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**Previous Year Paper
(Civil)**

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Booklet Serial No. 823673

Test Booklet Series

JUNIOR ENGINEER - CIVIL
OMR Examination - 2025

A

Time Allowed: 120 Minutes

Maximum Marks: 120

INSTRUCTIONS

- IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
- Please note that it is the candidate's responsibility to encode and fill in the Roll Number, Booklet Serial No. and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.
- You have to enter your Roll Number on the Test Booklet in the Box provided alongside.
DO NOT write *anything else* on the Test Booklet.
- This Test booklet contains 120 items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the appropriate. In any case, choose **ONLY ONE** response for each item.
- You have to mark all your responses **ONLY** on the separate Answer /Response Sheet provided. See directions in the Response Sheet.
- All items carry equal marks.
- After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer /Response Sheet**. You are permitted to take away with you the Test Booklet and **Candidate's Copy of the Response Sheet**.
- Sheets for rough work are appended in the Test Booklet at the end.
- While writing Centre Code and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use **"ONLY BLUE/BLACK BALL POINT PEN"**.
- Penalty for wrong answers:**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTIONS PAPERS).
 - There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, ($\frac{1}{4}$) of the marks assigned to that question will be deducted as penalty.
 - If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
 - If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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(Set - A)

1. Which of the following set of terms does not relate to operation of a theodolite?
- A) Transiting and inverting
B) Face left and face right
C) Right swing and left swing
D) Gauging and sounding

2. If the whole circle bearing is $315^{\circ}20'$, its quadrantal bearing would be
- A) $S 36^{\circ}30' W$
B) $N 44^{\circ}40' W$
C) $N 57^{\circ}24' W$
D) $S 60^{\circ}40' W$

3. Error due to inclination of line of collimation in levelling across a river can be eliminated by
- A) Reversion
B) Reciprocal ranging
C) Reciprocal levelling
D) Keeping level in middle

4. The length of a survey line when measured with a chain of 20 m nominal length was found to be 841.5m. If the chain used is 0.1 m too long, the correct length of the measured line is
- A) 845.7 m
B) 837.3 m
C) 841.6 m
D) 839.4 m
- $\frac{20-1}{20} \times 841.5$

5. In any closed traverse, if the survey work is error free, then
- I. The algebraic sum of all the latitudes should be equal to zero
II. The algebraic sum of all the departures should be equal to zero
III. The sum of the northings should be equal to the sum of the southings
- Which of the above statements are correct?

- A) I and II
B) I and III
C) II and III
D) I, II and III

6. Consider the following statements:
Reciprocal leveling eliminates the effect of

- I. Errors due to earth's curvature
II. Errors due to atmospheric refraction
III. Mistakes in taking levelling staff readings
IV. Error due to line of collimation

Which of these statements are correct?

- A) I, II and III
B) I, III and IV
C) II, III and IV
D) I, II and IV

7. Consider the following statements about the characteristics of contours:

- I. Closed contour lines with higher values inside show a lake
II. Contour is an imaginary line joining points of equal elevations
III. Closely spaced contours indicate steep slope
IV. Contour lines can cross each other in case an overhanging cliff

Which of these statements are correct?

- A) II, III and IV
B) I and II
C) I and IV
D) I, II and III

8. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Type of survey)

- i. Topographical survey
- ii. Reconnaissance survey
- iii. Cadastral survey
- iv. Archaeological survey

List - II (Purpose)

1. To determine boundaries of fields, houses, etc.
2. To find relics of antiquity
3. To determine natural features of a country
4. To determine possibility and rough cost of the surveying system to be adopted

Choose the correct option:

- A) (i) - 3, (ii) - 4, (iii) - 1, (iv) - 2
- B) (i) - 3, (ii) - 1, (iii) - 4, (iv) - 2
- C) (i) - 2, (ii) - 4, (iii) - 1, (iv) - 3
- D) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3

9. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Statement)

- i. Accurate centering in plane table surveying is necessary for
- ii. Exact orientation is more important than accurate centering for
- iii. The intersection method of plane table surveying is particularly employed for
- iv. Plane table survey is useful for

List - II (Situation)

1. Inaccessible points
2. Open country with good intervisibility
3. Large scale maps
4. Small scale maps

Choose the correct option:

- A) (i) - 3, (ii) - 4, (iii) - 1, (iv) - 2
- B) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1
- C) (i) - 1, (ii) - 2, (iii) - 4, (iv) - 3
- D) (i) - 3, (ii) - 2, (iii) - 1, (iv) - 4

10. The following steps are necessary to obtain sufficient accuracy with the tape:

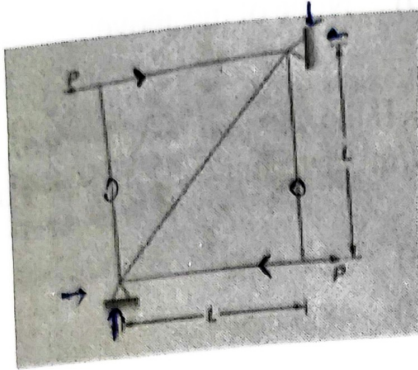
- I. Keeping uniform tension on tape for each measurement
- II. "Breaking" tape on slopes are necessary to keep the tape level
- III. Keeping accurate count of the stations
- IV. Keeping the tape on the line being measured

