

VERSION CODE

A1

Maximum Marks : 100
 Total Duration : 150 Minutes
 Maximum Time For Answering : 120 Minutes
 Subject : **CIVIL ENGINEERING**

MENTION YOUR PG CET NUMBER

Serial
Number :**108065**Subject
Code**P-CE**

DOs:

1. This question booklet is issued to you by the invigilator after 02.20 pm.
2. Check whether the PG CET Number has been entered and shaded in the respective circles on the OMR answer sheet.
3. The version code and serial number of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts:

1. The timing and marks printed on the OMR answer sheet should not be damaged / mutilated / spoiled.
2. The 3rd Bell rings at 2.30 p.m., till then;
 - Do not remove the seal present on the right hand side of this question booklet.
 - Do not look inside this question booklet or start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 75 questions and each question will have one statement and four different options / responses & out of which you have to choose one correct answer.
3. After the 3rd Bell is rung at 02.30 pm, remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
4. Completely darken / shade the relevant circle with a blue or black ink ballpoint pen against the question number on the OMR answer sheet.

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5. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. Last bell will ring at 4.30 pm, stop marking on the OMR answer sheet.
8. Hand over the OMR answer sheet to the room invigilator as it is.
9. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (candidate's copy) to you to carry home for self-evaluation.
10. Only Non-programmable calculators are allowed for "M.E. / M.Tech / M.Arch." examination.

Marks	PART-1 : 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)
Distribution	PART-2: 25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)

108062

CIVIL ENGINEERING

PART – 1

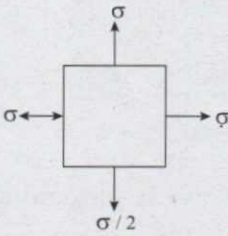
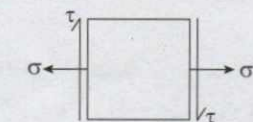
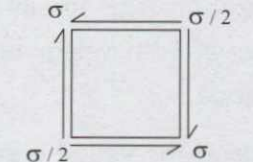
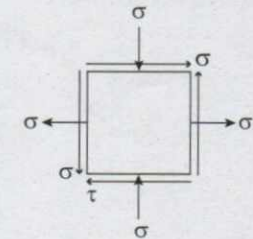
Each question carries one mark.

(50 × 1 = 50)

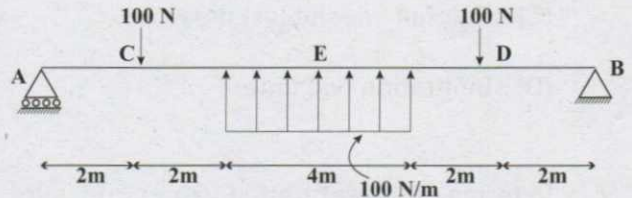
1. The unit of elastic modulus is same as those of

- (A) Stress, shear modulus and pressure
- (B) Strain, shear modulus and force
- (C) Shear modulus, stress and force
- (D) Stress, strain and pressure

2. Which of the following represents Bi-axial state of stress at a point?

- (A) 
- (B) 
- (C) 
- (D) 

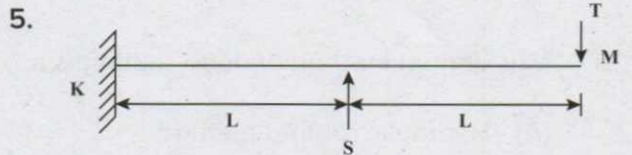
3. For the beam shown in figure, support reactions R_A, R_B respectively are



- (A) 100 N (↑), 100N (↓)
- (B) 150 N (↓), 50N (↓)
- (C) 100 N (↓), 100N (↓)
- (D) 50 N (↑), 150N (↓)

4. The maximum negative bending moment in case of fixed beam carrying UDL is at

- (A) mid span
- (B) $\frac{1}{3}$ of span
- (C) $\frac{1}{4}$ of span
- (D) supports



