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CIVIL ENGINEERING

INSTRUCTIONS TO CANDIDATES

1. Candidate should write their Hall Ticket Number and Name in the space provided on Question Paper Booklet and OMR Answer Sheet with Black Ball point pen.
2. The Candidates should ensure that the Hall Ticket Number and Name of the Candidate are properly written in the OMR Answer Sheet provided to them. The Candidates are also further instructed to darken the appropriate circles provided for the Hall Ticket Numbers, Question Paper Booklet Number, Subject, Booklet Code, Zone, Category, Gender and Physically handicapped status.
3. Changing an answer is NOT Allowed.
   - The Candidates must fully satisfy themselves about the accuracy of the answer before darkening the appropriate circle with Black Ball Point Pen, as it is not possible to change or erase once darkened.
   - Use of Eraser or White Fluid on the OMR Answer Sheet is not permissible as the OMR Answer Sheets are machine gradable and it may lead to wrong evaluation.
4. Immediately on opening this Question Paper Booklet, Check:
   (a) Section A contains 80 questions of relevant Engineering and Section B contains 20 questions of General Awareness and Numerical Ability.
   (b) Whether 100 multiple choice Questions in total are printed.
   (c) In case of any discrepancy, immediately exchange the Question Paper Booklet with same code with the invigilator.
5. Use of Calculators, Mathematics Tables, iphones, Mobile Phones and Log books is not permitted.
6. One mark will be awarded for every correct answer. **There are no Negative Marks.**
7. Answer to the questions must be entered only on OMR Answer Sheet by completely shading the appropriate circle with **Ball Point Pen (Black) only.**
8. The OMR Answer Sheet will be invalidated if the circle is shaded using Pencil or if more than one circle is shaded against each question.
9. The OMR Answer Sheet will not be valued if the candidate:
   a) Writes the Hall Tickets Number in any part of the OMR Answer Sheet except in the space provided for the purpose.
   b) Writes any irrelevant matter including religious symbols, words, prayers or any communication whatsoever in any part of the OMR Answer Sheet.
   c) Adopts any other malpractice.
10. Rough work should be done only in the space provided in the Question Paper Booklet.
11. No loose sheets or papers will be allowed in the examination hall.
12. Examination duration: **120** minutes.
13. Timings of Test: 10.00 A.M. to 12.00 Noon.
14. Candidate should ensure that he/she enters his/her Hall Ticket Number, name and appends signature on the Question Paper Booklet and also on the OMR Answer Sheet in the space provided. Candidate should ensure that the invigilator puts his/her signature on the Question Paper Booklet and OMR Answer Sheet.
15. Before leaving the examination hall, Candidate should **return the Original OMR Answer Sheet.** The candidate can take carbon copy of OMR Answer Sheet and Question Paper Booklet.
16. This booklet contains a total of **16** pages including Cover Page and the pages for Rough work.

N Booklet Code : **B**

Note: (1) Answer all questions.

(2) Each question carries 1 mark. There are no negative marks.

(3) Answer to the questions must be entered only on OMR Answer Sheet provided separately by Completely shading with **Ball Point Pen (Black) only.**

(4) The OMR Answer Sheet will be invalidated if the circle is shaded using Pencil or if more than one circle is shaded against each question.

Section A : Civil Engineering

1. Bucking load in a steel column is
   (1) related to length
   (2) directly proportional to the slenderness ratio
   (3) inversely proportional to the slenderness ratio
   (4) non linearity of the slenderness ratio

2. The best arrangement to provide unified behaviour in built up steel columns is by
   (1) lacing (2) battening
   (3) tie plates (4) perforated cover plates

3. A plate used for connecting two or more structure members inter-secting each other is
   (1) Template (2) Base plate (3) Gusset plate (4) Shoe plate

4. Which of the following soils has more plasticity index?
   (1) Clay (2) Sand (3) Silt (4) Gravel

5. Shear strength of the soil is
   (1) Directly proportional to angle of internal friction of soil
   (2) Inversely proportional to angle of internal friction of soil
   (3) Decrease with increase in normal stress
   (4) Increase with increase in normal stress