The correct sequence of these steps is:

- A) IV, II, I, III
- B) II, III, IV, I
- C) IV, I, II, III
- D) III, II, I, IV

11. Robert Hooke discovered experimentally that within elastic limit
 A) Stress = strain
 B) Stress $\times$ strain = 1
 C) Stress / Strain = a constant ...
 D) None of the above
12. A circular bar is subjected to an axial pull of 100 kN. If the maximum intensity of shear stress on any oblique plane is not to exceed 60 MN/m^2 , determine the diameter of the bar.
 A) 21.6 mm
 B) 32.6 mm
 C) 45.6 mm
 D) 48.6 mm
13. In case of a circular section, the maximum shear stress is _____ percent more than the mean shear stress.
 A) 10
 B) 20
 C) 33.33
 D) 66.66
14. In a rectangular section, the stress will be of the same sign throughout the section if the load lies within the _____ of the section.
 A) Middle third
 B) Middle half
 C) Both (A) and (B)
 D) None of the above ...
15. A cantilever 1.5 m long carries a uniformly distributed load over the entire length. Find the deflection at the free end if the slope at the free end is 1.5° .
 A) 21.88 mm
 B) 29.45 mm
 C) 36.48 mm
 D) 41.54 mm
16. The slope and deflection at a section in a loaded beam can be found out by which of the following methods?
 A) Double integration method
 B) Moment area method
 C) Macaulay's method
 D) Any of the above ...
17. The material that exhibits the same elastic properties in all directions at a point is said to be _____.
 A) homogeneous
 B) orthotropic
 C) viscoelastic
 D) isotropic ...
18. If principal stresses in a two-dimensional case are -10 MPa and 20 MPa respectively, then maximum shear stress at the point is
 A) 10 MPa
 B) 15 MPa ...
 C) 20 MPa
 D) 30 MPa

19. All the members of the planar truss (see figure), have the same properties in terms of area of cross-section (A) and modulus of elasticity (E),



For the loads shown on the truss, the statements that correctly represents the nature of forces in the members of the truss is:

- There are 3 members in tension, and 2 members in compression
- There are 2 members in tension, and 2 members in compression, 1 zero-force member
- There are 2 members in tension, 1 member in compression, and 2 zero-force members
- There are 2 members in tension, and 3 zero-force members

20. The following statements are related to bending of beams
- The slope of the bending moment diagram is equal to the shear force ✓
 - The slope of the shear force diagram is equal to the load intensity ✓
 - The slope of the curvature is equal to the flexural rotation +
 - The second derivative of the deflection is equal to the curvature + x
- The only FALSE statement is

- I
- II
- III
- IV

21. A circular solid shaft of span $L = 5$ m is fixed at one end and free at the other end. A twisting moment $T = 100$ kN-m is applied at the free end. The torsional rigidity GJ is 50000 kN-m²/rad. Following statements are made for this shaft:

- The maximum rotation is 0.01 rad ✓
- The torsional strain energy is 1 kN-m

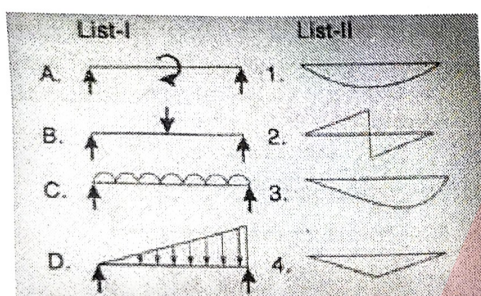
With reference to the above statements, which of the following applies?

- Both statements are true
- Statement 1 is true but 2 is false
- Statement 2 is true but 1 is false x
- Both statements are false y

22. Consider the following statements:
- On a principal plane, only normal stress acts ✓
 - On a principal plane, both normal and shear stresses act
 - On a principal plane, only shear stress acts ✗
 - Isotropic state of stress is independent of frame of reference

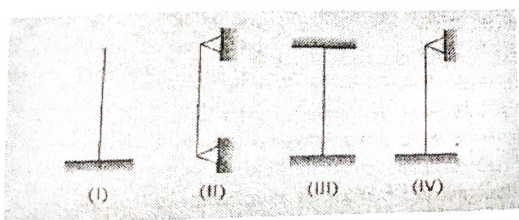
Which of these statements is/are correct?

- I and IV ✓
 - II only
 - II and IV
 - II and III
23. The "Plane section remain plane" assumption in bending theory implies
- Stress profile is linear
 - Strain profile is linear ✓
 - Both profiles are linear
 - Shear deformation is neglected
24. List-I shows different loads acting on a beam and List-II shows different bending moment distributions. Match the load with the corresponding bending moment diagram.



