3792093

PARTICULARS OF THE CANDIDATE	
Name [redacted] ID	
Application [redacted]	
Roll Num[redacted]	
Name of the Centre: Z.H.Engineering College	
Centre Code: 113	
Room No.: ML-5	
Seat No.: 3	
Date of the Test	04-06-2025
Signature of the Candidate	[redacted]

Code	WVCE/25
Booklet Number	3792093
Series	C

Maximum Marks: 100

Test Duration: 02 hours

INSTRUCTIONS

- Complete all entries on the cover page and put your signature in the space provided.
- Use only Ball Point Pen (black / blue) for making entries in the Question booklet and the OMR Answer Sheet.

1. The Question Booklet consists of **16** pages and contains **100** questions. Count the number of pages and questions before attempting the questions. Discrepancy, if any, must immediately be brought to the notice of the Invigilator.
2. The Test duration as specified above shall be reckoned from the moment of distribution of the Question Booklets.
3. Blank space in the Question Booklet may be used for rough work.
4. Each question is followed by four alternative answers. Select only one answer, which you consider as the most appropriate. Shade the relevant circle against the corresponding question number on the OMR Answer Sheet. Selecting more than one answer for a question, even if one of the selected answers is correct, would result in its being treated as an incorrect answer.
5. Answers should ONLY be marked on the OMR Answer Sheet. No answer should be written/marked on the Question Booklet.
6. **The candidate is required to separate the original OMR Answer Sheet and its carbonless copy at the perforation carefully after the Admission Test. He / She shall hand over the original OMR Answer Sheet and the Admit Card to the Invigilator before leaving his/her seat and take with him/her the carbonless copy of the OMR Answer Sheet and the Question Booklet.**
7. **Failure to handover the original OMR Answer Sheet and the Admit Card will lead to cancellation of the candidature.**

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1. The domain of the function

$f(x) = \sqrt{1-2x} + 3\sin^{-1}\left(\frac{3x-1}{2}\right)$, is:

(a) $\left[-\frac{1}{3}, 1\right]$ (b) $\left(-\infty, \frac{1}{2}\right]$

(c) $\left[-\frac{1}{3}, \frac{1}{2}\right]$ (d) $\left[-\frac{1}{3}, \frac{1}{2}\right)$

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2. The value of $\lim_{x\to e} \frac{\log x - 1}{x - e}$, is:

(a) 1 (b) $\frac{1}{e}$

(c) e (d) 0

3. The straight line $\frac{x}{a} + \frac{y}{b} = 1$ cuts the coordinate axes at A and B. The equation of the circle passing through O(0, 0), A and B, is:

(a) $x^2 + y^2 - ax - by = 0$ (b) $x^2 + y^2 - 2ax - 2by = 0$

(c) $x^2 + y^2 + ax + by = 0$ (d) $x^2 + y^2 = a^2 + b^2$

4. A vector of magnitude 4 which is equally inclined to the vectors $\hat{i} + \hat{j}, \hat{j} + \hat{k}$ and $\hat{k} + \hat{i}$ is:

(a) $\frac{4}{\sqrt{3}}(\hat{i} - \hat{j} - \hat{k})$ (b) $\frac{4}{\sqrt{3}}(\hat{i} + \hat{j} - \hat{k})$

(c) $\frac{4}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$ (d) None of these

5. The minimum value that $f(x) = 4x^2 - 4x + 11 + \sin 3\pi x$ attains is:

(a) 12 (b) 10

(c) 8 (d) None of these

6. The set of values of 'a' for which the roots of the equation $(a-3)x^2 - 2ax + 5a = 0$ are positive, is:

(a) $(-\infty, 0) \cup (3, \infty)$ (b) $\left[0, \frac{15}{4}\right]$

(c) $\left(3, \frac{15}{4}\right)$ (d) $\left(3, \frac{15}{4}\right]$

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7. The sum of the series:

$$\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \cdots \text{ ... upto infinity, is:}$$

(a) $e^{\frac{-1}{2}}$ (b) $e^{\frac{1}{2}}$

(c) e^{-2} (d) e^{-1}

8. Order and degree of differential equation

$\frac{d^2y}{dx^2} = \left\{y + \left(\frac{dy}{dx}\right)^2\right\}^{\frac{1}{4}}$ are:

(a) 4 and 2 (b) 1 and 2

(c) 1 and 4 (d) 2 and 4

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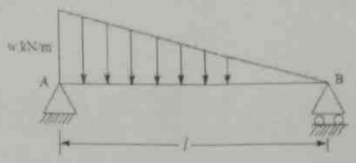
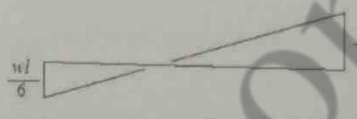
9. The Punching face required to punch a 25 mm diameter hole in a 10 mm thick mild steel plate is, if ultimate shearing strength of mild steel equal to 380 N/mm^2:

(a) 298.45 kN
(b) 300.45 kN
(c) 302.45 kN
(d) 304.45 kN

10. Shear force diagram for the beam shown below is:



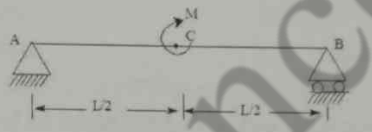
(a)

(b)


(c)

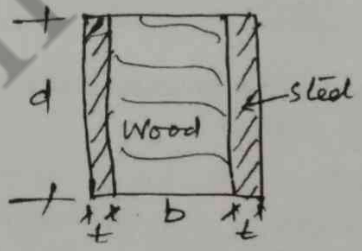
(d)

11. For the beam shown below, the shear force at point C is:



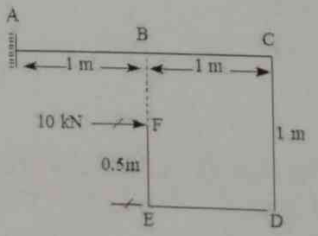
(a) ML
(b) M/L
(c) M
(d) ML^2

12. The equivalent wooden section for the flitched beam section in flexure is: (Where m is the modular ratio)



(a) b + m(2t) and d
(b) b + 2t and d
(c) 2b + mt and d
(d) 2b + m(2t) and d

13. The Bending moment of the following structure at A is:



(a) –3 kN-m
(b) –5 kN-m
(c) –7.5 kN-m
(d) –10 kN-m

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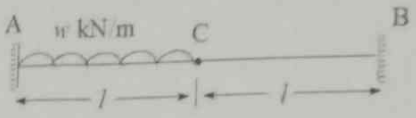
14. For the beam shown below, the reaction at point C is:



(a) $\frac{3}{5}\,wl$
(b) $\frac{3}{8}\,wl$
(c) $\frac{3}{16}\,wl$
(d) $\frac{3}{10}\,wl$

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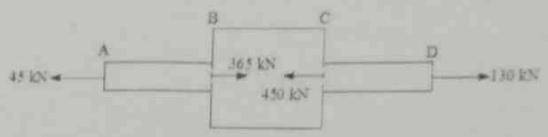
15. For the beam shown below, the Part BC has the force:



(a) 45 kN (tensile)
(b) 400 kN (comp)
(c) 320 kN (comp)
(d) 130 kN (tensile)

16. Total strain energy stored in the body is termed as:

(a) Modulus of Resilience
(b) Impact Energy
(c) Proof Resilience
(d) Resilience

17. The product of Young's modulus and moment of inertia is known as:

(a) Modulus of Rigidity
(b) Bulk Modulus
(c) Flexural Rigidity
(d) Torsional Rigidity

18. Consider the following statements:

1. The pitch of helical reinforcement shall not be more than one-fourth of the core diameter of the column.
2. The pitch of transverse reinforcement shall not be more than the least lateral dimension of the compression members.

