Civil Engineering Department
Structural Engineering Stream Model Exit Exam

General Direction: This is a five item test having 29 overall question, read each instructions carefully written in every item of test and complete the whole test with the time provided.

1. Write your full name *

Neguse Solomon

Test Item One: Reinforced Concrete Structures-I

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the question

2. When shear stress exceeds the permissible limit in slab, then it can be reduced by * (1 Point)

- Increasing the depth
- Providing shear reinforcement
- Using high strength steel
- Using thinner bars but more in number

3. A reinforced concrete beam, supported on columns at ends, has clear span of 5m and 0.5m effective depth. it carries a total uniformly distributed load of 100kN/m. The design shear force for the beam is (1 Point) *

- 250kN
- 200kN
- 175kN

- [ ] 150kN

4. Spacing of stirrups in a rectangular beam is (1 Point) *

- [ ] Kept constant throughout the length
- [x] Decreased towards the centre of the beam
- [ ] Increased at the ends
- [ ] Increased at the centre of the beam.

5. As compare to an over reinforced section, an under reinforced section is preferred because (1 Point) *

- [x] There is less chance of failure
- [ ] It is more economical
- [ ] It causes only compression failure for which the chances are least
- [ ] It cause tension failure for which the chances are generally less

6. In case of a T-beam, the position of neutral axis (1 Point) *

- [ ] Always lies somewhere in the web area
- [ ] Always lies somewhere in the flange area
- [ ] Is always outside the cross-sectional area
- [x] May be anywhere in the cross-section

7. Doubly reinforced beam used when , (1 Point) *

- [ ] When extra safety factor is required

- [ ] When depth of beam is more than the width
- [ ] When the depth and width of beam restricted
- [x] A large moment resistance desired

Test Item Two: Reinforced Concrete Structures-I

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

8. _____ Is a member in which, the steel is stressed after hardening of the concrete. (1 Point) *

- [ ] Pre tensioned
- [x] Post tensioned
- [ ] Reinforced concrete
- [ ] All

9. _____ Pick up the correct statement from the following: (1 Point) *

- [ ] Lateral reinforcement in R.C.C. columns is provided to prevent the longitudinal reinforcement from buckling
- [ ] Lateral reinforcement prevents the shearing of concrete on diagonal plane
- [ ] Lateral reinforcement stops breaking away of concrete cover, due to buckling
- [ ] Lateral reinforcement in R.C.C. columns, is kept not less than 5 mm diameter
- [x] All the above.

10. All are useful properties of Yield Lines in proposing possible collapse mechanisms, except. (1 Point) *

- [ ] Yield lines are generally straight and they must end at a slab boundary:

- [ ] To satisfy compatibility of deformations, the yield line dividing two plates must intersect the intersection of the axes about which those plates are rotating
- [ ] Axes of rotation lie along the line of supports. They can pass over a column at any angle.
- [x] none

11. Which one of the following is true about doubly reinforced concrete? (1 Point) *

- [ ] Reinforcement is only needed at the compression zone
- [ ] Reinforcement is needed at the tension zone
- [x] Reinforcement is needed on tension and compression zone
- [ ] None of the above

12. Let's given to you an assignment to reinforce a concrete. So, how can you reinforce the given concrete to produce free from cracking and buckling? (1 Point) *

- [ ] At the compression zone
- [ ] At the tension zone
- [x] At both
- [ ] None

Test Item Three: Steel and Timber Sructure

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

13. Among which of the following is the location of plastic hinge? (1 Point) *

- [ ] At center for uniformly distributed load
- [x] At points away from concentrated load

- ( ) At supports
- ( ) At center of beam

14. _____ Web crippling generally occurs at the point where (1 Point) *

- ( ) Bending moment is maximum
- ( ) Shearing force is minimum
- ( ) Concentrated load acts
- ( ) Deflection is maximum
- (•) All of the above