- A - 4, B - 2, C - 1, D - 3
- A - 4, B - 3, C - 1, D - 2
- A - 2, B - 3, C - 4, D - 1
- None of the above ✓

25. Four columns of the same material and having identical geometric properties are supported in different ways as shown below:



It is required to arrange these four columns in the increasing order of their respective first buckling loads. The correct order is given by

- I, II, III, IV
- III, IV, I, II
- II, I, IV, III
- I, II, IV, III ✓

$$P = \frac{\pi^2 EI}{L^2}$$

$$(I) \frac{P}{4}$$

$$(II) P$$

$$(III) 4P$$

$$IV 2P$$

I, II, IV, III

[P.T.O.]

(Set - A)

(7)

- (Set - A)**

33. The drainage water intercepting the canal can be disposed in different ways. And the type of cross-drainage works with their function is given below. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Function/Places)

1. By passing the canal over the drainage
2. By passing the canal below the drainage
3. By passing the drain through a canal

List - II (Accomplished)

- i. Either through a level crossing or through inlets and outlets
- ii. Either through a super-passage or through a canal syphon
- iii. Either through an aqueduct or through a syphon-aqueduct

Choose the correct option:

- A) (1) - i, (2) - ii, (3) - iii
- B) (1) - ii, (2) - iii, (3) - i
- C) (1) - iii, (2) - i, (3) - ii
- D) (1) - iii, (2) - ii, (3) - i

34. Match List - I with List-II and select the correct answer using the codes given below the lists:

List-I(Classification of River Training)

1. High water training
2. Low water training
3. Mean water training

List - II (Purpose)

- i. Sediment (efficient disposal of suspended load and bed load)
- ii. Discharge (flood control)
- iii. Depth (provide sufficient water depth)

Choose the correct option:

- A) (1) - i, (2) - ii, (3) - iii
- B) (1) - ii, (2) - iii, (3) - i
- C) (1) - iii, (2) - i, (3) - ii
- D) (1) - iii, (2) - ii, (3) - i

35. ____ (i) ____ evaporates water, and ____ (ii) ____, by causing and controlling winds, circulates the evaporated water vapour, and thus, helping in its ____ (iii) ____ at different places.

Choose the correct option to fill out i, ii, iii in order.

- A) Sun, hydro cycle, filtration
- B) Sun, Coriolis force, filtration
- C) Sun, cycle, precipitation
- D) Sun, Coriolis force, reprecipitation

36. In a domestic wastewater sample, COD and BOD were measured. Generally, which of the following statement is true for their relative magnitude?

- A) COD = BOD
- B) COD > BOD
- C) COD < BOD
- D) None of the above

37. The portable water is prepared from turbid surface water by adopting the following treatment sequence.
- A) Turbid surface water - Coagulation - Flocculation - Sedimentation - Filtration - Disinfection - Storage and Supply
 - B) Turbid surface water - Sedimentation - Coagulation - Flocculation - Filtration - Disinfection - Storage and Supply
 - C) Turbid surface water - Flocculation - Coagulation - Filtration - Disinfection - Sedimentation - Storage and Supply
 - D) Turbid surface water - Coagulation - Flocculation - Filtration - Disinfection - Sedimentation - Storage and Supply
38. A 1% solution of sewage sample is incubated for 5 days at 20°C. The depletion of oxygen was found to be 3 ppm. Determine the BOD of raw sewage.
- A) 60 ppm
 - B) 150 ppm
 - C) 300 ppm
 - D) 600 ppm
39. As per Noise Pollution (Regulation and Control) Rules 2000 of India, the day time noise limit for a residential zone, expressed in dB (A) L_{eq} , is
- A) 45
 - B) 55
 - C) 65
 - D) 75
40. When the depth of trench exceeds 1.5 to 2m, and when excavations is made with side vertical, it becomes necessary to support the side by sheeting and bracing. This operation is known as _____
- A) shafts of trench
 - B) electro-osmosis
 - C) boning of trench
 - D) timbering of trench
41. The following two statements are relevant to method of sewage disposal.
- Statement - 1:** The three principal processes of land treatment of wastewater are (i) Broad irrigation or sewage farming, (ii) Rapid infiltration, and (iii) Overland runoff.
- Statement - 2:** The ratio of quantity of receiving water to that of wastewater or effluent discharge is called the dilution factor.
- Choose the correct option:**
- A) Statement 1 is correct and Statement 2 is incorrect
 - B) Statement 2 is correct and Statement 1 is incorrect
 - C) Statement 1 and 2 are correct
 - D) Statement 1 and 2 are incorrect

42. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Water properties)

- i. Alkalinity
- ii. Hardness
- iii. Chlorine
- iv. Dissolved Oxygen

List - II (Titrants)

1. N/35.5 AgNO_3
2. N/40 $\text{Na}_2\text{S}_2\text{O}_3$
3. N/50 H_2SO_4
4. N/50 EDTA

Choose the correct option:

- A) (i) - 2, (ii) - 4, (iii) - 3, (iv) - 1
- B) (i) - 3, (ii) - 4, (iii) - 1, (iv) - 2
- C) (i) - 1, (ii) - 2, (iii) - 4, (iv) - 3
- D) (i) - 4, (ii) - 3, (iii) - 2, (iv) - 1

43. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Materials and Air pollutants)

1. Materials: Metals; and Pollutants: SO_2
2. Materials: Paper; and Pollutants: SO_2
3. Materials: Textiles; and Pollutants: SO_2

List - II (Effects)

- i. Embrittlement
- ii. Reduction in tensile strength
- iii. Tarnishing of surfaces

Choose the correct option:

- A) (1) - i, (2) - ii, (3) - iii
- B) (1) - ii, (2) - iii, (3) - i
- C) (1) - iii, (2) - i, (3) - ii
- D) (1) - iii, (2) - ii, (3) - i

44. Match List - I with List-II and select the correct answer using the codes given below the lists:

List - I (Type of water impurity)

- i. Hardness
- ii. Brackish water from sea
- iii. Residual MPN from filters
- iv. Turbidity

List - II (Method of treatment)

1. Reverse Osmosis
2. Chlorination
3. Zeolite treatment
4. Coagulation, Flocculation and Filtration

Choose the correct option:

- A) (i) - 1, (ii) - 4, (iii) - 3, (iv) - 2
- B) (i) - 4, (ii) - 3, (iii) - 1, (iv) - 2
- C) (i) - 2, (ii) - 1, (iii) - 4, (iv) - 3
- D) (i) - 3, (ii) - 1, (iii) - 2, (iv) - 4

45. Particles may settle out of a suspension in four ways, depending upon the concentration of the suspension and the flocculating properties of the particles. Arrange the four types in order with respect to decreasing of settling depth vs increasing of settling time.

Choose the correct order.

- A) Discrete settling, Flocculant settling, Zone settling, Compression settling
- B) Compression settling, Flocculant settling, Discrete settling, Zone settling
- C) Zone settling, Flocculant settling, Discrete settling, Compression settling
- D) Discrete settling, Zone settling, Flocculant settling, Compression settling

46. Gap grading of aggregate is one, in which
- At least one intermediate aggregate fraction is absent
 - % passing fall within a narrow limit of size fractions
 - Combines different fractions of fine and coarse aggregates
 - All the aggregate are of same size
47. As per limit state design method the ultimate strain in the outermost compression fiber of concrete in bending is taken as
- 0.0020
 - 0.0120
 - 0.0035
 - 0.0520
48. A frame having (M) number of member and joints (J) is said to be perfect frame if it follows the equation as given below
- $J = 2M - 3$
 - $M = 2J - 3$
 - $M = 3J - 2$
 - $J = M + 3$
49. Consider the following pairs, for a cantilever beam of length (l), loaded by point load (w) and flexural rigidity (EI).
- | | |
|---------------------------|--------------------------|
| i. Maximum Bending Moment | 1. wl |
| ii. Strain Energy | 2. $\frac{wl^2}{2EI}$ |
| iii. Maximum slope | 3. $\frac{wl^3}{3EI}$ |
| iv. Maximum deflection | 4. $\frac{w^2 l^3}{6EI}$ |
- Which of the pair given below is correctly matched?
- (i)-(1), (ii)-(4), (iii)-(3), (iv)-(2)
 - (i)-(1), (ii)-(4), (iii)-(2), (iv)-(3)
 - (i)-(4), (ii)-(2), (iii)-(1), (iv)-(3)
 - (i)-(4), (ii)-(3), (iii)-(1), (iv)-(2)
50. The constituent compounds of cement in decreasing order of rate of hydration are
- C_2S, C_3S and C_3A
 - C_3S, C_3A and C_2S
 - C_3A, C_2S and C_3S
 - C_3A, C_3S and C_2S
51. Which of the following Indian Standard (IS) code used for wind load analysis for designing building structure
- IS 456
 - IS 800
 - IS 875
 - IS 1893

52. In a cantilever RCC beam design, tensile reinforcement is provided
 A) On the top of the beam
 B) On the bottom of the beam
 C) In the middle of the beam
 D) On the top and bottom of the beam
53. For construction of structure under water the type of lime used is
 A) Hydraulic lime
 B) Fat lime
 C) Quick lime
 D) Pure lime
54. The standard size of the brick as per IS standard is
 A) $10 \times 9 \times 9$ cm
 B) $18 \times 9 \times 9$ cm
 C) $19 \times 9 \times 9$ cm
 D) $23 \times 12 \times 8$ cm
55. Inadequate compaction during concrete casting results in
 A) Segregation
 B) Rutting
 C) Bleeding
 D) Honey combing
56. Side face reinforcement is required when the depth of the web of a beam is
 A) Greater than 750 mm
 B) Greater than 900 mm
 C) Greater than 950 mm
 D) Greater than 1000 mm
57. Distribution of shear stress intensity over a rectangular section of a loaded beam follows diagrammatically
 A) A circular curve
 B) A straight line
 C) A parabolic curve
 D) An elliptical curve
58. The compressive strength of 100 mm cube as compared to 150 mm cube is always
 A) More
 B) Less
 C) Same
 D) Unpredictable
59. Which of the following is a tensile test of a cylindrical concrete sample,
 A) Compaction factor test
 B) Le Chatelier's test
 C) Splitting test
 D) Autoclave test
60. The main reinforcement of a RC slab consists of 6 mm bars at 10 cm spacing if it is desired to replace 6 mm bars by 12 mm bars, then spacing of 12 mm bars should be
 A) 10 cm
 B) 40 cm
 C) 60 cm
 D) 120 cm
61. The void ratio of a fully saturated soil sample having a porosity of 0.3 is
 A) 0.26
 B) 0.66
 C) 0.43
 D) 1.0