Of the above statements:

(a) 1 and 2 are correct
(b) 1 is incorrect, 2 is correct
(c) 1 is correct, 2 is incorrect
(d) 1 and 2 are incorrect

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19. The minimum eccentricity criteria for the column recommended by IS: 456 – 2000 with usual notations subject to a minimum of 20 mm, is:

(a) $\frac{L}{500}+\frac{b\text{ or }D}{30}$
(b) $\frac{L}{30}+\frac{b\text{ or }D}{500}$
(c) $\frac{L}{500}+\frac{b\text{ or }D}{20}$
(d) $\frac{L}{20}+\frac{b\text{ or }D}{500}$

20. To limit the vertical deflection for continuous beam up to the span of 10 m, the span to depth ratio shall not be greater than:

(a) 5
(b) 7
(c) 20
(d) 26

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21. Side face reinforcement is provided in RC beams when the depth of the beam exceeds:

(a) 450 mm (b) 750 mm

(c) 1000 mm (d) 1250 mm

22. As per the limit state method of RC design, the limiting ultimate moment of resistance $M_{u,lim}$ in a balanced singly reinforced beam section for M20 grade concrete and Fe415 grade steel is:

(a) $2.07\ bd^2$ (b) $2.76\ bd^2$

(c) $3.33\ bd^2$ (d) $3.45\ bd^2$

23. In reinforced concrete slab, the minimum reinforcement in either direction in slab shall not be less than:

(a) 0.12% of total cross sectional area for mild steel and 0.15% of total cross sectional area for high strength deformed bars.

(b) 0.15% of total cross sectional area for mild steel and 0.15% of total cross sectional area for high strength deformed bars.

(c) 0.12% of total cross sectional area for mild steel and 0.12% of total cross sectional area for high strength deformed bars.

(d) 0.15% of total cross sectional area for mild steel and 0.12% of total cross sectional area for high strength deformed bars.

24. In the design of shear reinforcement of a reinforced concrete beam, the design shear strength of concrete depends upon:

(a) Grade of concrete only (b) Grade of concrete and % of tension reinforcement

(c) Grade of concrete and % of total reinforcement (d) Grade of steel only

25. The critical section for the calculation of maximum bending moment for footing supporting a concrete column is:

(a) At the face of the column (b) Halfway between the centre line of the column and the edge of column

(c) At a distance equal to half the effective depth of footing from the face of the column (d) At a distance equal to the effective depth of footing from the face of the column

26. For a T-beam, the effective width of the flange (b_{eff}) is determined by considering:

(a) Breadth of the web and the effective depth (b) Breadth of the web and the span of the beam

(c) Span of the beam and thickness of the slab (d) Web width, slab thickness and span of the beam

27. As per IS: 456 – 2000, in the design of RC footing, the three critical sections (bending moment, one-way shear and two-way shear) are checked within the:

(a) Effective depth of footing (b) Half of effective depth of footing

(c) Two-third of effective depth of footing (d) One-fourth of effective depth of footing

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28. In a reinforced concrete beam, diagonal tension failure at centroidal axis occurs when:

(a) The maximum principal tensile stress exceeds the tensile strength of concrete.
(b) The maximum principal tensile stress exceeds the compressive strength of concrete.
(c) The maximum principal tensile stress is lower than the tensile strength of concrete.
(d) The maximum principal tensile stress is lower than the compressive strength of concrete.

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29. Match List-I with List-II for maximum moisture content of timber for standard elements such as beams, rafters, and posts and select the correct answer using the codes given below the lists:

List-I (Relative humidity)	List-II (Moisture content)
A. > 67%	1. 17%
B. 50-67%	2. 14%
C. < 40	3. 20%
D. 40-50%	4. 12%

Codes:

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

30. Calculate the flexural tensile strength of concrete based on a 100 × 100 × 500 mm prism tested under four-point loading. The recorded failure load is 12 kN, and the distance from the line of fracture to the nearest support is 125 mm.

(a) 2.44 N/mm^2
(b) 6.0 N/mm^2
(c) 4.8 N/mm^2
(d) 4.5 N/mm^2

31. The setting rate of cement paste is controlled by adjusting which of the following ratio:

(a) $SiO_2/(Al_2O_3 + Fe_2O_3)$
(b) $CaO/(Al_2O_3 + Fe_2O_3)$
(c) $Al_2O_3/(CaO + Fe_2O_3)$
(d) $Al_2O_3/(SiO_2 + Fe_2O_3)$

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

List-I (Purpose)	List-II (Aggregate type)
A. Affecting durability of concrete most	1. Rounded
B. Making light weight concrete	2. Flaky
C. For high strength concrete	3. Angular
D. Require minimum cement paste	4. Synthetic aggregate

Codes:

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

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33. Consider the following statements:

1. The purpose of adding pozzolana in cement is to increase early strength.
2. The purpose of adding pozzolana in cement is to reduce the heat of hydration.
3. Portland pozzolana cement can be used in dam construction.

