - A325 Type 1 bolts are used at the end connections
17. True or False: Low temperature alone can cause brittle fracture.
- True
  - False



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18. The down aisle longitudinal bracing in a rack storage structure is referred to as what?
- Flue Bracing
  - Down aisle strut
  - Cross aisle bracing
  - Stacker bracing
19. Which of the following is true about corrosion of steel piles?
- Corrosion is usually a consideration for the buried length of the pile.
  - Corrosion is usually a consideration where there is exposure to the atmosphere.
  - Corrosion is never a significant consideration for steel pile design.
  - Both a and b
20. Resonance cannot be avoided in low-tuned structures because...
- The damping ratio is less than 0.20
  - Appropriate acceptance criteria will reduce machine damage
  - The forcing frequency will pass through the natural frequency during startup and shutdown of the machine
  - The tuning ratio cannot be determined for low-tuned structures
21. True or False: Deep foundations are characterized by excavating deep into the foundation material.
- True
  - False
22. The buckling strength of ring stiffeners...
- Must be determined with advanced finite element techniques
  - Can be calculated with an equivalent-straight-member approach
  - Is dependent on the vortex shedding vibration amplitude
23. The in-plane buckling strength of ring stiffeners is dependent on several variables, including...
- The mesh density at stress concentrations
  - The vortex shedding vibration frequency
  - The centroidal radius
  - a, b and c
24. The buckling stress of a cylindrical shell subjected to longitudinal compression is dependent on...
- The shell thickness
  - The shell radius
  - The geometric imperfections
  - a, b and c