(Set - A)

(13)

[P.T.O.]

$$e = \frac{n}{1-n}$$

$$\frac{0.3}{0.6}$$

$$\frac{0.3}{0.6} = \frac{1}{2}$$

62. The soil has a bulk density of 55 kN/m^3 and water content 10%. The dry density of soil is
 A) 5.5 kN/m^3 B) 10 kN/m^3
 C) 50 kN/m^3 D) 55 kN/m^3
63. Lime stabilization is very effective in treating
 A) Sandy soil
 B) Silty soil
 C) Non-plastic soil
 D) Plastic clayey soil
64. Soil which contains finest grain particles
 A) Fine sand B) Sand
 C) Clay D) Silt
65. The minimum water content at which the soil just begins to crumble when rolled into threads of 3 mm in diameter, is known as
 A) Liquid limit B) Plastic limit
 C) Shrinkage limit D) Permeability limit
66. Consider soil as a three-phase system, the ratio of $\frac{(\text{Liquid Limit} - \text{Natural water Content})}{\text{Plasticity index}}$ for the soil mass is called
 A) Liquidity index B) Shrinkage ratio
 C) Consistency index D) Toughness index
67. Which of the following is a measure of particle size range?
 A) Effective size B) Uniformity coefficient
 C) Effective diameter D) Elongation index
68. From a laboratory proctor compaction test data, the mass of the soil and water content is found to be 1100 g and 10% respectively. The volume of the proctor mould used is 1000 cm^3 , then the dry density (γ_d) of the soil is
 A) 1 g/cm^3 B) 1.10 g/cm^3
 C) 1.50 g/cm^3 D) 1.15 g/cm^3
69. In an unconfined compression test, a saturated clay sample, fails under a load of 150N. Consider final cross-section area (A_f) = 2250 mm^2 . Then the shear resistance (cohesion) of the sample is
 A) 66.21 kPa B) 34.95 kPa
 C) 33.33 kPa D) 15 kPa

(Set - A)

70. Consider the following pairs
i. Standard Proctor Test

ii. Modified Proctor Test

iii. Direct Shear Test

iv. Triaxial Test

1. $[C, \phi]$, apparent cohesion and angle of internal friction
2. 03 layers, 310 mm height of drop
3. 05 layers, 450 mm height of drop
4. $[C', \phi']$, strength parameter

Which of the pair given below is correctly matched?

A) (i)-(1), (ii)-(2), (iii)-(4), (iv)-(3)

B) (i)-(2), (ii)-(3), (iii)-(1), (iv)-(4)

C) (i)-(3), (ii)-(2), (iii)-(1), (iv)-(4)

D) (i)-(4), (ii)-(3), (iii)-(1), (iv)-(2)

71. A fluid is said to be Newtonian fluid when its shear stress is

A) Inversely proportional to the velocity gradient

B) Proportional to the velocity gradient

C) Independent to the velocity gradient

D) Inversely proportional to the shear stress rate

72. Pascal-second (Pa.s) is the unit of

A) Pressure

B) Specific gravity

C) Dynamic viscosity

D) Compressibility

73. If specific gravity of a fluid is 0.5, and dynamic viscosity is 0.5 poise, then the kinematic viscosity of that fluid is

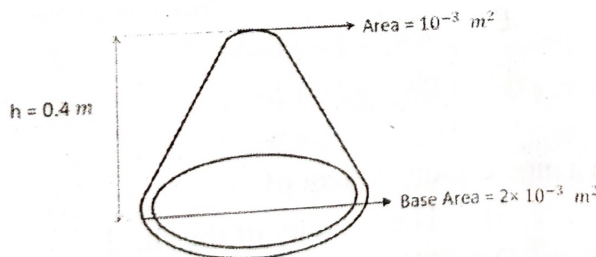
A) 0.25 stokes

B) 0.50 stokes

C) 1.0 stokes

D) 25 stokes

74. A uniformly tapering vessel is filled with liquid of density 900 kg/m^3 . Then the force that act on the base of the vessel due to the liquid ($g = 10 \text{ m/sec}^2$) is



$$F = \rho g h A$$

$$= 900 \times 10 \times 0.4 \times 2 \times 10^{-3}$$

$$= 3600 \times \frac{2}{1000} = 7.2$$

A) 3.6 N

B) 7.2 N

C) 9.8 N

D) 15.4 N

(15)

[P.T.O.]