Of these statements:

(a) 1, 2 are correct
(b) 1, 3 are correct
(c) 2, 3 are correct
(d) Only 1 is correct

34. The static modulus of elasticity of M25 grade of concrete as per Indian standard is (in N/mm^2):

(a) 28500
(b) 23500
(c) 27500
(d) 25000

35. As per Indian standard construction, the modular size of common building bricks shall be (L×W×H in mm):

(a) $190 \times 90 \times 90$
(b) $230 \times 110 \times 70$
(c) $200 \times 100 \times 100$
(d) $230 \times 115 \times 70$

36. In brick masonry construction, the type of brick used at the junction where walls meet at an angle:

(a) Queen closure
(b) King closure
(c) Cornice brick
(d) Arch brick

37. Which of the following chemicals are used to test freez and than action in coarse aggregate:

(a) SiO_2
(b) $(CaMg)_2CO_3$
(c) $CaCO_3$
(d) $CaSO_4$

38. Alkali-Aggregate reaction involves reaction of Alkali solution with:

(a) Silica
(b) Magnesia
(c) Ferric Oxide
(d) Alumina

39. The term 'Critical Velocity ratio' in associated from which of the following theories:

(a) Kennedy's theory
(b) Lacey's theory
(c) Bligh's theory
(d) Khosla's theory

40. The analysis of a gravity dam, having a bottom width of 60 m, carried out under the influence of major forces (weight of dam, water pressure and uplift force) shows that the distance of resultant from toe is 20 m. What shall be the value of eccentricity of resultant?

(a) 10 m
(b) 20 m
(c) 15 m
(d) 5 m

41. Salt factor in the design of earthen canal depends on which property of bed material?

(a) Porosity
(b) Mean size
(c) Void ratio
(d) Unit weight

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42. When a canal crosses a stream practically at the same level, the suitable structure constructed at the crossing for regulation of water is called:

(a) Aqueduct
(b) Head work
(c) Super passage
(d) Level crossing

43. A canal is crossing a stream at a site, which type of cross drainage work is most suited for the following levels?

Canal full supply level = 102.00 m
Canal bed level = 99.00 m
Highest flood level of stream = 99.60 m
Bed level of stream = 96.00 m

(a) Aqueduct
(b) Super passage
(c) Siphon Aqueduct
(d) Level Crossing

44. The horizontal distance left at ground level between the toe of the bank and the top edge of cutting is called as:

(a) Dowla
(b) Spoil bank
(c) Berm
(d) Borrow pit

45. In case of hydraulic structure resting on permeable foundation, which of the following statements is correct?

(a) Safe exit gradient is inversely proportional to static head and directly proportional to depth of downstream cutoff.
(b) Safe exit gradient is directly proportional to static head and inversely proportional to depth of downstream cutoff.
(c) Safe exit gradient is directly proportional to static head and depth of downstream cutoff.
(d) Safe exit gradient is inversely proportional to static head and depth of downstream cutoff.

46. A gravity dam is subjected to hydro dynamic pressure caused by:

(a) the rising waters of the reservoir when flood wave enters into it.
(b) the rising waves in the reservoir due to high winds.
(c) the increase in water pressure, momentarily caused by the horizontal earthquake acting towards the reservoir.
(d) the increase in water pressure, momentarily caused by horizontal earthquake, acting towards the dam.

47. The duty of irrigation water for a given crop is maximum:

(a) on the field.
(b) at the head of the main canal.
(c) at the head of the water course.
(d) at the head of branch canal.