6. As per Terzaghi's equation, the bearing capacity of strip footing resting on cohesive soil $C = 10\ kN/m^2$ for unit depth and unit width ($N_c = 5.7$) is
   (1) $47\ kN/m^2$ (2) $57\ kN/m^2$ (3) $67\ kN/m^2$ (4) $77\ kN/m^2$

7. According to Rankine's analysis minimum depth of the foundation is equal to
   (1) $\frac{q}{\gamma}\left(\frac{1+\sin\phi}{1+\sin\phi}\right)^2$ (2) $\frac{q}{\gamma}\left(\frac{1+\sin\phi}{1-\sin\phi}\right)^2$ (3) $\frac{q}{\gamma}\left(\frac{1-\sin\phi}{1+\sin\phi}\right)^2$ (4) $\frac{q}{\gamma}\left(\frac{1+\sin\phi}{1+\sin\phi}\right)$

8. Granite is an example of
(1) Aqueous rock (2) Sedimentary rock
(3) Metamorphic rock (4) Igneous rock

9. The degree of saturation for fully saturated soil is
(1) 0.25 (2) 0.50 (3) 0.75 (4) 1

10. The uniformly coefficient of soil is defined as the ratio of
(1) D_{40} to D_{10} (2) D_{40} to D_{20}
(3) D_{50} to D_{10} (4) D_{60} to D_{10}

11. A soil sample has void ratio of 0.5 and its porosity will be close to
(1) 50% (2) 66% (3) 100% (4) 33%

12. Plate load test is useful to estimate
(1) Bearing capacity of foundation
(2) Settlement of foundation
(3) Both bearing capacity and settlement of foundation
(4) Depth of foundation

13. In order to determine the natural features such as valleys, rivers, lakes etc. the surveying preferred is
(1) City surveying (2) Location surveying
(3) Cadastral surveying (4) Topographical surveying

14. If the Back bearing of a line is 36° 15", its Fore bearing will be
(1) 36° 15" (2) 126° 15" (3) 143° 45" (4) 216° 15"

15. Slack time in PERT analysis
(1) can never be greater than zero (2) is always zero for critical activities
(3) can never be less than zero (4) is minimum for critical events

16. Poisson's ratio is defined as the ratio of
(1) Longitudinal stress and longitudinal strain
(2) Lateral strain and longitudinal strain
(3) Longitudinal stress and lateral stress
(4) Lateral stress and longitudinal stress

17. A mosque is situated on the far side of a river and is inaccessible. It can be located by
(1) Radiation (2) Traversing (3) Intersection (4) Resection

18. Which will be the included angle AOB if the bearings of the lines AO and OB are 130° and 40°, respectively
(1) 90° (2) 170° (3) 270° (4) 130°

19. A one dimensional flow is one which
(1) is uniform flow
(2) is steady uniform flow
(3) takes place in straight lines
(4) involves zero transverse component of flow

20. Euler's dimensionless number relates the following
(1) Inertial force and gravity
(2) Viscous force and inertial force
(3) Viscous force and buoyancy force
(4) Pressure force and inertial force

21. Pitot tube is used for measurement of
(1) Pressure (2) Flow (3) Velocity (4) Discharge

22. Let y_n be the normal depth of flow in a prismatic channel, and y_c be the critical depth of flow. If $y_n > y_c$, the flow is referred to as
(1) Subcritical (2) Critical (3) Supercritical (4) Transcritical

23. To generate 1000 hp under a head of 81 m while working at a speed of 500 rpm, the turbine of choice would be
(1) Pelton (2) Kaplan (3) Bulb (4) Francis

24. The theoretical velocity of jet at vena contracta is
(1) $2gH$ (2) $H\sqrt{2g}$ (3) $2g\sqrt{H}$ (4) $\sqrt{2gH}$
Where H = Head of water at vena contracta, and g is the acceleration due to gravity

