

Sample Questions for Paper 3 – Building Structures

1. Load path is one of the key considerations in structural design, and it is about how to bring the load acting on the building
- A. to the building façade.
 - B. to the ground / foundation.
 - C. to the columns.
 - D. to the beams.

Ans : B

2. End enlargements or bellout in piles are
- A. used to increase frictional resistance.
 - B. used to increase end-bearing resistance.
 - C. more suitable in driven rather than bored piles.
 - D. used to prevent water penetration from artesian pressure.

Ans : B

3. In general, which of the following foundation systems gives the largest founding capacity?
- A. Bored pile on rock
 - B. Driven H-pile
 - C. Mini-pile on rock
 - D. Shallow raft foundation

Ans : A

4. Which of the following statements is **not** true about a framed-tube structural system for tall buildings?
- A. This system requires closely spaced perimeter columns.
 - B. The shear lag phenomenon occurs in this system.
 - C. This system achieves an interior floor plan relatively free of core bracing and large columns.
 - D. The perimeter structure primarily resists vertical loads while the core primarily takes the lateral loads.

Ans : D

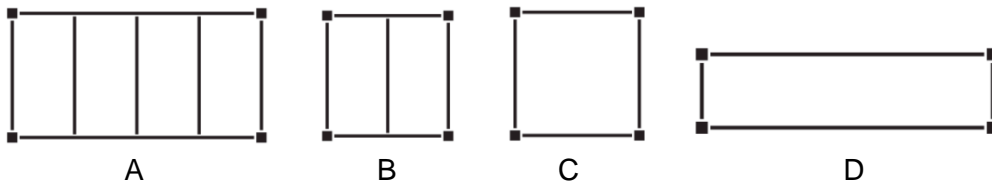
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5. Which of the following steel sections is most ideal for resisting torsion?

- A. Channel section
- B. H section
- C. T – section
- D. Circular hollow section

Ans : D

6. Which of the following reinforced concrete beam slab floors would be considered an effective two-way system?



Ans : C

7. The main function of a transfer slab is to

- A. transfer column loads from above to widely spaced piers or mega-columns below.
- B. transfer mechanical services such as HVAC conduits.
- C. transfer passengers between express lifts and local lifts.
- D. transfer lateral loads to outrigger trusses and super columns.

Ans : A

8. In general, which of the following gives a stiffer column section assuming all are of the same dimension?

- A. Plain concrete column
- B. Reinforced concrete column of 4% reinforcement ratio and normal-strength concrete
- C. Reinforced concrete column of 4% reinforcement ratio and high-strength concrete
- D. Composite column of 10% structural steel section

Ans : D

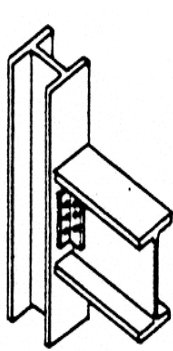
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9. For a 30-storey commercial building with a central core, which of the following is the **most** common lateral force resisting system?

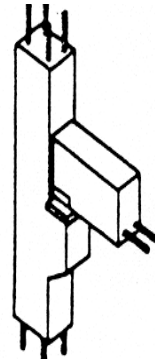
- A. Bearing- and shear-wall system
- B. Truss-wall frame
- C. Tubular frame
- D. Core and frame

Ans : D

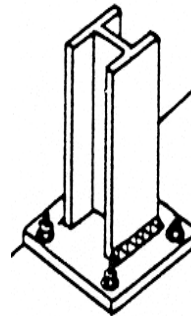
10. Which of the following is considered to be a rigid connection?



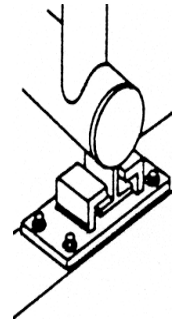
A. Bolted at web of beam



B. Precast



C. Column welded to base plate



D. Sliding joint

Ans : C

11. According to the Building Regulations, which of the following building types / spaces by occupancy has the **highest** uniform imposed load?

- A. Banking hall
- B. General office
- C. Hotel guestroom
- D. School classroom

Ans : A

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12. Which of the following statements regarding wind loads is **not** true?
- A. Wind pressure varies with building height.
 - B. Wind pressure varies with building shape and degree of exposure.
 - C. Suction forces due to wind are very small and therefore negligible.
 - D. The use of dampers is a means of resisting dynamic effects of wind.

Ans : C

13. A building subject to a horizontal force (F) results in a displacement (D). If the force is now increased to 2F, what will be the displacement D?
- A. D will increase proportionally.
 - B. D will increase unproportionally.
 - C. D will decrease proportionally.
 - D. D will be unchanged.