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48. A soil has a bulk density of 2.0 g/cm^3 at a water content of 10%, if the void ratio remains constant, then its bulk density for a water content of 20% will be:

(a) 2.05 g/cm^3 (b) 2.18 g/cm^3
(c) 2.38 g/cm^3 (d) 2.75 g/cm^3

49. In a seepage problem, critical hydraulic gradient is calculated as: (Symbols have their usual meanings)

(a) $\gamma_w/(\gamma - \gamma_w)$ (b) $(\gamma - \gamma_w)/\gamma_w$
(c) $(\gamma - \gamma_d)/\gamma_w$ (d) $(\gamma_d - \gamma_w)/(\gamma_{sat} - \gamma_w)$

50. The atomic structure of clay minerals are built of:

(a) Tetrahedral and Octahedral Crystals (b) Tetrahedral and Hexahedral Crystals
(c) Hexahedral and Octahedral Crystals (d) Hexahedral and Polyhedral Crystals

51. In the Terzaghi's one dimensional consolidation theory, the rate of consolidation depends on which parameter?

(a) Shape factor (b) Drainage path and coefficient of consolidation
(c) Permeability and void ratio (d) Stress history of the soil

52. Culmann's Graphical method is used to determine:

(a) Permeability (b) Seepage
(c) Rate of consolidation (d) Earth pressure

53. Coefficient of active earth pressure K_A can be calculated as:

(a) $(1 - \text{Sin}\phi)/(1 + \text{Sin}\phi)$ (b) $(1 - \text{Sin}^2\phi)/(1 + \text{Sin}^2\phi)$
(c) $(1 + \text{Sin}\phi)/(1 - \text{Sin}\phi)$ (d) $(1 - \text{Sin}\phi)/(1 - \text{Cos}\phi)$

54. In cyclic shear stress

$\tau_{av} = 0.65 \frac{\gamma z}{g} a_{max} r_d$

The γ density is:

(a) $\gamma_{saturated}$ (b) $\gamma_{submerged}$
(c) γ_{dry} (d) γ_{total}

55. For in-situ weight of natural soil, we conduct:

(a) Proctors Compaction Test (b) Density Bottle Test
(c) Pycnometer Test (d) Core-Cutter Test

56. The relationship between permeability and void ratio in soil is:

(a) Linear (b) Power-Law
(c) Exponential (d) Inversely proportional

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57. A line AB in an old map was having its magnetic bearing as 57°20' when the magnetic declination was 1°50' E. What is the magnetic bearing of AB now when the magnetic declination is 4°30' W?

(a) 51°30'
(b) 63°40'
(c) 54°40'
(d) 52°50'

58. A distance of 1200 m was measured with an initially correct 30 m chain. After the measurement, the chain was found to be 10 cm longer. The correct measured distance is:

(a) 1204 m
(b) 1202 m
(c) 1196 m
(d) 1198 m

59. Graduations in a prismatic compass are:

(a) inverted and run clockwise having 0° at N
(b) inverted and run clockwise having 0° at S
(c) inverted and run anti-clockwise having 0° at N
(d) inverted and run anti-clockwise having 0° at S

60. The reduced level of a factory floor is 30.000 m and staff reading on the floor is 1.400 m. The staff reading when held inverted with the bottom touching the Tee-beam of the roof is 3.67 m. Find the height of the beam above the floor.

(a) 2.270 m
(b) 31.400 m
(c) 35.070 m
(d) 5.070 m

61. Select the correct statement from the following:

(a) Magnetic declination at a place remains constant with age.
(b) True meridian at different places are parallel to one another.
(c) The angle of dip at magnetic pole is 45°.
(d) Diurnal variation of magnetic declination is less at equator than at poles.

62. In levelling, the curvature correction (in m) is given by the formula: (where, D is measured in Km)

(a) $0.0785\ D^2$
(b) $0.0673\ D^2$
(c) $0.785\ D^2$
(d) $0.673\ D^2$

63. Which of the following statements is correct?

(a) The angle of dip at magnetic pole is 0°.
(b) Agonic Lines pass through points of zero declination.
(c) A negative declination shows that the magnetic meridian is to the East of true meridian.
(d) Graduation in a prismatic compass is from 0° to 360°.

64. In compass surveying, the magnetic declination is defined as the:

(a) Vertical angle of a line with respect to the horizontal.
(b) Angle between the magnetic meridian and a line of sight.
(c) Horizontal angle between two survey lines.
(d) Angle between the true meridian and the magnetic meridian.

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65. Which of the following statements is incorrect?

(a) For a well conditioned triangle no angle should be less than 30°.
(b) The angle of intersection of mirrors in an optical square is 45°.
(c) The permissible error in chaining on rough or hilly areas is usually 1 in 250.
(d) A French Cross Staff is used to set out the lines at angle of 90° only.

