SEAL

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

Booklet Serial No. 053669

Test Booklet Series

JUNIOR ENGINEER CIVIL

OMR Examination - 2023

A

Time Allowed: 120 Minutes ***Maximum Marks: 120***

INSTRUCTIONS

1. 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.

2. **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.**

3. 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.

4. 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.

5. You have to mark all your responses ***ONLY*** on the separate Answer /Response Sheet provided. *See directions in the Response Sheet.*

6. ***All*** items carry equal marks.

7. 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*** **.**

8. Sheets for rough work are appended in the Test Booklet at the end.

9. 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".**

10. **Penalty for wrong answers:**

THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTIONS PAPERS).

(i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(¼)** of the marks assigned to that question will be deducted as penalty.

(ii) 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.

(iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

(Set - A)

SEAL

SEAL

1. Theory of probability can be applied to

A) Cumulative errors only

B) Accidental errors only

C) Both accidental and cumulative errors

D) None of the above is correct

2. The principle of "working from whole to part" is used in surveying because

A) Plotting and mapping becomes easy

B) Survey work can be completed quickly

C) Accumulation of errors is prevented

D) Lower manpower requirement

3. The relation between the radius *(R)* and degree *(D)* of a curve is

A) $R = \frac{D}{1719}$

B) $R = \frac{1719}{D}$

C) $\frac{R}{D} = 1719$

D) $\frac{D}{R} = 1719$

4. A stone is thrown vertically upwards with a vertical velocity of 98 m/sec. It returns to the ground in

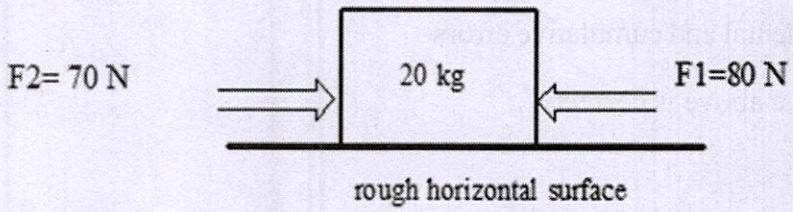
A) 5 sec

B) 10 sec

C) 20 sec

D) 98 sec

5. Two horizontal force F1=80 N and F2 = 70 N acting on a 20 kg block kept on rough horizontal surface, having coefficient of friction = 0.4, shown in following figure. The magnitude of the net acceleration of the block



A) 0 m / sec^2
B) 10 m / sec^2
C) 20 m / sec^2
D) 48 m / sec^2

6. Which of the following option is true about the moment of inertia of a section?
   i) The unit of moment of an area does not depends upon the units of its area.
   ii) The moment of inertia of an area may be obtained by the methods of integration.
   iii) The Routh's rule is used in finding out the moment of a body which is unsymmetrical about three mutually perpendicular axes.

   The true option is

   A) Only (i)
   B) Only (ii)
   C) Only (iii)
   D) None of the above is correct

7. The state of pure shear stress is produced by
   A) Tension in one direction and equal compression in perpendicular direction
   B) Equal tension in two directions at right angles
   C) Equal compression in two directions at right angles
   D) Same magnitude of compressive stress in all three direction

8. At the time of designing a 40 m length chimney with one end is fixed, effective length is considered as
   A) 20 m
   B) 40 m
   C) 80 m
   D) 120 m

9. Presence of 0.20% sugar by weight of cement in the mixing water is likely to

A) Retard the setting of cement

B) Reduce the early strength of cement

C) Accelerate the setting of cement

D) Decrease the work ability

10. If water-cement ratio is 0.6 then, water content per standard bag of cement is

A) 10 kg

B) 20 kg

C) 30 kg

D) 50 kg

11. If the depth of neutral axis for singly reinforced rectangular section is represented by "Kd" in working stress design, then the value of "K" for balance section where 'D" is the effective depth, σ_{st} permissible stress in steel in tension and σ_{cbc} is permissible stress in steel in bending compression.

A) Depends on σ_{st} only

B) Depends on σ_{cbc} only

C) Depends on Both σ_{st} and σ_{cbc}

D) Is independent of Both σ_{st} and σ_{cbc}

12. The soil has a bulk density of 44 kN/m^3 and water content 10%. The dry density of soil is

A) 4.4 kN/m^3

B) 10 kN/m^3

C) 20 kN/m^3

D) 40 kN/m^3

13. Considering

(i) Number of layers

(ii) Weight of hammer

(iii) Height of fall

(iv) Number of blows The key parameters in dynamic compaction for California Bearing Ratio (CBR) Test mold are

A) Both (i), and (iv)

B) Only (i)

C) Only (iv)

D) Both (i), and (ii)

14. Considering

(i) The structural resistance to displacement of the soil

(ii) Frictional resistance between the individual soil particles

(iii) Cohesion between the surface of the soil particles. The Shear strength of a soil basically made up of these statements

A) Only (i) and (ii)