15. Which one of the following sections should preferably be used at places where torsion occurs? (1 Point) *

- ( ) Angle section
- ( ) Channel section
- (•) Box type section
- ( ) Any of the above

16. _____A circular column section is generally not used in actual practice because (1 Point) *

- ( ) It is economical
- ( ) It cannot carry the load safety
- (•) It is difficult to connect beams to the round sections

- [ ] All of the above

17. _____The ratio of plastic section modulus to elastic section modulus (1 Point) *

- [ ] Is equal to 1
- [ ] Is always less than 1
- [ ] Is always greater than1
- [x] Can be less than 1

18. _____ In rolled steel beams, shear force is mostly resisted by (1 Point) *

- [x] Web only
- [ ] Flanges only
- [ ] Web and flanges together
- [ ] None of these
- [ ] All of the above

Test Item Four: Fundamentals of Bridge Design

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

19. _____ Lineal water way width of bridge is the way between the extreme edges of water surface at H.F.L. measured at (1 Point) *

- [ ] 45° to the abutment face
- [x] 90° to the abutment face

- 30° to the abutment face
- 0° to the abutment face

20. In which of the following elements of bridge project, design standards are established and data is collected? (1 Point) *

- A. feasibility phase
- B. Assembly of design criteria phase
- C. design phase
- D. construction phase

21. Which one of the following is correct about bridge piers? * (1 Point)

- A. Piers should be located in such a manner that they can provide the required lineal waterway and navigational clearance.
- B. Piers should be located to cause a minimum of obstruction to the flow.
- C. Piers and abutments should be located to make the best use of the foundation conditions available.
- D. All

22. In design of bridge, wind and _____ loads shall not be considered to act simultaneously. (1 Point) *

- A. Longitudinal
- B. Lateral
- C. Seismic

D. Centrifugal

23. Which one of the following is bridge transient load (1 Point) *

A. horizontal earth pressure load

B. earth surcharge load

C. dead load of wearing surfaces

D. vehicular braking force

24. SPan bridges are usually used to a maximum span of (1 Point) *

A. 3m

B. 6m

C. 9m

D. 12m

Test Item Five: Structural Design

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

25. Which one of the following is not the dependent variable for wind forces?

A. Geographical location

B. Mass of the building

C. Height of the structure

D. Topography of the area

26. Which of the following statement is false

A. Centre of mass is the point where the entire mass of the floor acts

B. Centre of rigidity is the point where the entire stiffness of the building acts

C. Mass is majorly contributed by walls and roofs

D. stiffness is majorly contributed by the columns and shear walls of the building

27. For a fixed-end beam of length L and central point load of W, what will be the value of W at collapse? (Note: plastic moment capacity of beam = Mp)

A. 6 Mp/L

B. 10 Mp/L

C. 9 Mp/L

D. 8 Mp/L

28. The plastic modulus of a section is 5 x 10-4 m3. Its shape factor is 1.2 and the plastic moment capacity is 120kNm, what is the value of the yield stress of the material?

A. 100 N/mm2

B. 200 N/mm2

C. 240 N/mm2

D. 288 N/mm2

29. An arbitrarily assumed mechanism the load factor is either exactly right or is wrong and is too large, leading a designer to think that the frame can carry more load than is actually possible. This theorem is known as .

A. Lower bound theorem

B. Upper bound theorem

C. Uniqueness theorem

D. Medium bound theorem

30. The strip along the unsupported edge acts as a support for the strips at right angles. Such strips have been referred to as

A. Strong band

B. Integral beam

C. Reinforcement concentrated slab

D. All

Test Item I: Highway I

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

31. Which one of the following factor is considered in determination of transition curve length?

A) The radius of the curve

B) The rate of change of radial acceleration

C) Rate of super elevation

D) The rate of time

E) All of the above

32. the length of vehicle affects

Extra width of pavement and minimum turning radius

width of traffic lane

- Width of shoulder and parking facilities
- Clearance to be provided under structures
- E) Noon of the above