25. One poise is equal to
(1) 0.1 N-s/m^2 (2) 1 N-s/m^2 (3) 10 N-s/m^2 (4) 100 N-s/m^2

26. The loss of head due to friction in a pipe of uniform diameter in which a viscous flow is taking place, is
(1) $1/R_N$ (2) $4/R_N$ (3) $16/R_N$ (4) $64/R_N$
Where R_N = Reynolds number

27. The maximum hydraulic efficiency of an impulse turbine is
(1) $\frac{1+\cos\phi}{2}$ (2) $\frac{1-\cos\phi}{2}$ (3) $\frac{1+\sin\phi}{2}$ (4) $\frac{1-\sin\phi}{2}$
Where ϕ = Angle of blade tip at outlet

28. With an increase in size of the tube, the rise or depression of liquid in the tube due to surface tension will
(1) Decrease
(2) Increase
(3) Remain unchanged
(4) Depends upon the characteristics of liquid

29. Activated carbon is used in water treatment for removing
(1) Colour
(2) Taste and Odour
(3) Turbidity
(4) Corrosiveness

30. The detention period for oxidation ponds is usually kept as
(1) 4-8 Hours (2) 24 Hours (3) 10-15 Hours (4) 03 Months

31. Turbidity of water is an indication of the presence of
(1) dissolved solids
(2) dissolved gases
(3) floating solids
(4) suspended inorganic matter

32. The ratio of oxygen available to the oxygen required for stabilisation of sewage is called the
(1) Bacterial stability factor
(2) Biological Oxygen Demend (BOD)
(3) Relative stability
(4) Oxygen ion concentration

33. The coagulant widely used for sewage treatment, is
(1) Alum
(2) Ferric sulphate
(3) Ferric chloride
(4) Chlorinated copperas

34. Pathogenic bacteria enter waste waters, primarily from
(1) Industrial waste
(2) Domestic waste
(3) Both Industrial as well as Domestic wastes
(4) Infiltration in sewers from the surrounding soils

35. In a high-rate trickling filter, the problem of ponding can be solved by
(1) Flooding and raking
(2) Chlorination and supply of air
(3) Raking and chlorination
(4) Flooding and supply of air

36. The ultimate BOD value of a waste
(1) Increases with temperature
(2) Decreases with temperature
(3) Remains the same as all temperatures
(4) Double with every 10°C rise in temperature

37. Which of the following treatment processes are necessary for removing suspended solids from water?
(1) Coagulation
(2) Flocculation
(3) Sedimentation
(4) All of these

38. The double mass curve technique is adopted
(1) to check the consistency of raingauge records
(2) to find the average rainfall over a number of years
(3) to find the number of raingauges required
(4) to estimate the missing rainfall data

39. A hyetograph is a plot of
(1) Cumulative rainfall Vs Time
(2) Rainfall intensity Vs Time
(3) Rainfall depth Vs Duration
(4) Discharge Vs Time

40. The rainfall in 5 successive days on a catchment was 3, 5, 9, 6, 1 cm respectively. The phi-index for the storm can be assumed to be 3 cm/day. The total direct runoff from the catchment due to this storm was
(1) 8 cm (2) 11 cm (3) 20 cm (4) 23 cm

41. The nearest object from a raingauge should be at a minimum distance equal to
(1) Its height
(2) Twice its height
(3) Thrice its height
(4) Height calculated using a formula

42. A unit hydrograph has one unit of
(1) Rainfall duration
(2) Rainfall excess
(3) Time base of direct runoff
(4) Discharge

43. A hyetograph is a graphical representation of
(1) Rainfall intensity and time
(2) Rainfall depth and time
(3) Discharge and time
(4) Cumulative rainfall and time

44. Which of the following is a non-recording raingauge?
(1) Tipping bucket type raingauge
(2) Simon's raingauge
(3) Weighing type raingauge
(4) Floating type raingauge