B) Only (ii) and (iii)

C) Only (i), and (iii)

D) (i), (ii) and (iii)

15. Find the height of water column equivalent to a pressure of 3×10^3 gm/cm^2. Specific weight of liquid is 1 gm/ cm^3

A) 3 meter

B) 30 cm

C) 30 meter

D) 3000 meter

16. Match the list-1 with list-2 and select the correct answer using the codes given below,

	List -1 (Property of fluid)		**List -2 (Description)**
a.	Viscosity	1	Property which explains the spherical shape of the drop of liquid
b.	Surface tension	2	Property which explains the rise of liquid in tube
c.	Compressibility	3	Property which explains the resistance of a fluid to flow
d.	Capillarity	4	Property which explains the measure of the relative volume change of a fluid in response to the pressure change

Correct codes:

	a	b	c	d
A)	1	2	4	3
B)	3	1	4	2
C)	4	2	3	1
D)	2	1	4	3

17. During designing water supply line of a housing complex, two distribution pipes of different diameter 2 cm, and 6 cm respectively are connected with the main supply pipe line. The velocity of flow of water in the pipe of 2 cm diameter is

A) 4 times that in the 6 cm diameter pipe

B) 6 times that in the 6 cm diameter pipe

C) 9 times that in the 6 cm diameter pipe

D) 12 times that in the 6 cm diameter pipe

18. Piezometric head is the sum of

A) Velocity head and pressure head

B) Pressure head and datum head

C) Datum head and velocity head

D) Velocity head, pressure head and datum head

19. Considering,

(i) Controlling flood

(ii) Generating hydropower

(iii) Preventing loss of water in percolation from fields

(iv) Sewage disposal. A reservoir is used for

Correct answer is

A) (i) and (ii)

B) (i) and (iii)

C) Only (iii)

D) (iii) and (iv)

20. Match the list-1 with list-2 and select the correct answer using the codes given below,

	List -1 (Name of the instrument)		**List -2** (Purpose)
a.	Current meter	1	Control silt entry into the canal
b.	Echo sounder	2	Control water levels and flow rates in canal
c.	Head regulator	3	Depth of flow
d.	Sluice gate	4	Velocity of flow of water

Correct codes:

	a	b	c	d
A)	1	2	4	3
B)	1	3	2	4
C)	4	3	1	2
D)	2	4	1	3

21. Match the list-1 with list-2 and select the correct answer using the codes given below,

List -1 (Name of the valve)		**List -2 (Purpose of the valve)**
a. Reflux valve	1	Drain out the west water from dead end
b. Sluice valve	2	Relieving water hammer pressure
c. Pressure relief valve	3	Control the flow in the distribution system at corner and pipe junction
d. Scour valve	4	Allow the flow only in one direction

Correct codes:

	a	b	c	d
A)	1	2	4	3
B)	4	3	2	1
C)	4	2	3	1
D)	1	2	3	4

22. Considering

(i) Screening

(ii) Sedimentation

(iii) Disinfection

(iv) Filtration.

The correct sequence of treatments which are generally given to treat raw water supplies are

A) (i) (ii) (iii) (iv)

B) (i) (ii) (iv) (iii)

C) (i) (iii) (iv) (ii)

D) (iv) (iii) (ii) (i)

23. The standard loads corresponding to 2.5 mm and 5.0 mm deformation in California Bearing Ratio (CBR) Test are.

A) 1350 N and 2055 N,

B) 2055 N and 1350 N,

C) 1350 kg and 2055 kg,

D) 2055 kg and 1350 kg.

24. Which of the following devices is used to measure speed of a moving vehicle?

A) Weigh bridge

B) LIDAR gun

C) Noise meter

D) Loop detector

25. Creep is a phenomenon of

A) Longitudinal movement of rails in a track

B) Lateral movement of rails in a track

C) Difference of level between sleeper and rail

D) Transverse movement of rails in a track

26. Consider the following surveys

(i) Reconnaissance survey

(ii) Preliminary survey

(iii) Traffic survey

(iv) Location survey

The correct sequence of surveys conducted to finalized the railway alignment is

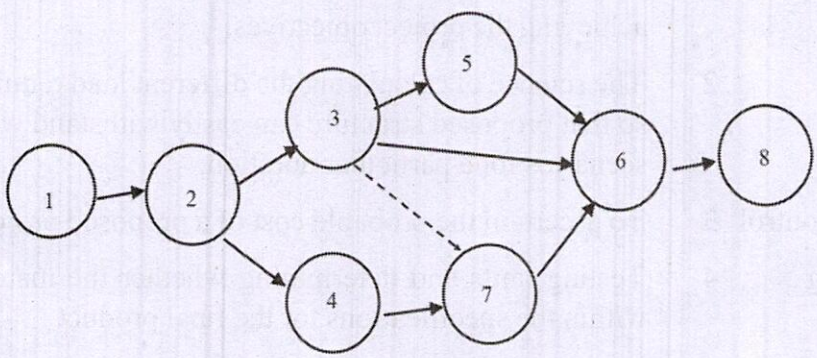
A) (i) (iii) (ii) (iv)