66. Pick up the incorrect statement out of the following:

(a) The surface runoff equals runoff minus base flow.
(b) The water that seeps into the ground reservoir is called infiltration.
(c) The yield of a drainage basin in depth, when multiplied by the basin area, gives us the yearly available water volume.
(d) The coarser sand and silt gets deposited near the face of the dam, and the finer are away from it.

67. The true color of water is measured on:

(a) Platinum Cobalt Scale
(b) Silica Scale
(c) Nickel Scale
(d) Formazin Scale

68. Gases, which are generally evolved during aerobic decomposition of sewage, are:

(a) $CO_2 + NH_3 + H_2S$
(b) $CO_2 + NH_3 + H_2S + CH_4$
(c) $CO_2 + NH_3 + SO_2$
(d) $CO_2 + NH_3 + SO_2 + CH_4$

69. A rectangular tank 15m × 5m × 3m of water depth treats 2 millions litres of water per day, the detention time for tank will be:

(a) 1.5 hours
(b) 2.2 hours
(c) 2.7 hours
(d) 3.2 hours

70. The product of $[H^+]$ and $[OH^-]$ ions is equal to:

(a) 1
(b) 10^{-7}
(c) 0
(d) 10^{-14}

71. If the recirculation ratio in a high rate trickling filter is zero, then the recirculation factor is:

(a) 1
(b) 0
(c) More than 1
(d) Less than 1

72. In biological treatment, there is a formation of a biological film of:

(a) Algae
(b) Anaerobic bacteria
(c) Aerobic bacteria
(d) Protozoa

73. The spacing of bars of perforation of fine screens used for the treatment of sewage is:

(a) 2 – 3 mm
(b) 8 – 10 mm
(c) 15 – 20 mm
(d) 25 – 30 mm

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74. The most prominent force, acting on the underground sewer pipes would be:

(a) Compressive force
(b) Tensile force
(c) Bending force
(d) Hydraulic force

75. A vehicle has a wheel base of 7.0 m negotiating a curved path with a mean radius of 35 m. The value of the off tracking will be:

(a) 0.25 m
(b) 0.30 m
(c) 0.60 m
(d) 0.70 m

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76. If a railway track is layed on a curved path, the wear and tear in rails take place at:

(a) Top of rail
(b) Bottom of rail
(c) Top on inner side of outer rail
(d) Top on outer side of outer rail

77. The rate of rise or fall of the road surface along it's length is known as:

(a) Super elevation
(b) Cant
(c) Gradient
(d) Camber

78. Match the following:

I.	Diaphragm	A.	Image viewed
II.	Cadastral map	B.	Telescope
III.	Bubble tube	C.	Contour lines
IV.	Wedges	D.	Plotting of topographical survey data
V.	Interpolation	E.	External focusing type telescope

(a) I-A, II-B, III-E, IV-C, V-D
(b) I-B, II-A, III-C, IV-D, V-E
(c) I-E, II-D, III-A, IV-B, V-C
(d) I-B, II-D, III-E, IV-A, V-C

79. A valley curve needs to be designed for comfort condition where a descending grade of 1 in 25 meets an ascending grade of 1 in 30. The design speed is 80 km/hr, and the allowable rate of change of centrifugal acceleration C = 0.6 m/sec^3. The length of the valley curve to fulfil the comfort condition is:

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(a) 50.2 m
(b) 73.1 m
(c) 199.5 m
(d) 43.2 m

80. For laying the railway track, the Quantities required for one Km of B.G track, No. of rails (A), No. of fish plate (B), No. of Fish Bolt (C) and No. of bearing plate (D).