For beam system as shown, if the slope at M is zero then ratio T/S is

- (A) $\frac{1}{2}$
- (B) $\frac{1}{3}$
- (C) $\frac{1}{4}$
- (D) $\frac{1}{8}$

Space For Rough Work

6. Mass curve of rainfall shows the variation of
- Cumulative rainfall (vs) time
 - Effective rainfall (vs) time
 - Rainfall intensity (vs) time
 - Infiltration (vs) time
7. In terms of the saturation vapour pressure ' P_s ' corresponding to water surface temperature and the actual vapour pressure in air ' P_a ', the Dalton's law of evaporation can be stated as
- $E = K P_s \cdot P_a$
 - $E = K \cdot \frac{P_s}{P_a}$
 - $E = K[P_s - P_a]$
 - $E = K[P_a + P_s]$
8. Muskingum method of flood routing is a
- Hydraulic routing method
 - Reservoir routing method
 - Hydrologic channel routing method
 - Complete numerical solution of St. Venant's equation
9. A hyetograph is a graphical representation of
- Rainfall intensity and time
 - Rainfall depth and time
 - Discharge and time
 - Cumulative rainfall and time
10. The value of Sodium Absorption Ratio for high sodium water lies between
- 0 and 10
 - 10 and 18
 - 18 and 26
 - 26 and 34
11. Consider the following statements in the context of curves, the correct statements are
- Simple circular arc is used for horizontal curves
 - Square parabola is generally used for summit curves with design criteria as sight distance
 - Spiral is used for Valley curves with design criteria as comfort
- 1 & 2
 - 2 & 3
 - 1 & 3
 - all

Space For Rough Work

12. While conducting plate load test over 30 cm diameter mild steel plate, the pressure at 0.6 MPa for a deflection of 1.0 mm. The modulus of soil is
- (A) 212.4 MPa
 - (B) 106.2 MPa
 - (C) 58 MPa
 - (D) 36 MPa
13. Coning of wheels
- (A) prevents lateral movement of wheels
 - (B) provides smooth running of trains
 - (C) avoids excessive wear of inner faces of rail
 - (D) All of the above
14. Arrangement made to divert the trains from one track to another, is known as
- (A) railway point
 - (B) railway crossing
 - (C) turnout
 - (D) railway junction
15. Pick up the incorrect statement from the following:
- (A) As a wave of sea water approaches the coastline, it is generally accompanied by a drift of water in the direction of wave advance
 - (B) The on-shore wind helps to produce wave action as well as rise of M.S.L.
 - (C) A falling hydraulic gradient occurs in the direction of the wave
 - (D) The wave while receding carries finer particles out to deep water
16. Which among the following methods of forecasting is more suitable for old and settled Indian town?
- (A) Arithmetic increase method
 - (B) Geometric increase method
 - (C) Incremental increase method
 - (D) Decreasing growth rate method
17. Which among the following diseases is not a water-borne disease?
- (A) Jaundice
 - (B) Typhoid
 - (C) Polio
 - (D) Influenza

Space For Rough Work

18. A Grit chamber treating 3000 lit/sec of waste water with a flow through velocity of 0.3 m/sec then c/s area of grit chamber in m^2

- (A) 1
- (B) 10
- (C) 100
- (D) 1000

19. Biochemical Oxygen Demand (B.O.D.) of safe drinking water must be

- (A) 5
- (B) 10
- (C) 15
- (D) nil

20. By boiling water, hardness can be removed if it is due to

- (A) Calcium sulphate
- (B) Calcium bicarbonate
- (C) Magnesium sulphate
- (D) Calcium nitrate

21. Liquid limit and plastic limit of soil finer than $2 \mu m$ with % fraction of 25% has 55% and 30% respectively, activity ratio of soil

- (A) 1.5
- (B) 1
- (C) 0.75
- (D) 2.2

22. Consider the following statements

- 1) Increasing volume of soil without disturbance on submergence in water is termed as free swell of soil
- 2) Clay soil rich in montmorillonite exhibits very low swelling characteristics
- 3) Reduction in volume stops, when the water content falls below shrinkage limit.