B) (i) (iii) (iv) (ii)

C) (iii) (i) (iv) (ii)

D) (iii) (i) (ii) (iv)

27. With reference to the following network which statement is incorrect?



A) Events 3 and 4 occur after event 2

B) Event 7 can occur after event 4

C) Event 7 preceded event 6

D) Event 5 follows event 3

28. Difference between cost of property and accumulated depreciation cost is known as

A) Market value

B) Salvage value

C) Book value

D) Capital value

29. **Statement 1**: Security deposit is an amount of money which is nonrefundable, even after the maintenance period is over.

Statement 2: Retention money always forfeited by the department even after the finalization of maintenance or adjustment of the claim is over.

The correct combination is

A) Both statement (1) and statement (2) are individually true and statement (1) is correct explanation of statement (2)

B) Statement (1) is true but statement (2) is false

C) Statement (1) is false but statement (2) is true

D) Both the statement (1) and Statement (2) are individually false

30. Match the list-1 with list-2 and select the correct answer using the codes given below,

	List -1		**List -2**
	(Description)		**(Purpose details or functions)**
a.	Estimation	1	Setting objectives and determining a course of action for achieving the project objectives.
b.	Planning	2	The science of calculating the different load requirements, so that proposed structure can easily withstand worst-case scenarios for a particular duration.
c.	Quality control	3	To ascertain the probable cost of a proposed project.
d.	Designing	4	Testing units and determining whether the materials are within the specifications for the final product .

Correct codes:

	a	b	c	d
A)	1	2	4	3
B)	3	1	4	2
C)	4	2	3	1
D)	1	2	3	4

31. The distribution system of water supplies is designed in the basis of _____

A) Peak hourly demand
B) Coincident draft
C) Average daily demand
D) Greater of (A) or (B)

32. Arrange the following environmental conventions in chronological order (from oldest to latest)

a. Stockholm Convention
b. Montreal Protocol
c. Kyoto Protocol
d. Basel Convention

A) b> d> a> c
B) a> c> b> d
C) b> d> c> a
D) c> a> d> b

33. What is the name of the water coming out of the kitchen, bathroom, and wash basin?

A) Garbage
B) Sullage
C) Sewage
D) Discharge

34. If duty is 1428 hectares/cumec and base period is 120 days for an irrigated crop, then the delta in meters is given by

A) 1.381
B) 0.017
C) 0.726
D) 102.805

35. Khosla's theory of independent variables is used in the design of

a. Weirs and barrages
b. Cross regulators and head regulators
c. Modules

A) a only
B) c only
C) Both a and b
D) a, b and c

36. Direction: The item consists of two statements, one labelled as the 'Statement (I) and the other as 'Statement (II)'. You are to examine these two statements carefully and select the answers to these items using the codes given below:

Statement (I) : Cross drainage structure, aqueduct is constructed to negotiate an aligned channel over, below or at the same level of a stream.

Statement (II) : Aqucduct is constructed, when full supply level (FSL) of canal is much higher than high flood level (HFL) of a stream

A) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)

B) Both Statement (I) and Statement (II) are individually true but Statement (II) is not the correct explanation of Statement (I)

C) Statement (I) is true but Statement (II) is false

D) Statement (I) is false but Statement (II) is true

37. The switch angle depends on

(i) Heel divergence

(ii) Length of tongue rail

(iii) Flange-way clearance

(iv) Throw of switch

The correct answer is

A) (i) and (ii)

B) (ii) and (iii)

C) (iii) and (iv)

D) (i) and (iv)

38. Calculate the number of sleepers required for 1 km railway track , it sleeper density is (n+4) for broad gauge and the length of one rail for a broad gauge is 13 m.

A) 437

B) 678

C) 1308

D) 17000

39. Consider the following pairs.

	List - I	**List - II**
i)	Broad gauge	1676
ii)	Meter gauge	762
iii)	Narrow gauge	1000

Which of the pairs given above is/are correctly matched?

A) i

B) ii

C) iii

D) None of the above

40. A RC beam has cross section 300mm×600mm and is subjected to the following design forces

Bending moment =115KN-m
Shear force = 95KN-m
Torsional moment = 45KN-m

Determine the equivalent bending moment for which section is to be designed.

A) 194.41 KN-m
B) 205.6 KN-m
C) 150.63 KN-m
D) 146.56 KN-m

41. According to I.S.: 456, slabs which span in two directions with corners held down, are assumed to be divided in each direction into middle strips and edge strips such that the width of the middle strip, is

A) Half of the width of the slab
B) Two-third of the width of the slab
C) Three-fourth of the width of the slab
D) Four-fifth of the width of the slab

42. Consider the following pairs.

	Admixtures	**Chemicals**
a.	Water reducing admixtures	Calcium chloride
b.	Air-entraining agent	Neutralized vinsol resin
c.	Super plasticizer	Sulphonated melanin
d.	Accelerator	Lignosulphonate

Which of the pairs given above is/are correctly matched?