Ans : A

14. Stiffness (K) defines the relationship between the applied load (F) and the displacement (D). For a column, the column stiffness (K_c) is defined as

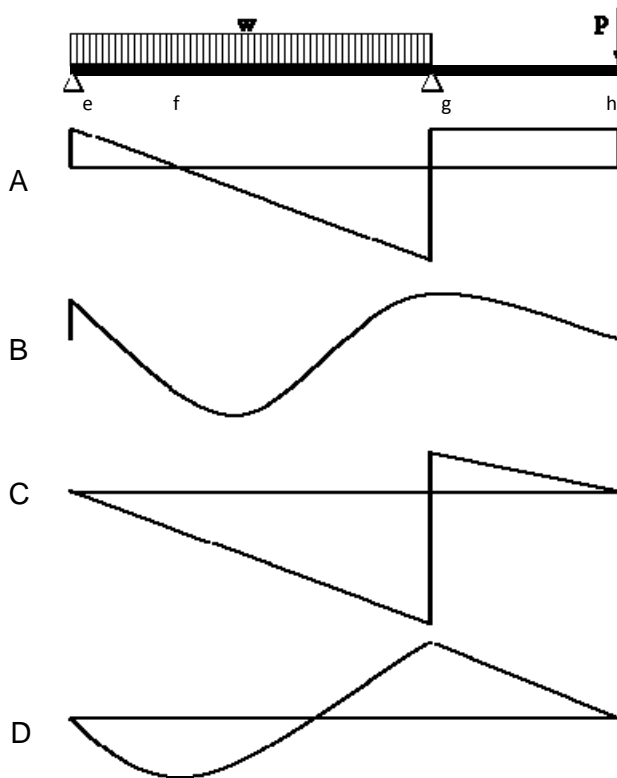
Where : E – elastic modulus of the column material
A – cross sectional area of column
L – length of column

- A. $(E \times A) / L$
- B. A / L
- C. $L / (E \times A)$
- D. L / E

Ans : A

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Refer to the diagrams of a beam below to answer Questions 15 to 17, where w is a uniform distributed load and P is a point load.



15. For the beam supported and loaded as shown, which of the diagrams from A to D represents its shear force diagram?

- A. A
- B. B
- C. C
- D. D

Ans : A

16. For the beam supported and loaded as shown, which of the diagrams from A to D represents its bending moment diagram?

- A. A
- B. B
- C. C
- D. D

Ans : D

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17. If this is a reinforced concrete beam, at which point along its length will require tension reinforcements at the top of the beam?

- A. Point e
- B. Point f
- C. Point g
- D. Point h

Ans : C

18. Which of the following is **not** a factor in the choice of a foundation system?

- A. Geographical location.
- B. Below ground soil conditions.
- C. The weight of the building and all applied loads.
- D. The proximity of adjacent buildings.

Ans : A

19. Concrete is strong in compression and weak in tension, and steel is

- A. similar to concrete.
- B. strong in both compression and tension.
- C. weak in compression and strong in tension.
- D. weak in both compression and tension in comparison with concrete.

Ans : B

20. The role of stirrups in reinforced concrete beams includes the following **except**

- A. to provide shear reinforcement.
- B. to arrest the development of diagonal tension cracking.
- C. to provide torsion reinforcement when stirrups are in closed configuration.
- D. to provide compression reinforcement.

Ans : D

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21. The purpose of the raised profiles on ribbed reinforcement bars is
- A. to create a mechanical interlock between the concrete and the steel bar.
 - B. to provide more surface area for the cohesion of the cement onto the bar.
 - C. to serve as an edge that catches the reinforcement ties and prevents them from slipping along the bar.
 - D. to provide a non-smooth surface on the bars that makes handling and lifting easier.

Ans : A

22. The diaphragm action of a floor or roof system refers to
- A. the manner in which it transfers gravity loads to columns and walls.
 - B. the manner in which it transfers lateral loads to shear walls or frames.
 - C. the resistance to uplift forces of wind.
 - D. the vibration caused by impact loads.