(Set - A)

-

78. An open tank filled with water (density = ρ and $g = 9.81 \text{ m/sec}^2$) has a narrow hole at a depth of "h" below the water surface. Then the velocity of water flowing out is

- A) $\sqrt{2gh}$ B) ρgh
C) $2gh$ D) gh

79. The Reynold's number for fluid flow in a pipe is independent of
- A) The viscosity of the fluid B) The velocity of the fluid
- C) The length of the pipe D) The diameter of the pipe
80. The point in the immerse body through which the resultant of the total pressure of the liquid be taken to act is known as
- A) Metacenter B) Centre of gravity
- C) Centre of buoyancy D) Centre of pressure

81. Bernoulli's principle is derived from the law of conservation of
 A) Energy B) Mass
 C) Linear momentum D) Angular momentum
82. If a mercury droop is divided into 8 equal parts, then its total energy
 A) Remains same B) Becomes twice
 C) Decreases by a factor of 8 D) Increases by a factor of 8
83. The continuity equation is based on which of the following principle
 A) Conservation of mass B) Conservation of static energy
 C) Conservation of kinetic energy D) Conservation of momentum
84. The major causes for the loss of energy in long pipe is due to
 A) Sudden contraction B) Sudden enlargement
 C) Loss at the exit of the pipe D) Friction in the pipe
85. Consider the following pairs
 i. Pitot tube 1. Flow and viscous property of fluid
 ii. Rheometer 2. Flowing fluid velocity at any point
 iii. Hydrometer 3. Pressure of the pipeline
 iv. Manometer 4. Specific gravity or density of a liquid
Which of the pair given below is correctly matched?
 A) (i)-(1), (ii)-(2), (iii)-(3), (iv)-(4)
 B) (i)-(1), (ii)-(4), (iii)-(3), (iv)-(2)
 C) (i)-(2), (ii)-(1), (iii)-(4), (iv)-(3)
 D) (i)-(4), (ii)-(3), (iii)-(2), (iv)-(1)
86. If N = Number of layers, W = Weight of the hammer, H = Height of fall, then which of the following option is correct for California Bearing Ratio (CBR) Test using heavy compaction?
 A) $N=3$, $W=4.89$ kg and $H=31$ cm
 B) $N=3$, $W=4.89$ kg and $H=45$ cm
 C) $N=5$, $W=4.89$ kg and $H=45$ cm
 D) $N=5$, $W=4.89$ kg and $H=31$ cm
87. The coefficient of uniformity is defined as
 A) $C_u = \frac{D_{30}}{D_{10}}$ B) $C_u = \frac{D_{60}}{D_{10}}$
 C) $C_u = \frac{[D_{30}]^2}{D_{10}}$ D) $C_u = \frac{D_{30}}{D_{10} \times D_{60}}$

88. For a vehicle negotiating a curve, centrifugal force "P", is
- Directly proportional to the weight of vehicle
 - Inversely proportional to square of velocity
 - Inversely proportional to radius of curve

Which of the above statements are true?

- (i) and (ii)
- (ii) and (iii)
- (i) and (iii)
- (i), (ii) and (iii)

89. The penetration test of bitumen is conducted at X, measuring the penetration of needle loaded with Y load for Z time.

The correct values are

- X=25°C; Y=100 gm; Z=5 sec
- X=25°C; Y=100 gm; Z=10 sec
- X=27°C; Y=50 gm; Z=60 sec
- X=27°C; Y=100 gm; Z=10 sec

90. For carrying out bituminous patch work during rainy season, the most suitable binder is

- Bitumen
- Bituminous emulsion
- Cutback bitumen
- Road tar

91. Pick the right sequence of the different layers of a flexible pavement construction

- Base course construction
- Subbase course construction
- Surface course and seal coat application
- Natural subgrade and compacted subgrade construction
- Prime coat, binder course and tack coat application

Choose the correct answer from the options given below

- (i), (ii), (iii), (iv), (v)
- (i), (iii), (v), (ii), (iv)
- (iv), (ii), (i), (v), (iii)
- (iv), (v), (i), (ii), (iii)

92. Alligator or map cracking is the most common type of failure in

- Bituminous surfacing
- Water Bound Macadam (WBM) surfacing
- Wet Mix Macadam (WMM) surfacing
- Telford and Macadam surfacing

93. A vehicle was stopped in 2 second by fully jamming the break and skid marks measured 20 m then average skid resistance is (consider $g = 10 \text{ m/sec}^2$)

- 0.35
- 0.50
- 1.0
- 2.2

(Set - A)