A) b and c
B) c and d
C) a and d
D) a and c

43. Consider the following strengths of concrete:

i. Cube strength
ii. Cylinder strength
iii. Split-tensile strength
iv. Modulus of rupture

The correct sequence in increasing order of these strengths is

A) (iii), (iv), (ii), (i)
B) (iii), (iv), (i), (ii)
C) (iv), (iii), (ii), (i)
D) (iv), (iii), (i), (ii)

44. Match list I with list II and select the correct answer using the codes given below the list

List - I		List - II	
a.	Topographical survey	1.	To obtain data for carrying out any of project
b.	Geodetic survey	2.	To show the boundaries of fields, building, etc.
c.	Engineering survey	3.	To furnish the data for size and shape of the earth.
d.	Cadastral survey	4.	To show natural features of the country such as rivers, hills, lakes, roads, bridges etc.

A) a-1, b-2, c-3, d-4

B) a-2, b-1, c-4, d-3

C) a-1, b-3, c-4, d-2

D) a-4, b-3, c-1, d-2

45. After fixing the plane table to the tripod, the main operations that are needed at each plane table station are

a. Levelling

b. Orientation

c. Centering

The correct sequence for this operation is

A) a, b, c

B) a, c, b

C) c, a, b

D) b, c, a

46. The three consecutive readings taken from a level are 1.325 m, 0.985 m, and 2.546 m. If the instrument was shifted after the first reading, the rise or fall of the last point is.

A) 1.221 m, rise

B) -1.221, fall

C) 1.561, rise

D) -1/561, fall

47. A soil sample has a total unit weight of 16.97 KN/m^3 and a void ratio of 0.84. Determine the moisture content.

A) 18%

B) 25%

C) 35%

D) 44%

48. Which of the following properties depend on effective stress?

A) Shear strength

B) Compressibility

C) Permeability

D) All of the above

49. A sand sample of 35 cm^2 cross-sectional area and 20 cm long was tested in a constant head permeameter. Under a head of 60 cm, the discharge was 120 ml in 6 min. The dry weight of sand used for the test was 1120 g, and G=2.68. Determine the seepage velocity.

A) $9.52*10^{-3}$ cm/sec

B) $8.20*10^{-3}$ cm/sec

C) $2.36*10^{-3}$ cm/sec

D) $5.56*10^{-3}$ cm/sec

50. The expected time (E) of a PERT activity in terms of optimistic time (O), pessimistic time (P) and most likely time (M) is given by.

A) E=(O+2M+P)/3

B) E=(O+4M+P)/3

C) E=(O+2M+P)/6

D) E=(O+4M+P)/6

51. Match the list - I with List - II and select the correct answer using the codes given below the list.

	List - I		**List - II**
a.	Open tender	1.	The tender enquiry is sent only to one party.
b.	Limited tender	2.	Open for everyone and anyone can take part in the tendering process.
c.	Single tender	3.	Offer of tender is sent to limited parties and is not open for all.

A) a-1, b-2, c-3

B) a-2, b-3, c-1

C) a-3, b-2, c-1

D) a-3, b-1, c-2

52. A project takes 20 days along the critical path and has a standard deviation of 4 days. How many days does it take to complete the project?

A) 20 days
B) 24 days
C) 18 days
D) 16 days

53. The simplest space frame or truss consists of six members joined to form

A) Tetrahedron
B) Hexahedron
C) Dodecahedron
D) Octahedron

54. Match the following Forces with their examples and select the correct answer using the codes given below:

Forces	**Examples**
a. Collinear forces	1. Forces on a rope in a tug of war
b. Coplanar concurrent forces	2. Forces on a rod resting against a wall
c. Non-coplanar concurrent forces	3. A tripod carrying a camera
d. Non-coplanar parallel forces	4. The weight of benches in a classroom

A) a-1, b-2, c-3, d-4
B) a-2, b-1, c-4, d-3
C) a-1, b-3, c-4, d-2
D) a-4, b-3, c-1, d-2

55. In a lifting machine, an effort of 500 N is to be moved by a distance of 20 m to raise a load of 10,000 N by a distance of 0.8 m. Determine the velocity ratio, and mechanical advantage of the machine respectively.

A) 25 and 20
B) 15 and 20
C) 25 and 15
D) 10 and 15

56. A steel flat of thickness 10 mm tapers uniformly from 60 mm at one end to 40 mm at other end in a length of 600 mm. If the bar is subjected to a load of 80 KN, find its extension. Take E=2×105 MPa.