33. Which of the following lighting layout is economical and suitable for narrow roads?

- Central lighting system
- Staggered lighting system
- Single side lighting
- None of the above

34. Channelization island should have

- Large entry and exit radius
- Large entry and small exit radius
- Small entry and large exit radius
- Equal radius at entry and exit

35. Which one of the following is not type of transition curve used? *

- Parabolic
- Clothoid
- Lemniscate
- Cubic parabola

36. Select the purpose of transition curves in the geometric alignment of the road? *

- Enable gradual introduction of super elevation
- Avoid abrupt change of the curvature of the road
- Improve the aesthetic appearance of the road
- Enable gradual introduction of steering gradually
- All of the above

37. Which one of the following is true about preliminary survey in highway design? *

- It is use to estimate the cost of alternative alignment
- It also used to collect the necessary physical information and details of topography, drainage and soil properties
- It used in finalising of the best alignment alternative
- All of the above

38. 1. Which one of the following is the correct sequence of survey in road project? *

- Topographic, Preliminary, Reconnaissance and Detailed
- Reconnaissance , Topographic, Preliminary and Detailed
- Topographic, Reconnaissance, Preliminary and Detailed
- Preliminary, Reconnaissance, Topographic and Detailed

39. Which one of the following is the correct order of the pavement structure of the road with respect to the construction sequences? *

- Sub-soil, Sub-grade, Capping, Sub-base, Base Course and Wearing Course

- Sub-base, Capping, Wearing Course, Base Course, Sub-grade and Sub-soil
- Sub-soil, Wearing Course, Base Course, Sub-grade, Capping and Sub-base
- Wearing Course, Base Course, Sub- base, Capping, Sub-grade, Sub-soil

40. Traffic volume is *

- Maximum number of vehicles passing a given road section in unit time in one direction
- Number of vehicles per unit length of road
- Number of vehicles passing through a section of road in either direction in unit time
- All of the above

41. In which angle of parking can have maximum number of vehicles can be parked? *

- 10° angle parking
- 30° angle parking
- 45° angle parking
- 90° angle parking

42. The instrument used to study spot speed in traffic engineering is *

- Enoscope
- Enometer
- Speed recorder

- [x] Speedometer

43. Which one of the following is not information sign? *

- [ ] Name of destination
- [x] Cross road ahead
- [ ] Name of road
- [ ] Speed limit

44. The most common shape of Warning signs plates is _____. *

- [ ] Circular
- [ ] Rectangular
- [x] Triangular
- [ ] Square

Geotechnical Engineering Stream Model Exit Exam

Test Item One: Soil Mechanics I

45. For a sand, the maximum and minimum possible void ratios were determined in the laboratory to be 0.94 and 0.33 respectively. What is the value of the relative density of the sand if it is compacted in the field at a void ratio of 0.57? *

- [ ] 57.9%
- [ ] 72.5%
- [ ] 60.6%

- [x] 42.3%

46. Which of the following doesn't happen when compaction is done? *

- [ ] Permeability decreases
- [x] Water content increases
- [ ] Shear strength decreases
- [ ] Compressibility decreases

47. According to Darcy's law: *

- [ ] q = IA
- [x] q = KA
- [ ] q ∞ IA
- [ ] q = KA

48. The mass of moist soil is 20kg, and its volume is 0.011 . After drying in an oven, the mass was reduced to 16.5kg. What is the moisture content of the soil? *

- [x] 12.5%
- [ ] 36.2%
- [ ] 21.2%
- [ ] 82.5%

49. For the soil above, what is the value of the dry density? *

- 1818.18 kg/m^3
- 1500 kg/m^3
- 2000 kg/m^3
- 1725 kg/m^3

50. Coarse particles are those particles with size coarser than ____mm diameter. *

- 60
- 0.002
- 4.75
- 0.075

Test Item Two: Soil Mechanics II

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

51. When drainage is permitted throughout the triaxial test, the test is known as: *

- Quick test
- Drained test
- Consolidated undrained test
- None of the above

52. Columb's equation for shear strength can be represented as: *

- [x] C=S+σ tan〖∅^'〗
- [ ] C=S-σ tan〖∅^'〗
- [ ] S=σ+C tan〖∅^'〗
- [ ] S=C-σ tan〖∅^'〗