Of these statements, which is/are correct?

- (A) 1 & 2 only
- (B) 1 & 3 only
- (C) 2 & 3 only
- (D) 1, 2 & 3

23. Two points on a virgin compression curve for normally consolidated soil are

$$e_1 = 1, e_2 = 0.7$$

$$\sigma_1^1 = 1.5 \text{ Kg/cm}^2, \sigma_2^1 = 4.5 \text{ Kg/cm}^2$$

The compression index, c_c _____

- (A) 0.5
- (B) 0.63
- (C) 0.8
- (D) 1.3

Space For Rough Work

24. The minimum water content at which the soil just begins to crumble when rolled into threads 3 mm in diameter, is known as

- (A) Liquid limit
- (B) Shrinkage limit
- (C) Permeability limit
- (D) Plastic limit

25. Failure of the stability of slopes, generally occurs along

- (A) a curved surface
- (B) a horizontal surface
- (C) slip plane
- (D) smooth plane

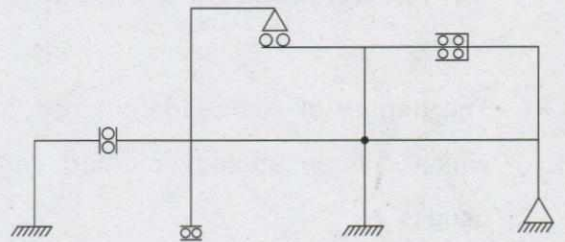
26. Geologic cycle for the formation of soil, is

- (A) Transportation → upheaval → weathering → deposition
- (B) Weathering → Transportation → deposition → upheaval
- (C) Weathering → upheaval → Transportation → deposition
- (D) upheaval → Transportation → deposition → weathering

27. In a statically indeterminate structure sum of rotation factors of all members meeting at one joint will be

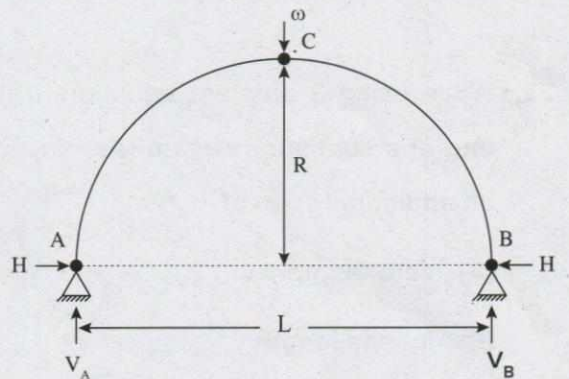
- (A) $\frac{1}{2}$
- (B) $-\frac{1}{2}$
- (C) $\frac{3}{4}$
- (D) $-\frac{3}{4}$

28. Find the static indeterminacy of the plane frame shown in the figure



- (A) 8
- (B) 7
- (C) 6
- (D) 5

29. For the three hinged parabolic arch, what will be the ratio $\frac{L}{R}$ to satisfy $H = W$?



- (A) 0.5
- (B) 1.5
- (C) 2
- (D) 4

Space For Rough Work

30. Castigliano's 1st theorem is applicable
- (A) for statically determinate structures only
 - (B) when the system behaves elastically
 - (C) only when principle of superposition is valid
 - (D) None of the above
31. The degree of static indeterminacy upto which column analogy method can be used is
- (A) 2
 - (B) 3
 - (C) 4
 - (D) unrestricted
32. While using 3 moment equation, a fixed end of a continuous beam is replaced by an additional span of
- (A) zero length
 - (B) infinite length
 - (C) zero moment of inertia
 - (D) None of the above
33. A vertical wall is subjected to a pressure due to one kind of liquid on one of its sides. The total pressure on the wall acts at a distance _____ from the liquid surface
- (A) $H/3$
 - (B) $H/2$
 - (C) $2H/3$
 - (D) $3H/4$
34. The total energy line lies over the hydraulic gradient line by an amount equal to the
- (A) pressure head + velocity head
 - (B) pressure head
 - (C) velocity head
 - (D) pressure head – velocity head
35. Choose the wrong statement
- (A) Viscosity of a fluid is that property which determines the amount of its resistance to a shearing force
 - (B) Viscosity is expressed as poise, stoke, or saybolt seconds
 - (C) Viscosity of liquids decreases with increase in temperature. Viscosity of liquids is appreciably affected by change in pressure
 - (D) Viscosity is due primarily to interaction between fluid molecules