A) 0.486
B) 0.386
C) 0.225
D) 0.724

57. The term alternate depth is used in open channel flow to denote the depths _____

A) Having the same kinetic energy for a given discharge

B) Having the same specific force for a given discharge

C) Having the same specific energy for a given discharge

D) Having the same total energy for a given discharge

58. A triangular open channel has a vertex angle of 90 degrees and carries flow at a critical depth of 0.30m. The discharge in the channel is

A) 0.15 m^3/s

B) 0.2 m^3/s

C) 0.08 m^3/s

D) 0.11 m^3/s

59. A rectangular channel has a width of 2.0 m and carries a discharge of 4.8 m^3/s with a depth of 1.60 m. At a certain section, a small, smooth hump with a flat top and of height 0.10 m is proposed to be built. Calculate the critical depth of flow. Neglect the energy loss.

A) 1.824 m

B) 1.256 m

C) 2.230 m

D) 0.876 m

60. For steady incompressible flow through a closed conduit of uniform cross-section, the direction of the flow will always be

A) From higher to lower elevation

B) From higher to lower pressure

C) From higher to lower velocity

D) From higher to lower piezometric head

61. What were the main recommendations of Jayakar Committee:

a. Central Road Fund was founded in 1929.

b. Indian Road Congress was established in 1930.

c. Central Road Research Institute started in 1950.

d. More stress was given on long term planning programme for a period of 20 years.

Which of the following statements is/are correct?

A) a and d

B) a, c and d

C) b and c

D) b, c, and d

62. Choose the correct relation between gradient and camber?

A) Gradient = Camber ×0.5

B) Gradient = Camber ×2

C) Camber = Gradient ×1.5

D) Camber = Gradient

63. The unit of dynamic viscosity of a fluid is

A) M^2/s

B) Ns/m^2

C) $Pa\ s/m^2$

D) $Kg\ s^2/m^2$

64. Which of the following statements is true?

1. CPM is activity - oriented network

2. PERT is activity oriented

A) Only 1 is true

B) Only 2 is true

C) Both are false

D) Both are true

65. An open cubical tank of 2m side is filled with water. If the tank is rotated with an acceleration such that half of the water spills out, then the acceleration is equal to

A) g/3.

B) g/2.

C) 2g/3.

D) g.

66. Match List I with List II and select the correct answer using the combination given below the lists:

	List - I (Physical quantity)		**List - II** (Dimensional formula)
a.	Specific gravity.	1.	$[M^0 L^2 T^{-1}]$
b.	Coefficient of viscosity.	2.	$[M^0 L^0 T^{-0}]$
c.	Kinematic viscosity.	3.	$[ML^{-1} T^{-1}]$
d.	Stress.	4.	$[M L^{-1} T^{-2}]$

The correct combination is:

A) a-2 b-3 c-4 d-1

B) a-4 b-1 c-2 d-3

C) a-1 b-4 c-3 d-2

D) a-2 b-3 c-1 d-4

67. A hydraulic model of a spillway is constructed with a scale 1:16. If the prototype discharge is 2048 cumec, then the corresponding discharge for which the model should be tested is

A) 1 cumec.

B) 2 cumec.

C) 4 cumec.

D) 8 cumec.

68. A level was set up at a point A and distance to the staff station B was 100 m. The net combined correction due to curvature and refraction as applied to the staff reading is

A) 0.00673 m.

B) 0.000673 m.

C) - 0.000673 m.

D) - 0.00673 m.

69. In the cantilever method of lateral load analysis, which of the following assumptions are made?

(i) The axial force in the beam is zero.

(ii) The intensity of axial stress in each column of a storey is proportional to the horizontal distance of that column from the centre of gravity of all columns of the storey under consideration.

(iii) The total horizontal shear on each storey is divided between the columns of that storey so that each interior column catties twice as much shear as each exterior column.

The correct answer is

A) (i) and (ii).

B) (i) and (iii).

C) Only (ii).

D) Only (iii).

70. Slenderness ratio of a 5 m long column hinged at both ends and having a circular cross-section with diameter 160 mm is

A) 31.25.

B) 62.5.

C) 100.

D) 125.

71. Match List I with List II and select the correct answer from the combinations given below:

	List - I		**List - II**
a.	Moment of inertia.	1.	Tensile stress.
b.	Elongation.	2.	Modulus of rupture.
c.	Neutral axis.	3.	Zero shear stress.
d.	Top fibre.	4.	Zero longitudinal stress.

The correct combination is:

A) a-2 b-1 c-3 d-4.

B) a-1 b-2 c-4 d-3.

C) a-3 b-4 c-1 d-2.

D) a-2 b-1 c-4 d-3.

72. Consider the following statements:

A simply supported beam is subjected to a couple somewhere in the span. It would produce

(i) A rectangular SF diagram.

(ii) Parabolic BM diagrams.

(iii) Both +ve and -ve BMs which are maximum at the point of application of the couple.

Of these statements

A) (i), (ii), and (iii) are correct.

B) (i) and (ii) are correct.

C) (ii) and (iii) are correct.

D) (i) and (iii) are correct.

73. In a ring beam subjected to uniformly distributed load

(i) Shear force at mid span is zero.