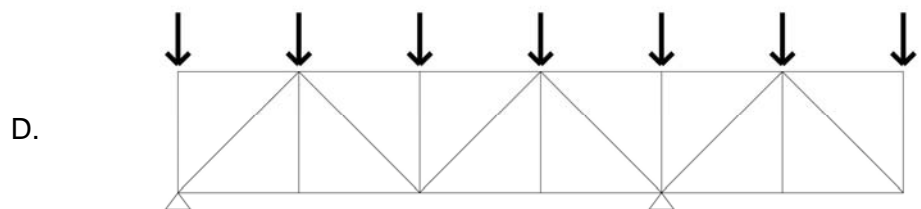
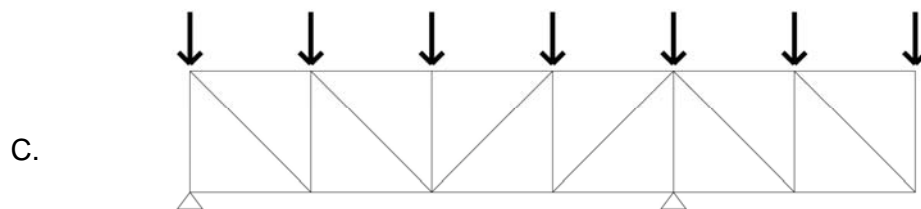
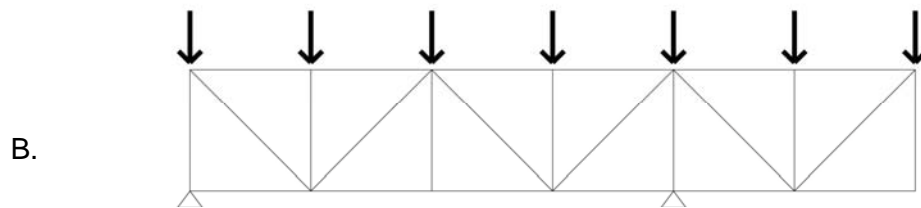
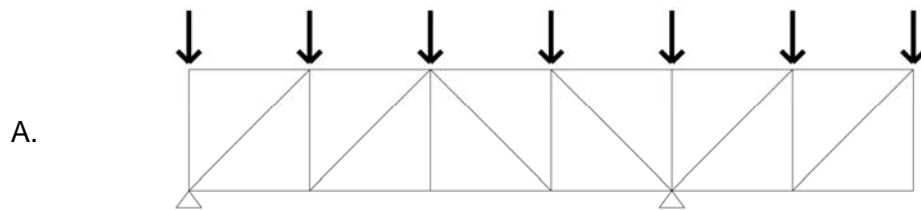
Ans : B

23. Which of the following about core and outrigger tall structures is **not** true?
- A. Core and outrigger structures are lateral resisting systems normally capable of supporting buildings much taller than normal moment resisting frames or braced frames.
 - B. Core and outrigger structures allow clear spans between cores and external structure columns thereby allowing flexible planning of those spaces.
 - C. Outrigger trusses or girders can be two or more storeys deep and often allocated as mechanical equipment floors, elevator transfer floors, or refuge floors.
 - D. Core and outrigger tall structures are only appropriate for buildings with square plans.

Ans : D

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24. In which of the following arrangements will the forces of all the internal diagonal web members of the truss be tension?



Ans : C

25. Which of the following structures derives its stiffness and stability from **synclastic** curvature?

- A. Dome
- B. Stretched membrane
- C. Barrel Shell
- D. Folded plate

Ans : A

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26. Which of the following structures derives its stiffness and stability from *anticlastic* curvature?

- A. Barrel Shell
- B. Folded plate
- C. Dome
- D. Stretched membrane

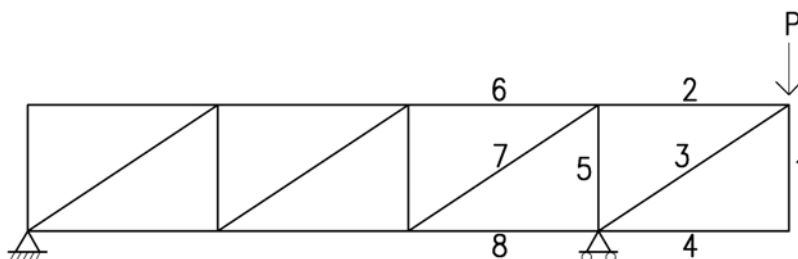
Ans : D

27. Which of the following is *not* a one-way long-span structure?

- A. Barrel Shell
- B. Deep steel plate girder
- C. Space frame
- D. Folded plate

Ans : C

Refer to the diagram of the pin-connected truss below with a point load P to answer Questions 28 to 30.



28. Which truss member is a zero-force member?

- A. 1
- B. 2
- C. 3
- D. 7

Ans : A

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29. Which truss member is in tension?

- A. 3
- B. 5
- C. 6
- D. 8

Ans : C

30. Which truss member is in compression?

- A. 2
- B. 3
- C. 6
- D. 7

Ans : B