Space For Rough Work

36. Field capacity = 40%, permanent wilting point = 12%, readily available moisture = 60% of available moisture. What is optimum moisture content?
- (A) 25.2%
 - (B) 24.3%
 - (C) 23.2%
 - (D) 21.5%
37. Which one of the following methods of applying water may be used on rolling land?
- (A) Border flooding
 - (B) Check flooding
 - (C) Furrow flooding
 - (D) Free flooding
38. A regime canal carries silt of medium size 0.25 mm. Lacey's silt factor for this silt is
- (A) 0.5
 - (B) 0.88
 - (C) 0.68
 - (D) 0.78
39. The bottom portion of a concrete dam is usually stopped in order to
- (A) increase the overturning resistance of the dam
 - (B) increase the shear strength at the base of the dam
 - (C) decrease the shear strength at the base of the dam
 - (D) none of the above
40. The maximum irrigation requirement of rice crop is exhibited by its
- (A) Maximum delta value
 - (B) Maximum duty value
 - (C) Minimum duty value
 - (D) None of the above
41. Which will be the included angle POG if the bearings of the line OP and OG are 320° and 20° respectively?
- (A) 60°
 - (B) 120°
 - (C) 30°
 - (D) 320°
42. If the points are inaccessible, which method of plane table survey is adopted to plot the points?
- (A) Radiation method
 - (B) Intersection method
 - (C) Orientation method
 - (D) Lehmann's method

Space For Rough Work

43. If the lower clamp screw is tightened and the upper clamp screw is loosened, the theodolite may be rotated
- (A) with a relative motion between the vernier and the graduated scale of the lower plate
 - (B) without a relative motion between the vernier and the graduated scale of the lower plate
 - (C) without a relative motion between the vernier and the graduated scale of the upper plate
 - (D) All of the above
44. To observe an included angle with better accuracy then what is achieved by reading the vernier of a theodolite, the method preferred is
- (A) Repetition
 - (B) Reiteration
 - (C) Double observation
 - (D) Any of these
45. The temporary adjustments which are done before observation at every setup of the theodolite consist of
- (i) Setting up of the theodolite over station
 - (ii) Levelling up
 - (iii) Elimination of parallax error
 - (iv) Orientation
- (A) (i), (ii), (iii), (iv)
 - (B) (i), (ii), (iii)
 - (C) (i) and (iii) only
 - (D) (i) & (iv) only
46. Which of the following bonds in masonry is the most aesthetically pleasing bond?
- (A) Stretcher Bond
 - (B) Header Bond
 - (C) English Bond
 - (D) Flemish Bond
47. Which of the below roof types can be used for a span of about 3.5 m?
- (A) Couple close roof
 - (B) Lean-to-roof
 - (C) Couple roof
 - (D) Collar Beam roof
48. A good building stone should not absorb water more than
- (A) 5%
 - (B) 8%
 - (C) 10%
 - (D) 12%
49. Percentage of carbon content in mild steel is
- (A) less than 0.25
 - (B) between 0.25 and 0.7
 - (C) between 0.7 and 1.5
 - (D) greater than 1.5
50. The triangular space formed between the extrados and horizontal line drawn through the crown of an arch is known as
- (A) haunch
 - (B) voussoirs
 - (C) spandril
 - (D) skewbacks

Space For Rough Work

PART – 2

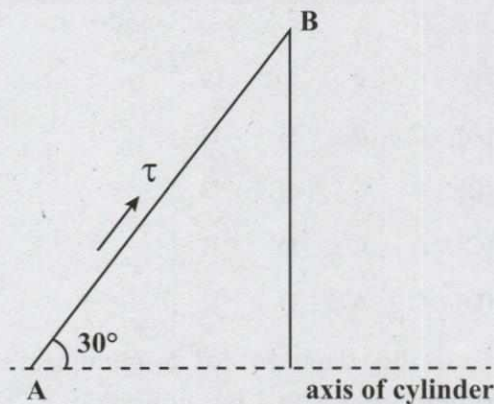
Each question carries 2 marks.