(a) A = 67, B = 144, C = 305, D = 67
(b) A = 77, B = 154, C = 308, D = 77
(c) A = 76, B = 154, C = 308, D = 77
(d) A = 77, B = 144, C = 305, D = 67

81. The total number of V-notches formed in case of Acute Angle Crossing of two railway tracks are:

(a) One
(b) Two
(c) Four
(d) Six

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82. Abrasion test is conducted on stone aggregates to determine:

(a) Hardness
(b) Toughness
(c) Strength
(d) None of these

83. Passenger Car Unit (PCU) for urban roads, mid block sections for bus and truck is:

(a) 2.2
(b) 2.8
(c) 3.4
(d) 3.6

84. On increasing the temperature, ionic product of water will:

(a) decrease
(b) increase
(c) remain constant
(d) becomes zero

85. pH of buffer solution prepared by adding 10 ml of 0.1M CH_3COOH to 20 ml of 0.1M CH_3COONa will be: (pK_a of $CH_3COOH = 4.74$)

(a) 4.5
(b) 4.74
(c) 5.04
(d) 5.8

86. Galvanizing is:

(a) coating of zinc on iron
(b) coating of tin on iron
(c) coating of lead on iron
(d) coating of platinum on iron

87. The value of ΔG° for the following fuel cell reaction will be:

$$2H_2 + O_2 \rightarrow 2H_2O \quad E^\circ_{cell} = 1.23V$$

(a) −59.2 kJ
(b) −474.78 kJ
(c) −237.4 kJ
(d) −118.5 kJ

88. Nylon 6:6 is:

(a) Polyhexamethylene adipate
(b) Polyhexamethylene tartaric acid
(c) Polytetramethylene adipate
(d) Polytetramethylene tartaric acid

89. Lindlar's catalyst is used to reduce alkynes to get:

(a) Trans-alkenes
(b) Cis-alkenes
(c) Mixture of cis- & trans-alkenes
(d) None of these

90. Which of the following compound is amphoteric in nature?

(a) CH_3COOH
(b) NaCl
(c) NaOH
(d) H_2O

91. HCOOH & CH_3COOH can be distinguished by:

(a) $NaHCO_3$
(b) Aq.$FeCl_3$
(c) Tollen's reagent
(d) None of these

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92. Which of the following does not show structural isomerism?

(a) Propane (b) Butane
(c) Pentane (d) Hexane

93. The amount of heat produced in a resistor of 20Ω when a 2A current flows through it for 5 minutes is:

(a) 48 kJ (b) 12 kJ
(c) 24 kJ (d) 18 kJ

94. A moving body is covering distances in proportion to the square of time. The acceleration of the body is:

(a) increasing (b) decreasing
(c) zero (d) constant

95. Which of the following properties show that light is a transverse wave?

(a) reflection (b) interference
(c) polarization (d) diffraction

96. Radioactive materials A and B have decay constants λ_A and λ_B respectively. If they have the same number of nuclei initially, then the ratio of number of nuclei of A to that of B will be 1/e after a time:

(a) $\frac{1}{\lambda_A - \lambda_B}$ (b) $\frac{1}{\lambda_A} - \frac{1}{\lambda_B}$
(c) $\frac{1}{\lambda_A} + \frac{1}{\lambda_B}$ (d) $\frac{1}{\lambda_A + \lambda_B}$

97. A sine wave having wavelength λ is travelling in a medium. A particular particle has zero displacement at a certain instant. The particle closest to it having zero displacement is at a distance:

(a) $\frac{\lambda}{3}$ (b) λ
(c) $\frac{\lambda}{2}$ (d) $\frac{\lambda}{4}$

98. Two plane harmonic sound waves are expressed by the equations: (All parameters are in MKS)

$y_1 (x, t) = A \cos (0.5\pi x - 100\pi t)$

$y_2 (x, t) = A \cos (0.46\pi x - 92\pi t)$

How many times does an observer hear maximum intensity in one second?

(a) 4 (b) 6
(c) 8 (d) 10

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99. A parallel beam of monochromatic light of wavelength λ passes through a slit of width 'd'. The angular divergence in which most of the light is diffracted is:

(a) $\pm \sin^{-1}\left(\frac{2\lambda}{d}\right)$ (b) $\pm \sin^{-1}\left(\frac{\lambda}{d}\right)$

(c) $\pm \sin^{-1}\left(\frac{\lambda}{2d}\right)$ (d) $\pm \sin^{-1}\left(\frac{\lambda}{3d}\right)$

100. The temperature of inversion of a thermocouple is 580°C and the neutral temperature is 300°C. the temperature of the cold junction is:

(a) −20°C (b) 40°C

(c) 20°C (d) 10°C

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