(18)

$$20 = ut + \frac{1}{2}at^2$$

$$20 = u \cdot 2 + \frac{1}{2} \cdot 10 \cdot 2^2$$

$$20 = 2u + 10$$

$$10 = 2u$$

$$u = 5 \text{ m/sec}$$

$$v = u + at$$

$$0 = 5 + 10 \cdot 2$$

$$0 = 5 + 20$$

$$0 = 25$$

$$f = \mu N$$

$$s = ut + \frac{1}{2}at^2$$

$$20 = 5 \cdot 2 + \frac{1}{2} \cdot 10 \cdot 2^2$$

$$20 = 10 + 10$$

$$20 = 20$$

94. The wall which are necessary on the hill side of roadway where natural earth has to be retained from sliding is known as
- Retaining wall
 - Breast wall
 - Parapet wall
 - Cavity wall
95. Consider the following pairs
- | | |
|-------------------------|--------------|
| i. Los angeles abrasion | 1. Gradation |
| ii. Size | 2. Toughness |
| iii. Durability | 3. Hardness |
| iv. Impact | 4. Soundness |
- Which of the pair given below is correctly matched?
- (i)-(2), (ii)-(1), (iii)-(3), (iv)-(4)
 - (i)-(2), (ii)-(4), (iii)-(3), (iv)-(1)
 - (i)-(3), (ii)-(1), (iii)-(4), (iv)-(2)
 - (i)-(3), (ii)-(4), (iii)-(1), (iv)-(2)
96. The fundamental relationship between space-mean speed (u), traffic density (k) and traffic flow (q) is
- $q = u \times k$
 - $q = \frac{u}{k}$
 - $q = \frac{k}{u}$
 - $q = \frac{k^2}{u}$
97. Which of the following rails is most preferred by Indian railway
- Flat footed rails
 - Bull head rails
 - Double headed rails
 - Thin headed rails
98. Gauge is the horizontal distance measured between
- Centre to center of two rails
 - Inner or running faces of two rails
 - Outer to inner face of two rails
 - Inner to Outer face of two rails
99. Two major constituents in the composition of steel used in rail are
- Carbon and Silicon
 - Carbon and Sulphur
 - Carbon and Manganese
 - Carbon and Lithium
100. The rising gradient on which a moving train takes the advantage of the preceding falling gradient, usually referred as
- Pusher gradient
 - Neutral gradient
 - Ruling gradient
 - Momentum gradient

101. The longitudinally movement of rails in a track is technically referred as,

- A) Hogging
B) Buckling
C) Creeping
D) Tilting

102. The sleeping of driving wheels of locomotives on the rail surface causes,

- A) Wheel burns
B) Hogging of rail
C) Corrugation of rail
D) Buckling of rail

103. The wear of the rail is maximum at

- A) Tunnel
B) Sharp curve
C) Coastal area
D) Square crossing

104. Which among the following organization is the Research and Development (R&D) wing of Indian Railways

- A) IRCTC
B) DRDO
C) RDSO
D) CRIS

105. Consider the following pairs

- i. Ballast
ii. Sleeper
iii. Jim crow
iv. Pandrol clip

1. Rail fastenings with concrete sleeper
2. To hold the rail in proper gauge
3. To bend the rail
4. To Provide cushion effect to the track

Which of the pair given below is correctly matched?

- A) (i)-(2), (ii)-(1), (iii)-(3), (iv)-(4)
B) (i)-(2), (ii)-(4), (iii)-(3), (iv)-(1)
C) (i)-(3), (ii)-(1), (iii)-(4), (iv)-(2)
D) (i)-(4), (ii)-(2), (iii)-(3), (iv)-(1)

106. What is the portion of a brick obtained by cutting the brick longitudinally into two equal parts?

- A) Queen closer
B) King closer
C) Half bat
D) Bewelled closer

107. In long and short wall method of estimation, the length of long wall is the center to center distance between the wall and

- A) breadth of the wall
B) half breadth of the wall on each side
C) one forth breadth of the wall on each side
D) one fifth breadth of the wall on each side

108. The Damp Proof Course (D.P.C) is measure in

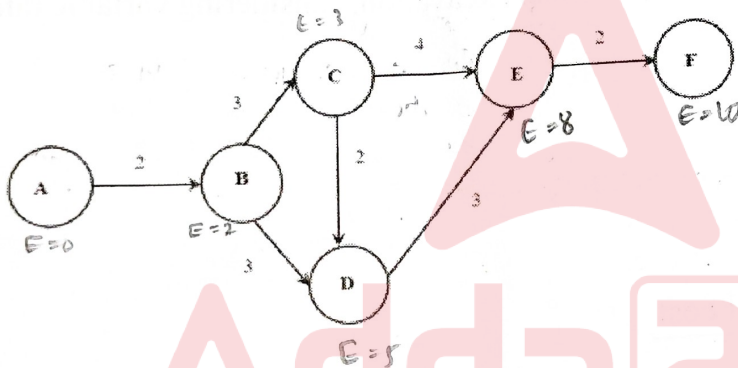
- A) Cubic meter
B) Square meter
C) Meters
D) Rupees per meter

109. While submitting a tender the contractor is required to deposit some amount with the department, as guarantee of the tender, known as
- A) Bank guarantee
B) Caution money
C) Security deposit
D) Earnest money...