(25 × 2 = 50)

51. A column has slenderness ratio 65. Young's modulus and crushing strength of the column are 200 Gpa and 330 Mpa respectively. According to Euler's theory, column would preferably fail through

- (A) Crushing
- (B) Buckling
- (C) Both A and B
- (D) Can't determine

52. A closed pressure vessel with plate thickness 10 mm and internal diameter 240 mm is subjected to internal pressure of 5 Mpa. What is the shear stress (in Mpa) on an element of the cylinder wall on a plane at 30° to the longitudinal axis of the cylinder shown in fig. below



- (A) 9.8
- (B) 15.0
- (C) 10.6
- (D) 12.9

53. A 12-hour storm of 'X' cm at a particular place has a return period of 50 years. The probability that a 12-hour rainfall of 'X' cm or large magnitude will occur at least once in 10 successive year is _____ percentage

- (A) 2.00
- (B) 98.00
- (C) 18.3
- (D) 81.7

54. A Direct Runoff Hydrograph (DRH) due to a 4-hrs storm in a drainage basin is triangular in shape with a base of 84 hours and peak discharge of 90 m³/sec. Drainage basin is about 400 km². The peak of 4-hour unit hydrograph for this basin will be _____ m³/sec

- (A) 306.18
- (B) 3.06
- (C) 26.5
- (D) 2645.5

55. The ordinate of 2-hrs Unit Hydrograph (UH) at 1-hr time interval starting from time t = 0 are 0, 5, 13.5, 26, 41, 30.5, 21.6, 14.5 m³/sec. A two-hour storm occurred over the catchment area producing an effective rainfall of 2.5 cm. Assuming a constant baseflow of 15 m³/sec and φ-index = 5 mm/hr, the peak of resulting Direct Runoff Hydrograph (DRH) would be _____ m³/sec

- (A) 61.5
- (B) 117.5
- (C) 76.5
- (D) 102.5

Space For Rough Work

56. Match the following:

List-A

1) Abrasion test

2) Impact test

3) Soundness test

4) Crushing test

List-B

a) Resistance against weathering

b) Strength of aggregate

c) Resistance to wear and impact

d) Resistance of the aggregate to fracture under repeated impacts

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

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

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

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

57. A set of dual tyres has a total of 4090 kg, a contact radius of 10 cm and a centre to centre tyre spacing is 30 cm. The Equivalent Single Wheel Load (ESWL) as per IRC at a depth 30 cm below the road surface is

(A) 8180 kg

(B) 7040 kg

(C) 6715 kg

(D) 4090 kg

58. A rising gradient of 1 in 30 meets a falling gradient of 1 in 50 on a National Highway. The existing features near the locality permit the adoption of only minimum sight distance. The design speed is 100 kmph; minimum stopping sight distance is 180 m. The length of vertical curve is

(A) 178.3 m (B) 233.7 m

(C) 287.4 m (D) 368.4 m

59. Match the following:

I) Skimming tank A) Suspended particles

II) Sedimentation tank B) Bacteria

III) Trickling filter C) Oil & grease

IV) Ozonator D) Biodegradable matter

I II III IV

(A) C A B D

(B) A C B D

(C) A C D B

(D) C A D B

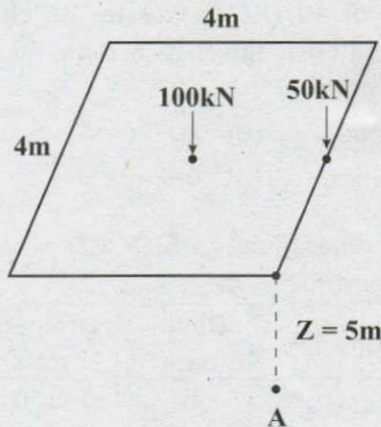
60. Find the diameter of a circular sewer running with half full condition carrying $0.06 \text{ m}^3/\text{sec}$ of sewage with a self cleaning velocity of 0.6 m/sec