53. The bearing capacity of soil supporting a footing size of 3m x 3m will not be affected by the presence of water if the water table is located at a _____ meter below the base of the footing. *

- [ ] 1 meter
- [ ] 1.5 meter
- [ ] 3 meter
- [x] 6 meter

54. **1)** The inclination of the failure plane behind a vertical wall in the passive pressure case is inclined to the horizontal at *

- [ ] 〖45〗^0-∅/₂
- [x] 〖45〗^0+∅/₂
- [ ] 〖45〗^0-∅
- [ ] 〖45〗^0+∅

55. If a uniform surcharge of is placed on the backfill with , the increase in pressure is: *

- ○ 12 kN/m^2
- ○ 30 kN/m^2
- ◉ 40 kN/m^2
- ○ 120 kN/m^2

Test Item Three: Foundation I

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

56. Which of the following, is a type of shallow footing? *

- ◉ Spread footing
- ○ Pile foundation
- ○ Pier foundation
- ○ Well foundation

57. Which one of the following method use for soil boring? *

- ○ Percussion drilling
- ○ Wash boring
- ○ Rotary drilling
- ◉ All of the above

58. Which of the below is a footing that covers the entire area beneath a structure and supports all the columns? *

- Strap footing
- Spread footing
- Combined footing
- Raft footing

59. When two column loads are unequal, which of the most possible footing can be provided? *

- Strap footing
- Raft footing
- Trapezoidal combined footing
- Mat footing

60. Retaining walls should be designed to provide adequate stability against *

- Foundation bearing failure
- Sliding stability
- Overturning stability
- All of the above

61. Which of the following soil sample type represent the in-situ soil structure and are required for determining reliable information on shearing resistance and stress-deformation characteristics of a deposit? *

- Interrupted sample

- [x] Undisturbed sample
- [ ] Disturbed sample
- [ ] Good sample

Test Item Four: Foundation II

Instructions: Choose the letter of the correct answer and write it on the blank space provided at the left side of the test question.

62. A sheet pile walls that derive their support from a combination of interaction with the surrounding soil and one (or more) mechanical devices which inhibit motion at an isolated point known as: *

- [ ] A. Precast concrete sheet pile wall
- [ ] B. Cantilever sheet pile wall
- [ ] C. Steel sheet pile wall
- [x] D. Anchored sheet pile wall

63. Which one of the following isn't the advantage of driven piles? *

- [ ] A. Used in a places where it is advisable not to drill holes for fear of meeting ground water under pressure.
- [ ] B. Piles can be precast to the required specifications.
- [x] C. Requires light equipment for handling and driving.
- [ ] A pile can be driven into granular soil to compact the adjacent soil mass

64. A modification of soil property with the help of additional chemicals or admixtures is _____ *

- [ ] A. Compaction

- [x] B. Mechanical stabilization
- [ ] C. Drainage
- [ ] Particle size distribution

65. The downward drag acting on a pile due to the movement of the surrounding is called: *

- [x] A. Negative skin friction
- [ ] B. Skin friction
- [ ] C. Frictional force
- [ ] D. None of the mentioned

66. The load carrying capacity of a pile can be determined by which of the following methods? *

- [ ] A. Dynamic formulae
- [ ] B. Static formulae
- [ ] C. Plate load test
- [x] D. All of the mentioned

67. Which of the following affect the properties of a soil under compaction *

- [x] A. Water content
- [ ] B. Swelling

- C. Placement condition
- D. Permeability

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