(ii) Shear force at mid span is maximum.

(iii) Torsion at mid span is zero.

(iv) Torsion at mid span is maximum.

The correct answer is

A) (i) and (iii).

B) (i) and (iv).

C) (ii) and (iii).

D) (ii) and (iv).

74. The diameter of needle used in Vicat's apparatus for the determination of initial setting time is prescribed as

A) 0.5 mm.

B) 1 mm.

C) 5 mm.

D) 10 mm.

75. If a simply supported concrete beam, prestressed with a force of 2500 kN, is designed by load balancing concept for an effective span of 10m and to carry a total load of 40 kN/m, the central dip of the cable profile should be

A) 100 mm.

B) 200 mm.

C) 300 mm.

D) 400 mm.

76. Select the correct statement.

A) Unit weight of dry soil is greater than unit weight of wet soil.

B) For dry soils, dry unit weight is less than total unit weight.

C) Unit weight of soil increases due to submergence in water

D) Unit weight of soil decreases due to submergence in water.

77. In a triaxial compression test when drainage is allowed during the first stage (i. e. application of cell pressure) only and not during the second stage (i. e. application of deviator stress at constant cell pressure), the test is known as

A) Consolidated drained test.

B) Consolidated undrained test.

C) Unconsolidated drained test.

D) Unconsolidated undrained test.

78. According to Dicken's formula for estimating floods, the peak discharge is proportional to:

Where A is catchment area in square kilometres.

A) A

B) $A^{1/2}$

C) $A^{2/3}$

D) $A^{3/4}$

79. Muskingham method of flood routing is

A) Reservoir routing method.

B) Channel routing method.

C) Hydraulic method of flood routing.

D) None of the above.

80. Which of the following treatments reduce salinity of water?

(i) Flocculation and sedimentation.

(ii) Filtration.

(iii) Reverse osmosis.

(iv) Electrodialysis.

Select the correct answer given below.

A) (i) and (ii)

B) (iii) and (iv)

C) (ii) and (iii)

D) (i) and (iv)

81. Match List I with List II and select the correct answer from the combinations given below:

List - I (Terms/Description)	**List - II (Treatment operation/process)**
a. Sludge volume index	1. Settling in primary sedimentation tank.
b. Thickening of sludge	2. Settling in secondary sedimentation tank.
c. Scum removal	3. Filtration in trickling filter.
d. Recycling of effluent	4. Activated sludge process.

The correct combination is

A) a-2 b-4 c-1 d-3.

B) a-4 b-2 c-3 d-1.

C) a-2 b-4 c-3 d-1.

D) a-4 b-2 c-1 d-3.

82. If b is the wheel track of a vehicle and h is the height of centre of gravity above road surface, then to avoid overturning and lateral skidding on a horizontal curve, the centrifugal ratio should always be

A) Less than b/2h and greater than coefficient of lateral friction.

B) Less than b/2h and also less than coefficient of lateral friction.

C) Greater than b/2h and less than coefficient of lateral friction.

D) Greater than b/2h and also greater than coefficient of lateral friction.

83. In CBR test the value of CBR is calculated at

A) 2.5 mm penetration only.

B) 5.0 mm penetration only.

C) 7.5 mm penetration only.

D) Both 2.5 mm and 5.0 mm penetrations.

84. In a bituminous pavement, alligator cracking is mainly due to

A) Inadequate wearing course.

B) Inadequate thickness of sub-base course of pavement.

C) Use of excessive bituminous material.

D) Fatigue arising from repeated stress applications.

85. Flangeway clearance is the distance

A) Between the adjoining faces of the running rail and the check rail near the crossing.

B) Between the gauge faces of the stock rail and the tongue rail.

C) Through which the tongue rail moves laterally at the toe of the switch.

D) None of the above.

86. Match List I with List II and select the correct answer from the combinations given below

List - I	List - II
a. Wire claw.	1. To clean the ballast.
b. Jim crow.	2. To pack the ballast under sleeper.
c. Beater.	3. To bend the rails.
d. Mallet.	4. To sound the sleeper for packing.

The correct combination is:

A) a-1 b-3 c-2 d-4.
B) a-1 b-4 c-3 d-2.
C) a-2 b-1 c-3 d-4.
D) a-2 b-3 c-1 d-4.

87. Wear of rails is maximum in

A) Tangent track.
B) Sharp curve.
C) Tunnels.
D) Coastal area.

88. Which of the following earth moving machines has the shortest cycle time?

A) Drag line.
B) Hoe.
C) Clam shell.
D) Dipper shovel.

89. The sinking fund is

A) The fund for rebuilding a structure when its economic life is over.
B) Raised to meet maintenance costs.
C) The total sum to be paid to municipal authorities by the tenants.
D) A part of the money kept in reverse for providing additional structures and structural modification.