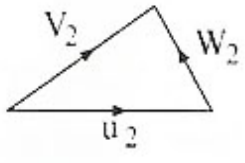
45. Water stored in a reservoir below the minimum pool level is called
(1) Valley storage
(2) Bank storage
(3) Surcharge storage
(4) Dead storage

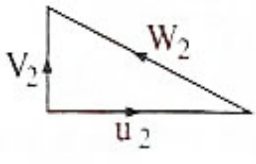
The net work output (kJ kg $^{-1}$) of the cycle is
(1) 498 (2) 775 (3) 860 (4) 957

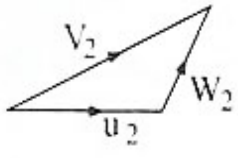
47. For two cycles coupled in series, the topping cycle has an efficiency of 30% and the bottoming cycle has an efficiency of 20%. The overall combined cycle efficiency is
(1) 50% (2) 44% (3) 38% (4) 55%

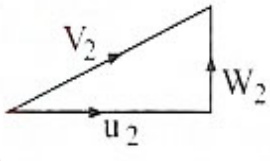
48. Consider the following statements:
The overall efficiency of a steam power plant can be increased by
a) Increasing the steam temperature.
b) Increasing the condenser pressure.
c) Improving turbine blade cooling.
d) Providing air preheaters.
of these correct statements are:
(1) a, b and c (2) b and c (3) a and d (4) b and d

49. Which one of the following velocity triangles represents the one at the exit of a radial impeller with forward curved blades? (u_2 = peripheral velocity, V_2 = absolute velocity, W_2 = relative velocity)

(1) 

(2) 

(3) 

(4) 

50. In a 50% reaction stage, absolute velocity angle at intel is 45° mean peripheral speed is 175 m/s and the absolute velocity at the exit is axial. The stage specific work is
(1) 2500 m^2/s^2 (2) 3270 m^2/s^2 (3) 4375 m^2/s^2 (4) 5625 m^2/s^2

51. In order to tune a parallel resonant circuit at a lower frequency, the capacitance must be
(1) Increased (2) Decreased (3) Remain same (4) Equal to zero

52. The current in a coil of resistance 90Ω is to be reduced by 90%. What the value of resistance should be connected in parallel with it?
(1) 9Ω (2) 100Ω (3) 90Ω (4) 10Ω

53. A moving iron instrument having meter resistance of 5Ω is to be used as voltmeter of range 0-100 V. If the full-scale deflection current is 10 mA, then required series resistance is
(1) 20Ω (2) 95Ω (3) 995Ω (4) 9995Ω

54. A large number of commutator segments are used in a dc generator to
(1) Increase the magnitude of output voltage
(2) Increase the output current
(3) Increase the output power
(4) Make the dc output voltage wave smooth

55. A capacitor-start, capacitor-run motor has
(1) low power factor (2) high power factor
(3) low efficiency (4) high starting torque

56. When shear force at a point is zero, then bending moment at that point is
(1) Zero (2) Minimum (3) Maximum (4) Infinity

57. If the circular shaft is subjected to a torque 'T' and bending moment 'M' the ratio of maximum bending stress and maximum shear stress is
(1) $\frac{2M}{T}$ (2) $\frac{M}{2T}$ (3) $\frac{M}{T}$ (4) $\frac{2T}{M}$

58. The maximum bending moment in a beam occurs where
(1) Shear force is minimum (2) Shear force is maximum
(3) Shear force changes sign (4) Deflection is zero

59. A cantilever beam of span L is carrying a uniformly distributed load of intensity w/unit length on the entire span. The deflection at the free end is given by
(1) $\frac{wL^4}{6EI}$ (2) $\frac{wL^4}{8EI}$ (3) $\frac{5wL^4}{384EI}$ (4) $\frac{wL^4}{48EI}$

60. A thin spherical shell of diameter d and thickness t is subjected to internal pressure p, the tensile stress in the shell will be
(1) $\frac{pd}{2t}$ (2) $\frac{pd}{4t}$ (3) $\frac{pt}{2d}$ (4) $\frac{pt}{4d}$

