



Pre Evaluation Structural Engineering 2005



Directions For Numbers 1-24 : Read each of the following multiple-choice items and the possible answers carefully. Mark the letter of the correct answer on your answer sheet or as instructed by your teacher. **Remember: Make no marks on this test.**

1

The efficiency of a contest structure is usually determined by:

- A The structure height divided by its weight.
- B The weight supported by the structure divided by its weight.
- C The weight supported by the structure divided by its height.
- D The height of the structure multiplied by its weight.

2

The efficiency of a permanent building refers to its:

- A Total costs including land, labor and materials.
- B Square footage multiplied by its life-span.
- C Total cost divided by its construction time.
- D Usefulness as compared to its costs (time, money, energy).

3

Calculate the slenderness ratio in inches for a post given its height of 4 feet, its depth of 2 inches, and its width of 4 inches.

$$SR = H/D$$

- A 48 inches
- B 8 inches
- C 2 inches
- D 24 inches

4

Political considerations in construction include:

- A Foundation style, roof design, and orientation.
- B Flooding, use of wood, and adhesive type.
- C Building codes, zoning, and school construction.
- D Construction loans, profitability, and contracts.

5

When forces push a material from opposite directions at the same time, this is called?

- A Torsion
- B Compression
- C Tension
- D Shear

6

Simple post and beam structures in a square or rectangular shape can start to fold along the joints. This is called:

- A Deflecting.
- B Racking.
- C Sagging.
- D Loading.

7

What is the cross-sectional area of an 8 in. post that is 4 in.x 4 in.?

- A 2 in.²
- B 4 in.²
- C 8 in.²
- D 16 in.²

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- 8** When a load is applied to the end of a cantilevered beam, what is the resulting movement called?
- A Sag
 - B Stress
 - C Deflection
 - D Brittle
- 9** What is the slenderness ratio of a board that is 12" x 2" x 3"?
- A 2
 - B 4
 - C 6
 - D 8
- 10** The main force that a post is designed to resist is:
- A Compression.
 - B Tension.
 - C Torsion.
 - D Shear.
- 11** What is the study of forces on stationary objects?
- A Statics
 - B Structural engineering
 - C Materials science
 - D Dynamics
- 12** What is the strongest polygon?
- A Parallelogram
 - B Rectangle
 - C Square
 - D Triangle
- 13** Which is **NOT** a characteristic of the geodesic dome?
- A Needs no interior supports
 - B Square shaped
 - C Deflects wind over the top
 - D Invented by Buckminster Fuller
- 14** Which glue joint failure must you be the most careful of when constructing a model bridge?
- A Adhesive
 - B Substrate
 - C Cohesive
 - D Sag
- 15** In structures, what are the horizontal members that rest on solid surface supports called?
- A Beams
 - B Posts
 - C Braces
 - D Footings
- 16** In structures, what are the upright members that are mainly under compression called?
- A Beams
 - B Posts
 - C Braces
 - D Footings
- 17** The strength of all trusses is based on their use of:
- A Steel.
 - B Rectangles and squares.
 - C Triangles.
 - D Gussets.

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- 18** To determine the likelihood of a post buckling, one would use:
- A A Slenderness ratio.
 - B A Hydrometer.
 - C Ohm's Law.
 - D Bernoulli's Principle.
- 19** When a beam has a load placed on its center, which side is under compression?
- A Top
 - B Bottom
 - C Both
 - D Neither
- 20** During compression, a material is:
- A Pulled apart.
 - B Pushed together.
 - C Twisted rotationally.
 - D Separated.
- 21** During tension, a material is:
- A Pulled apart.
 - B Pushed together.
 - C Twisted rotationally.
 - D Separated.
- 22** A piece of plastic that breaks when it is bent is:
- A Ductile.
 - B Elastic.
 - C Flexible.
 - D Brittle.
- 23** Examples of forces are:
- A Torsion and gravity.
 - B Sag and deflection.
 - C Stress and strain.
 - D Ductility and elasticity.
- 24** The Brooklyn Bridge is what type of bridge?
- A Truss
 - B Beam
 - C Arch
 - D Suspension

Stop here

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| ? | ⊙ | Answer/ Scale | Objective | ? | ⊙ | Answer/ Scale | Objective |
|----|----|------------------|--------------------|----|----|------------------|--------------------|
| 1 | 1 | B | SE18.03 Technology | 13 | 13 | B | SE18.03 Technology |
| 2 | 2 | D | SE18.01 Math | 14 | 14 | B | SE18.03 Technology |
| 3 | 3 | D | SE18.01 Math | 15 | 15 | A | SE18.03 Technology |
| 4 | 4 | C | SE18.03 Technology | 16 | 16 | B | SE18.03 Technology |
| 5 | 5 | D | SE18.03 Technology | 17 | 17 | C | SE18.03 Technology |
| 6 | 6 | B | SE18.03 Technology | 18 | 18 | A | SE18.03 Technology |
| 7 | 7 | D | SE18.01 Math | 19 | 19 | A | SE18.03 Technology |
| 8 | 8 | C | SE18.03 Technology | 20 | 20 | B | SE18.02 Science |
| 9 | 9 | C | SE18.01 Math | 21 | 21 | A | SE18.02 Science |
| 10 | 10 | A | SE18.02 Science | 22 | 22 | D | SE18.02 Science |
| 11 | 11 | A | SE18.03 Technology | 23 | 23 | A | SE18.02 Science |
| 12 | 12 | D | SE18.01 Math | 24 | 24 | D | SE18.03 Technology |

Minimum points
required to achieve
mastery category

Total questions on test: 24

| Objectives measured: 3 | Items | Points | ● | ☾ | Questions measuring this objective |
|------------------------|-------|--------|----|----|------------------------------------|
| SE18.03 Technology | 14 | 14 | 11 | 9 | 1 4 5 6 8 11 13 14 15 16 17 |
| SE18.03 Technology | | | | | 18 19 24 |
| SE18.01 Math | 5 | 5 | 4 | 3 | 2 3 7 9 12 |
| SE18.02 Science | 5 | 5 | 4 | 3 | 10 20 21 22 23 |
| Totals | | 24 | 19 | 15 | |

SE18

? = Test Question Number ⊙ = line on GP Form

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Items used in test

| ? | Item name | ? | Item name | ? | Item name |
|---|---------------|----|---------------|----|---------------|
| 1 | SE18.03.00.14 | 9 | SE18.01.00.03 | 17 | SE18.03.00.11 |
| 2 | SE18.01.00.04 | 10 | SE18.02.00.05 | 18 | SE18.03.00.12 |
| 3 | SE18.01.00.05 | 11 | SE18.03.00.04 | 19 | SE18.03.00.13 |
| 4 | SE18.03.00.02 | 12 | SE18.01.00.02 | 20 | SE18.02.00.01 |
| 5 | SE18.03.00.10 | 13 | SE18.03.00.06 | 21 | SE18.02.00.02 |
| 6 | SE18.03.00.01 | 14 | SE18.03.00.07 | 22 | SE18.02.00.03 |
| 7 | SE18.01.00.01 | 15 | SE18.03.00.08 | 23 | SE18.02.00.04 |
| 8 | SE18.03.00.05 | 16 | SE18.03.00.09 | 24 | SE18.03.00.03 |

SE18

? = Test Question Number ● = line on GP Form