90. The time estimates obtained from four contractors P, Q, R and S for executing a particular job are as under:

Contractor	Optimistic time (t_o)	Most likely time (t_l)	Pessimistic time (t_p)
P	5	10	13
Q	6	9	12
R	5	10	14
S	4	10	13

Which one of the contractors is more certain about completing the work in time:

A) Contractor P
B) Contractor Q
C) Contractor R
D) Contractor S

91. If three consecutive ordinates are taken at 2 m intervals from a traverse line and measured as 1.8 m, 2.5 m and 2.0 m, then the area between the traverse line, the first and last ordinates and the boundary, by trapezoidal rule, is

A) 17.6 sq m
B) 8.8 sq m
C) 18.8 sq m
D) 7.6 sq m

92. Number of links in a 30 m metric chain is.

A) 150
B) 180
C) 100
D) 200

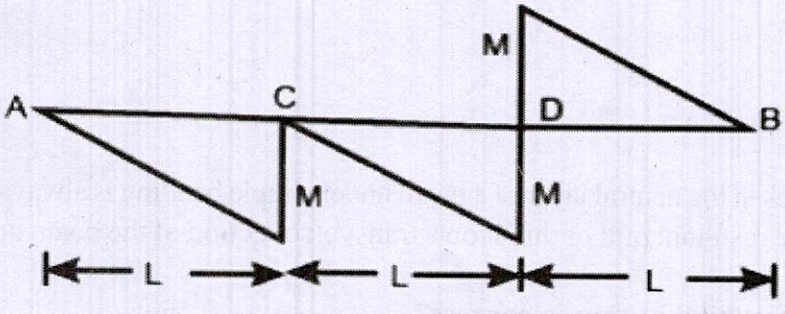
93. "If a number of coplanar forces acting on a particle are in equilibrium, then the algebraic sum of their moments about any point is equal to the moment of their resultant force about the same point" is

A) Lami's Theorem
B) Varignon's Theorem
C) Cauchy's Theorem
D) Euler's Theorem

94. If the member is denoted by m and joints by j, the condition for a frame to be redundant is given by:

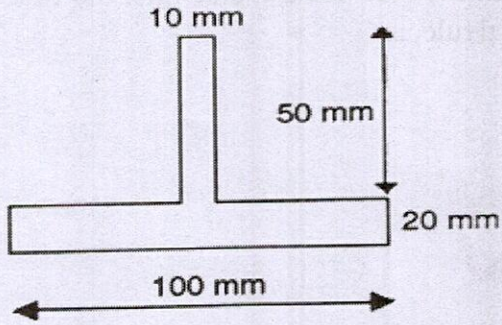
A) $m < 2j+3$
B) $m < 2j - 3$
C) $m > 2j - 3$
D) $m > 2j + 3$

95. A simply supported beam AB has the bending moment diagram as shown in the following figure. The beam is possibly under the action of following loads:



A) Couples of M at C and 2M at D
B) Couples of 2M at C and M at D
C) Concentrated loads of M/L at C and 2M/L at D
D) Concentrated loads of M/L at C and couple of 2M at D

96. Find the centroid of laminae shown in figure



A) (50 mm, 45 mm)
B) (50 mm, 35 mm)
C) (50 mm, 17 mm)
D) (50 mm, 27 mm)

97. Which of the following statement is correct about Portland Pozzolana Cement (PPC)?

A) The long term strength of PPC is less and it has reduced heat of hydration and permeability.
B) The long term strength of PPC is more and it has enhanced heat of hydration and permeability.
C) The long term strength of PPC is more and it has reduced heat of hydration and permeability.
D) The long term strength of PPC is less and it has reduced heat of hydration and enhanced permeability

98. A test is done to assess the quality of concrete by ultrasonic pulse velocity method as per IS: 13311 (Part 1)-1992. The Pulse Velocity by Cross Probing obtained is 4 km/sec. Then in which concrete quality grading is it belongs to?

A) Poor
B) Doubtful
C) Excellent
D) Good

99. **Statement I:** Fibres in the neutral layer of a beam under simple bending is always stressed.
Statement II: The resultant pull or thrust on a transverse section of the beam under pure bending is zero.
Out of following, which option is correct?

A) Statement I and Statement II are True
B) Statement I and Statement II are False
C) Statement I is False and Statement II is True
D) Statement I is True and Statement II is False

100. As the cube size increases, the strength of concrete

A) Decreases
B) Increases
C) Remains constant
D) Insufficient data

101. The rollers ideally suited for cohesive soils are

A) Sheep foot roller
B) Vibratory roller
C) Smooth wheeled roller
D) Pneumatic roller

102. The ratio of unconfined compressive strength of an undisturbed sample of soil to that of a remoulded sample, at the same water content is known as

A) Activity
B) Sensitivity
C) Damping
D) Plasticity

103. Wheat is to be grown in a field having field capacity equal to 30% and the permanent wilting point equal to 10%. Irrigation water is to be supplied when the moisture content of the soil falls to 20%. The root zone depth is 1 m, dry weight of soil is 14 kN/m3 and the specific weight of water is 10 kN/m3. The Net Irrigation Requirement (NIR) for the above cultivation is:

A) 28 cm of water
B) 19.6 cm of water
C) 21 cm of water
D) 14 cm of water

104. Full Reservoir Level (FRL) is:

A) The maximum elevation to which reservoir water surface will rise during normal operating conditions
B) The maximum level to which reservoir water will rise during worst design flood
C) The normal operating level in a reservoir
D) Both (A) and (C)

105. The line in a dam section in within a dam section below which there are positive hydrostatic pressure within the dam?