61. When a circular shaft is subjected to torsion, shear stress induced in the shaft at its centre shall be
(1) Minimum (2) Maximum (3) Zero (4) Average

62. The moment required to rotate the near end of a prismatic beam through a unit angle without translation, when the far end is pinned is given by
(1) $3EI/L$ (2) $4EI/L$ (3) $2EI/L$ (4) EI/L

63. What is the magnitude of fixed end moment of a propped cantilever beam having length 'L' carrying a concentrated load 'P' at the mid-span? Take EI = constant
(1) $\frac{3PL}{8}$ (2) $\frac{3PL}{16}$ (3) $\frac{5PL}{16}$ (4) $\frac{PL}{4}$

64. Simply supported beam of length L is loaded with a triangularly varying load intensity, starting from zero at the left end to ω at the right end. Find the maximum shear force
(1) $\frac{\omega L}{3}$ (2) $\frac{\omega L}{6}$ (3) $\frac{2\omega L}{3}$ (4) ωL

65 A beam having rectangular cross section 200 mm wide and 400 mm deep is simply supported over a span of 5 m. It is carrying a concentrated load of 10 kN at the centre of the span. The maximum bending stress developed at quarter span of the beam is

(1) 2.34 N/mm^2 (2) 1.25 N/mm^2 (3) 1.17 N/mm^2 (4) 2.0 N/mm^2

66. A rectangular beam 200 mm wide and 400 mm deep spans over a distance of 4 meters and carries a uniformly distributed load 40 kN/m. Determine the maximum shear stress acting on the beam cross section

(1) 1.5 N/mm^2 (2) 1.0 N/mm^2 (3) 3.0 N/mm^2 (4) 2.0 N/mm^2

67. Which of the following do not have same dimensions?

(1) Kinetic energy and Potential energy (2) Torque and Energy

(3) Impulse and Momentum (4) Angular momentum and Moment of force

68. According to Hookes's law of elasticity

(1) Stress is proportional to strain within the proportionality limit

(2) Stress is equal to strain within the proportionality limit

(3) There is no correlation between stress and strain within the proportionality limit

(4) Stress is inversely proportional to strain within the proportionality limit

69. Gypsum is added in the manufacture of Portland Cement in order to

(1) Shorten the setting time of cement (2) Lengthen the setting time of cement

(3) Decrease the burning temperature (4) Decrease the grinding time

70. According to BIS code, the curing temperature of concrete should be

(1) 5°C (2) 10°C (3) 27°C (4) 40°C

71. Increased fineness of cement

(1) Affects only early development of strength

(2) Affects only ultimate strength

(3) Both (1) and (2)

(4) Does not affect the strength

72. The doubly reinforced beam is less economical than singly reinforced beam because

(1) Tensile steel required is more than balanced section

(2) Shear reinforcement is more

(3) Concrete remains under utilized

(4) Compressive steel remains under utilized

73. In reinforced concrete beam design, the distance between the centroid of the area of tension reinforcement and the maximum compressive fibre is known as
(1) Overall depth
(2) Lever arm
(3) Effective depth
(4) Depth of neutral axis

74. If any tension reinforcement in a beam attains its yield stress during loading before the concrete in the compression zone fails due to crushing, the beam is said to be
(1) Under-reinforced
(2) Over-reinforced
(3) Balanced
(4) Non homogeneous

75. Strength of cement concrete primarily depends upon
(1) quantity of water
(2) quantity of aggregate
(3) quantity of cement
(4) water-cement ratio

76. Addition of fibers to concrete mix results in improvement in
(1) compressive strength
(2) tensile strength
(3) bond strength
(4) flexural strength

77. Force acting on web splice of a plate girder are
(1) Axial force
(2) Axial and Bending
(3) Shear and Axial force
(4) Shear and Bending

78. In a roof truss, which component of the truss maybe subjected to unsymmetrical bending
(1) Principal rafters
(2) Struts
(3) Ties
(4) Purlin

