



1. The efficiency of horizontally-curved beams can be improved by:
  - a. Using continuous members to provide flexural and warping continuity
  - b. Using infill members to restrain torsion of the curved member
  - c. Eliminating ovalization in round members
  - d. Both a and b
  
2. For the  $M/R$  Method, which of the following statements is true?
  - a. The curved beam is modeled as a straight member with a length equal to the chord length,  $L_s$
  - b. The curved beam is modeled as a straight member with a length equal to the developed span length,  $L_{ds}$
  - c. The flexural load is calculated using the warping boundary conditions
  - d. An equivalent torsion constant,  $J_e$ , can be used to increase the accuracy
  - e. Both c and d
  
3. For 2-D finite element models:
  - a. The flanges are modeled with beam elements
  - b. The web is modeled with beam elements
  - c. The web is modeled with plate elements
  - d. The entire cross section is modeled with a single beam element
  - e. Both a and c
  
4. An equivalent torsion constant,  $J_e$ , can be used to increase the accuracy of 2-D finite element models because:
  - a. The basic beam finite element formulation used in most commercial finite element programs includes only the St Venant torsion stiffness
  - b. The basic beam finite element formulation used in most commercial finite element programs includes only the warping stiffness
  - c. The torsional strength is dependent on stress concentration factors at the fillet radius
  - d. Both b and c
  
5. For 3-D finite element models:
  - a. The flanges can be modeled with beam elements
  - b. The flanges must be modeled with plate elements
  - c. The web is typically modeled with beam elements
  - d. The web can be modeled with plate elements
  - e. Both a and d
  - f. Both b and c



## Design of Curved Members/Façade Attachments

Quiz for Session 3: Design of Horizontally-Curved Members – July 2, 2018

Due: July 23, 8:00 a.m. EDT – Submit through the online form

6. For 3-D finite element models with both the web and the flanges modeled with plate elements:
  - a. The element stresses from the model can be compared directly with the available loads in the *AISC Specification* and *AISC Design Guide 9*
  - b. The required loads should be determined by summing the element stresses over the entire section
  - c. The required loads must include the effect of stress concentrations
  
7. Horizontally-curved beams can be designed using the flexural provisions in *AISC Specification* Chapter F if:
  - a. Excessive torsional rotation is avoided
  - b. The straight length between braces,  $L_b$ , is replaced with the developed (curved) length between braces,  $L_{db}$
  - c. The lateral-torsional buckling modification factor,  $C_b$ , is replaced with  $C_{bo}$
  - d. Both a and c
  - e. Both b and c
  
8. The elastic method of calculating the torsional strength is limited because:
  - a. The *AISC Manual* lists torsional properties only for HSS shapes
  - b. *AISC Design Guide 9* contains design charts only for the simplest cases
  - c. Second-order effects cannot be included in the analysis
  - d. Proper modeling of the warping conditions is difficult
  
9. For the isolated flange method:
  - a. The flanges are modeled as independent beams
  - b. To approximate the torsional moment, a radial load is applied to each flange
  - c. The flexural boundary conditions of the isolated flange are based on the warping boundary conditions of the curved member
  - d. The torsional strength is dependent on the plastic flexural strength of the isolated flange
  - e. All of the above statements are true
  
10. The second-order effect in horizontally-curved members:
  - a. Increases the torsional moment
  - b. Increases the torsional rotation
  - c. Increases the flexural moment
  - d. Increases the flexural rotation
  - e. Both a and b
  - f. Both c and d