A) Seepage line
B) Phreatic line
C) Saturation line
D) All of these

106. The total area which can be economically irrigated from an irrigation system without considering the limitation of the quantity of water available

A) Gross Command Area
B) Culturable Command Area
C) Gross Cultivable Area
D) Mean sea level

107. Which of the following curves/line represents the total project cost versus time in the best way?

A) Straight line
B) S shaped curve
C) U shaped curve
D) Parabola

108. Which of the following refers to the annual periodic payments made for the repayment of the capital invested?

A) Annuity
B) Sinking fund
C) Depreciation
D) Solatium

109. Filling work in trenches shall be carried out in layers of thickness not exceeding _____.

A) 100mm
B) 200mm
C) 500mm
D) 750mm

110. What is the number of standard modular bricks required to make $1 m^3$ of masonry?

A) 400
B) 450
C) 500
D) 900

111. Match the following, instrument with its purpose :

1.	Manometer	a.	To measure the pressure at a point in a fluid
2.	Nozzle meter	b.	To measure velocity of flow of fluid
3.	Pitot tube	c.	To measure the rate of flow of fluid
4.	Hydrometer	d.	To measure the density of certain fluid

A) 1-c, 2-d, 3-a, 4-b
B) 1-b, 2-d, 3-c, 4-a
C) 1-a, 2-c, 3-b, 4-d
D) 1-d, 2-b, 3-c, 4-a

112. When a plate is immersed in a liquid parallel to the flow, it will be subjected to a pressure _____ that if the same plate is immersed perpendicular to the flow.

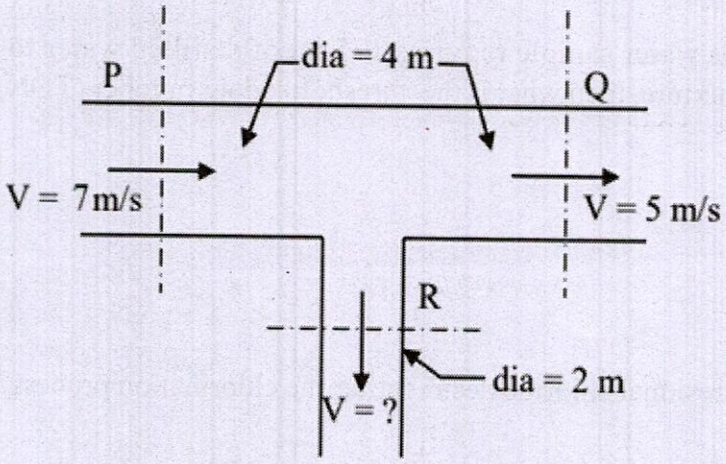
A) Less than

B) More than

C) Equal to

D) None of these

113. Consider full flow occurring through the circular water pipe system as shown in figure, Determine the velocity, V (in m/s) in the branch pipe 'R'.



A) 6

B) 8

C) 4

D) 2

114. Consider the following statements related to the coefficient of dynamic viscosity (μ) and temperature (T) and choose the incorrect option(s).

a. For water, 'μ' decreases when 'T' increases

b. For water, 'μ' increases when 'T' increases

c. For Air, 'μ' increases when 'T' increases

d. For Air, 'μ' decreases when 'T' increases

A) a and d

B) b and c

C) b and d

D) a and c

115. What is the maximum ruling gradient permitted in Indian Railways in plains?
A) 1 in 500
B) 1 in 150
C) 1 in 100
D) 1 in 50

116. What is the crossing number adopted by Indian Railways for high speeds?
A) 1 in 8 1/2
B) 1 in 16
C) 1 in 12
D) 1 in 20

117. If 25 ml of an odorous water sample requires 175 ml of distilled water to produce 200 ml of odour free mixture, then what is the threshold odour number (TON)?
A) 7
B) 8
C) 10
D) 12.5

118. What is the minimum residual chlorine desired after the chlorination process?
A) 0.2 ppm
B) 2 ppm
C) 20 ppm
D) 1 ppm

119. Among the following water supply distribution system, which one is referred to as Reticulation system?
A) Grid Iron system
B) Dead end system
C) Radial system
D) Ring system

120. What is the most common camber for earthen roads?
A) 1 in 20
B) 1 in 24
C) 1 in 30
D) 1 in 36

ROUGH WORK

SEAL

ROUGH WORK

SEAL

SEAL