79. In a plate girder, the web is primarily designed to resist
(1) Torsional moment
(2) Bending moment
(3) Diagonal buckling
(4) Shear force

80. A simply supported beam of rectangular section and span L is subjected to a uniformly distributed load at the centre. The length of elastoplastic zone of the plastic hinge will be
(1) $L/3$
(2) $L/\sqrt{3}$
(3) $L/2$
(4) $L/8$

N Booklet Code : B

Section B : General Awareness and Numerical Ability

81. What is the standard '**currency**' of Golconda kingdom.
(1) Honnu (2) Paisa (3) Dinar (4) Halisikka

82. Which of the following programming languages are considered as low level language?
(1) BASIC, COBOL, Fortran (2) C, C++
(3) Assembly language (4) Prolog

83. Basic building blocks for a digital circuit is
(1) CMOS (2) DMOS (3) BIOS (4) Logic gates

84. A digital signature is
(1) a bit string giving identity of a correspondent
(2) a unique identification of a sender
(3) an authentication of an electronic record by tying it uniquely to a key only a sender knows
(4) an encrypted signature of a sender

85. Which of the following is not functionally a complete set?
(1) AND, OR (2) NAND
(3) NOR (4) NOT, AND, OR

86. Find the remainder when 2^{31} is divided by 7
(1) 3 (2) 1 (3) 5 (4) 2

87. A bottle of ink was $\frac{2}{3}$ full. When 7 pens were filled with ink from the bottle and 2 pens full of ink was poured into it, it was $\frac{1}{4}$ full. How many pens can be filled with the full bottle of ink?
(1) 12 (2) 14 (3) 8 (4) 16

N

Booklet Code : B

88. The average of 7 numbers is 28. The average of first two numbers is $12\frac{1}{2}$ and that of the next three is $16\frac{1}{3}$. If the sixth number is less than the seventh number by 5, then the seventh number is

(1) 84 (2) 72 (3) 59 (4) 63

89. The ratio of the ages of a man and his wife is 5:3. After 5 years, this ratio will be 3:2. If at the time of marriage, the ratio was 1:2, then how many years ago were they married?

(1) 12 (2) 18 (3) 26 (4) 32

90. Air Marshal ___ is appointed as the new chief of Western Air Command of Indian Air Force?

(1) S.B. Deo (2) Rohit Nandan
(3) K. Vijay Raghvan (4) Devendra Chaudhry

91. Best Hindi Film award in the 62nd National Film Awards has been given to _____

(1) Happy New Year (2) Queen
(3) Highway (4) Veer Zaara

92. Dronacharya Award is given for excellence in the field of -

(1) literary work (2) social service
(3) coaching in sport (4) winners of Olympics

93. Which of the following is used in pencil?

(1) graphite (2) charcoal (3) silicon (4) phosphorous

94. You could tell the time by he because he always _____ work at exactly the same time every day.

(1) ends (2) ended (3) finish (4) finishes

95. Which is the correct expression?

(1) Joe's the person with who I am angry (2) Joe's the person with whom I am angry
(3) Joe's the person I am angry on (4) Joe's the person who I am angry

96. Which sentence uses the present tense correctly?
(1) Look, it rains
(2) No, I am not listening you
(3) I'm playing cricket every Thursday
(4) She works for a bank

97. The manager was terrified that his employees would stop work and walk _____ without warning.
(1) over (2) about (3) out (4) at

98. Name the author of 'Basavapuranam'.
(1) Palkuri somanath
(2) Vallabharaya
(3) Sreenatha
(4) Jayapa

99. Who built the famous 'Ramappa temple' located at Palampet.
(1) Recherla Venna
(2) Recherla Prasaditys
(3) Recherla Mallanna
(4) Recherla Rudra

100. Identify the Peshwa and famous engineer of Muhammad Quli-Qutub Shah, who has designed the plan of Hyderabad.
(1) Mir-khadir
(2) Mir-Muneer
(3) Mir-Momin-Astrabadi
(4) Gawan