(A) 0.5 m (B) 0.36 m

(C) 1 m (D) 0.72 m

Space For Rough Work

61. Isometric projection



Two point loads, one @ centre & other at side as shown in figure. The vertical stress at point 'A' _____ (use Boussinesq theory)

- (A) 0.95 kN/m^2 (B) 0.38 kN/m^3
 (C) 1.34 kN/m^2 (D) 2.31 kN/m^2

62. Consider the following statements

- 1) Coulomb's theory of earth pressure is preferred to analyze masonry walls
- 2) Active pressure caused by cohesionless backfill gels increases by compacting the backfill
- 3) Basement walls & Bridge abutments are usually designed for earth pressure at rest
- 4) Wall friction decreases the active earth pressure and increases the passive earth pressure

Which of above statements are correct?

- (A) 1 & 2 only (B) 2 & 4 only
 (C) 1, 2, 4 (D) 1, 3 & 4

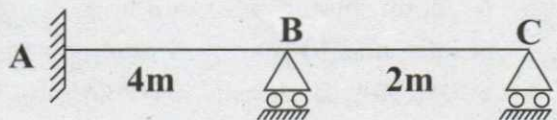
63. A friction pile of diameter 500 mm is embedded into a homogenous sand stratum with dry unit weight, friction angle & earth pressure co-efficient as 16 kN/m^3 , 30° & 3 respectively. The length of pile required to design the capacity of pile as 900 kN with safety factor of 2.5 is

- (A) 12.83 m
 (B) 15 m
 (C) 4.5 m
 (D) 17.5 m

(Assume $D_c = 10 \times \text{dia of pile}$)

64. Consider the two span prismatic continuous beam shown in figure. Find the moment at fixed end 'A', given that a clockwise rotation slip $\theta_A = 0.002$ radians occurs at the fixed end A.

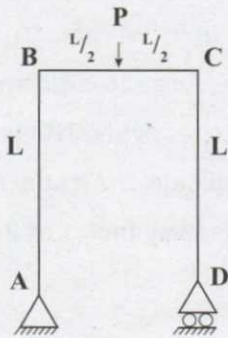
Assume $EI = 8 \times 10^4 \text{ kN-m}^2$



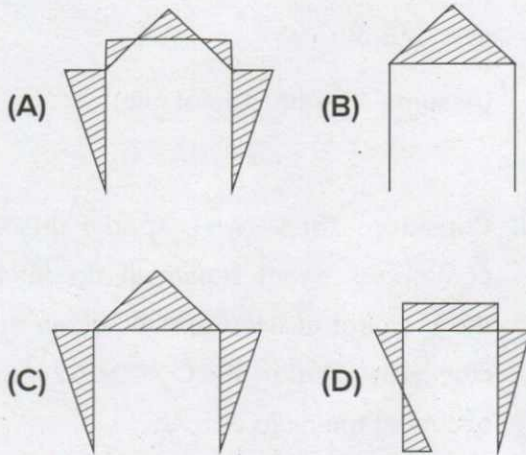
- (A) 48 kN-m
 (B) 96 kN-m
 (C) 100 kN-m
 (D) 144 kN-m

Space For Rough Work

65. The given figure shows a portal frame with loads



the bending moment diagram for this frame



66. A Venturi meter is 50 mm bore diameter at inlet and 10 mm bore diameter at the throat. Oil of density 900 kg/m^3 flows through it and a differential pressure head of 80 mm is produced. Given $C_d = 0.92$, determine the flow rate in kg/s (density of water to be 997 kg/m^3)
- (A) 0.0815 (B) 0.8510
(C) 0.9250 (D) 0.0518