110. Estimated value of a built up property at the end of its useful life without being dismantled is known as,
- A) Scrap value
B) Salvage Value
C) Market value
D) Book value

111. In a network diagram, an activity having a dotted arrow between two activity is referred as,
- A) Important activity
B) Risky activity
C) Dummy activity
D) Delayed activity

112. In the following network, choose the Critical Path from given options, (the number on the arrow shows duration of activity)



The correct option is:

- A) A - B - C - D - E - F
B) A - B - D - E - F
C) A - B - C - E - F
D) A - B - D - C - E - F

113. If the optimistic time (t_o), most likely or probable time (t_m), and pessimistic time (t_p), for activity (A) are 2, 5 and 14 days respectively, then expected duration and variance of the activity are
- A) 2 and 5 days
B) 6 and 4 days
C) 14 and 7 days
D) 16 and 5 days

114. As per Critical Path Methodology (CPM) the earliest start time for an event (I) is 10 weeks. Activity (I-J) takes 4 weeks for completion. Event (J) starts after 20 weeks. Then the total float for activity (I-J) is,
- A) 2 weeks
B) 6 weeks
C) 12 weeks
D) 16 weeks

(21)

[P.T.O.]

(Set - A)

115. The difference between Late Start and Early Start Time of an activity is referred as,

- A) Float
- B) Progress of an activity
- C) Task of a work
- D) PERT task

116. A scheduled activity may begin 10 days before the predecessor activity finishes. Then it's referred as an example of,

- A) Finish to start
- B) Finish to finish
- C) Start to finish
- D) Start to start

117. Following is a Rate list for an earth excavation work:

S.No	Item : earth work	Rate	Variable rate
I	Manual excavation	Rs.10 /cum	Nil
II	Machine excavation	Rs. 4000 fixed	Rs.2 /cum

As per above rate list, estimated quantity of earth, for which the cost of excavation by machine will be equal to the cost of manual excavation, considering variable rate is

- A) 500 cum
- B) 1000 cum
- C) 2500 cum
- D) 3000 cum

118. The cost slop is defined as

- A) $\frac{\text{Crash cost} - \text{Normal cost}}{\text{Normal time}}$
- B) $\frac{\text{Crash cost} - \text{Normal cost}}{\text{Crash time}}$
- C) $\frac{\text{Crash cost}}{\text{Normal time} - \text{Crash time}}$
- D) $\frac{\text{Crash cost} - \text{Normal cost}}{\text{Normal time} - \text{Crash time}}$ ✓

119. Which among the following, means statistical quality control of RCC work at civil construction site?

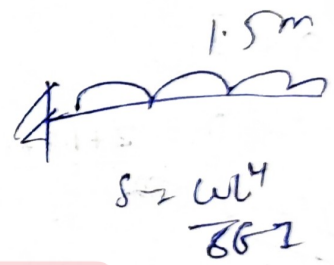
- A) Minimizing cost for removal of defective work
- B) Applying theory of probability to sample testing or inspection ...
- C) Minimizing in wastage of inspection cost
- D) Calculating risk probably to minimize utilization

120. Consider the following pairs

- | | |
|--------------------|--|
| i. Net working | 1. actual performance of the task and consume time or resources, represented by an arrow |
| ii. Activity | 2. an arrow diagram obtained by connecting all the activities of a project in a logical sequence |
| iii. Event | 3. sequential relationship between other activities but does not consume resources, and represented by a circle |
| iv. Dummy activity | 4. start or completion of tasks and does not consume time or resources, and represent precedence relationship between real activities. |

Which of the pair given below is correctly matched

- A) (i)-(2), (ii)-(1), (iii)-(3), (iv)-(4)
 B) (i)-(2), (ii)-(4), (iii)-(3), (iv)-(1)
 C) (i)-(3), (ii)-(1), (iii)-(4), (iv)-(2)
 D) (i)-(3), (ii)-(4), (iii)-(1), (iv)-(2)



$$1. \frac{wL^3}{8EI} = 1.5$$

$$LST-EST$$

$$q = \frac{P_f}{P_w}$$

$$\frac{w}{EI} = \frac{6 \times 1.5}{L^3}$$

$$0.5 \times 19 / ca = \frac{P_f}{8}$$

LST-EST

$$A / \frac{2 + 20 + 14}{6}$$

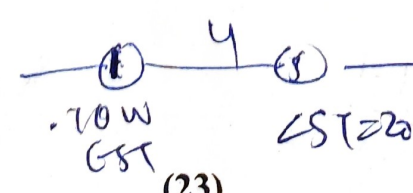
$$\frac{36}{6} = 6$$

$$\frac{9 \times 3}{8}$$

$$\frac{27}{8}$$

$$v = 0.5$$

$$v = \frac{0.5 \times 0.1 \text{ NSI}}{1000 \times 5}$$



$$(20 - 10) - 4$$

$$10 - 4$$

[P.T.O.]