67. Oil of density 860 kg/m^3 has a kinematic viscosity of 40 cSt. Calculate the critical velocity when it flows in a pipe 50 mm bore diameter
- (A) 1.6 m/s (B) 20.0 m/s
(C) 3.6 m/s (D) 0.5 m/s

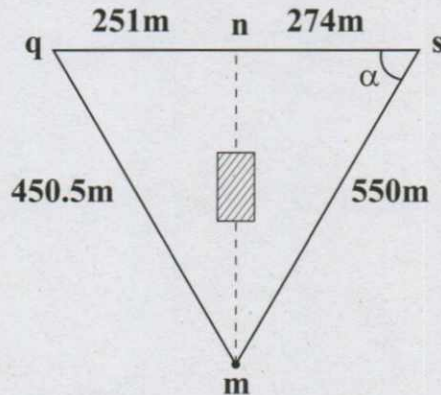
68. For the data given, which CD work is recommended?

Item	Canal data	Drainage data
Flow (m^3/sec)	5	500
Bed level (m)	120	112
Depth of flow (m)	0.8	10

- (A) Aqueduct
(B) Siphon Aqueduct
(C) Siphon
(D) Super passage
69. While designing a hydraulic structure, the piezometric head at the bottom of the floor is computed as 10 m. The datum is 3 m below floor bottom. The assumed standing water depth above the floor is 2 m. Specific gravity of the floor material is 2.5. The floor thickness should be (without factor of safety)
- (A) 2 m (B) 3.33 m
(C) 4.44 m (D) 6.00 m
70. The ideal condition for energy dissipation in the design of spillways is the one when the tail water curve
- (A) lies above JHC at all discharges
(B) coincides with JHC at all discharges
(C) lies below JHC at all discharges
(D) depends on magnitude of Q

Space For Rough Work

71. A big building obstructs the chain line mn. A line mq was measured on the left of the line mn for circumventing the obstacle. The length mq was 450.5 m. Similarly, the line ms was measured on the right of the line mn whose length was 550 m. The points n, q and s are in the same straight line. The length of qn and ns are 251 m and 274 m, respectively. The distance mn is



- (A) 445.16 m
 (B) 526.34 m
 (C) 426.34 m
 (D) 545.16 m
72. The magnetic bearing of a line was found to be $N50^{\circ}30' W$ in 1992, when the declination was $5^{\circ}10' E$. Find its present magnetic bearing, if declination is $2^{\circ} W$
- (A) $S 43^{\circ}20' E$
 (B) $S 63^{\circ}20' W$
 (C) $N 63^{\circ}20' W$
 (D) $N 43^{\circ}20' W$

73. The following perpendicular offsets were taken from a chain line to an irregular boundary

Chainage(m)	0	30	60	90	120
Offset	0	2.65	3.80	3.75	4.65
length(m)					

Chainage(m)	150	180	210
Offset length(m)	3.60	5.0	5.80

The area between the chain line and the irregular boundary by trapezoidal rule and Simpson's rule are

- (A) Trapezoidal rule $A = 790.5 m^2$
 Simpson's rule $A = 781 m^2$
 (B) Trapezoidal rule $A = 781 m^2$
 Simpson's rule $A = 790.5 m^2$
 (C) Trapezoidal rule $A = 891.1 m^2$
 Simpson's rule $A = 682.1 m^2$
 (D) Trapezoidal rule $A = 882.1 m^2$
 Simpson's rule $A = 891.1 m^2$
74. Which of the following need not be considered when concrete mix is prepared as per IS 10262:2009?
- (A) Alkali content in cement
 (B) Water cement ratio
 (C) Admixtures
 (D) Bulking of sand
75. What is the maturity of concrete after 7 days of casting where the average day time temperature is $25^{\circ}C$ and average night time temperature is $20^{\circ}C$?
- (A) $5628^{\circ}C$ Hours
 (B) $3864^{\circ}C$ Hours
 (C) $4252^{\circ}C$ Hours
 (D) $5262^{\circ}C$ Hours

Space For Rough Work

SPACE FOR ROUGH WORK