

पुस्तिका में पृष्ठों की संख्या-16
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Question Paper Booklet No.
प्रश्न-पत्र पुस्तिका संख्या

समय : 2.00 घण्टे
Time: 2.00 Hours

अधिकतम अंक : 200
Maximum Marks: 200

प्रश्न-पत्र पुस्तिका एवं उत्तर पत्रक के पेपर सील/पॉलिथीन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि उसके प्रश्न-पत्र पुस्तिका पर वही प्रश्न-पत्र पुस्तिका संख्या अंकित है जो उत्तर पत्रक पर अंकित है। इसमें कोई भिन्नता हो तो वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें। ऐसा न करने पर जिम्मेदारी अभ्यर्थी की होगी।

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- सभी प्रश्नों के अंक समान हैं।
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- कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानीपूर्वक सही भरें। गलत अथवा अपूर्ण रोल नम्बर भरने पर 5 अंक कुल प्राप्तांकों में से काटे जा सकते हैं।
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- Answer all questions.
- All questions carry equal marks.
- Only one answer is to be given for each question.
- If more than one answers are marked, it would be treated as wrong answer.
- Each question has four alternative responses marked serially as 1, 2, 3, 4. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
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CIVIL ENGINEERING

1. A prismatic bar when subjected to pure bending assumes the shape of-
 - (1) Catenary
 - (2) Cubic parabola
 - (3) Quadratic parabola
 - (4) Arc of circle
2. Most common method of pre-stressing used for factory production is-
 - (1) Long line method
 - (2) Freyssinet system
 - (3) Magnel-Blaton system
 - (4) Lee-McCall system
3. The drain which is provided parallel to roadway to intercept and divert the water from hill slopes is -
 - (1) Sloping drain
 - (2) Catch water drain
 - (3) Side drain
 - (4) Cross drain
4. A traffic rotary is justified where-
 - (1) Number of intersecting roads is between 8 & 10
 - (2) Space is limited and costly
 - (3) When traffic volume is > 6000 vehicles/hr
 - (4) When traffic volume is having lowest limit of 500 vehicles per hour
5. Contour lines can unite only in one condition, that is-
 - (1) Cave
 - (2) Valley
 - (3) Vertical cliff
 - (4) River bed
6. Tacheometry is adopted where-
 - (1) Too many curves exists at the border
 - (2) Obstacles, undulation exists
 - (3) Limitation of space exists
 - (4) None of the above
7. 70% index of wetness means-
 - (1) Rain excess of 30%
 - (2) Rain deficiency of 30%
 - (3) Rain deficiency of 70%
 - (4) None of the above
8. Methemoglobinemia or blue baby is caused due to-
 - (1) Chlorides
 - (2) Fluorides
 - (3) Nitrates
 - (4) Sulphides
9. Lacustrine soils are obtained from-
 - (1) River
 - (2) Glaciers
 - (3) Sea
 - (4) Lake beds

10. A prismatic member with area of cross section 'A' is subjected to a tensile load 'P', then the maximum shear stress and its inclination with the direction of load respectively are-
- (1) P/A and 60° (2) $P/2A$ and 45°
 (3) $P/2A$ and 60° (4) P/A and 45°
11. The phenomenon of decreased resistance of material due to reversal of stress is called-
- (1) Creep (2) Fatigue
 (3) Resilience (4) Plasticity
12. A bull nose brick is not used for-
- (1) Rounding off sharp corners (2) Pillars
 (3) Decoration purpose (4) Arches
13. Bullet proof glass is made of thick glass sheet sandwiched by a layer of-
- (1) Steel (2) Stainless steel
 (3) Vinyl plastic (4) Chromium plate
14. The most suitable equipment for compacting clayey soils is a-
- (1) Smooth wheeled roller (2) Pneumatic tyred roller
 (3) Sheeps foot roller (4) Vibrator
15. RC - 2; MC-2 and SC-2 correspond to-
- (1) Same viscosity (2) Viscosity in increasing order from RC-2 to SC-2
 (3) Viscosity in decreasing order from RC-2 to SC-2 (4) None of the above
16. The shape factor of an isosceles triangle should be-
- (1) 1.5 (2) 1.7
 (3) 2.34 (4) 2
17. For a floating body to be in stable equilibrium, its metacenter should be-
- (1) Below the center of gravity (2) Below the center of buoyancy
 (3) Above the center of buoyancy (4) Above the center of gravity
18. As per IS:800, the maximum bending moment of purlin is-
- (1) $WL/6$ (2) $WL/8$
 (3) $WL/4$ (4) $WL/10$

Where- $W = udl$; $L = \text{Span of purlin}$

19. The standard meridian of India is-
- (1) 35° (2) $82^\circ30'$
(3) $67^\circ30'$ (4) 120°
20. The window provided on the sloping roof of a building is called-
- (1) Dormer window (2) Bay window
(3) Sky light window (4) Glazed window
21. A queen closer is a-
- (1) Brick laid with its length parallel to the face or direction of wall. (2) Brick laid with its breadth parallel to the face or direction of wall.
(3) Brick having the same length and depth as the other bricks but half the breadth. (4) Brick with half the width at one end and full width at the other.
22. Resins are-
- (1) Not soluble in water (2) Soluble in spirit
(3) Used in Varnishes (4) Left behind on evaporation of oil
23. Steps which are normally triangular in shape are called-
- (1) Angular steps (2) Radial steps
(3) Winders (4) Spiral steps
24. A beam of uniform strength contains same-
- (1) Bending Moment (2) Bending stress
(3) Deflection (4) Stiffness
25. Consider the following statements :
The coefficient of permeability 'K' depends upon-
- (i) Void ratio of the soil
(ii) Duration of flow
(iii) Diameter of the soil grain
(iv) Shape of the particle
- Which of the above statement is correct?
- (1) i, ii, iii, iv (2) ii & iii only
(3) i, iii & iv only (4) iii & iv only
26. The windblown soils are associated with-
- (1) Alluvial soil (2) Lateritic soil
(3) Loess (4) Black Cotton soil
27. The tendency of a stone is, to split along-
- (1) Texture (2) Fracture
(3) Cleavage (4) Structure

28. The load carrying capacity of a helically reinforced column as compared to that of a tied column is about-
- (1) 5% less (2) 10% less
(3) 5% more (4) 10% more
29. The vertical member used in door frame is called-
- (1) Post (2) Hanging style
(3) Sill (4) Rail
30. The property of the ingredients to separate from each other while placing the concrete is called-
- (1) Segregation (2) Compaction
(3) Shrinkage (4) Bulking
31. When (h) is the difference in heights between the extremities of a chain length (l) then the correction for the slope required is-
- (1) h/l (2) h^2/l
(3) $h^2/2l$ (4) $h/2l$
32. The first observation taken on turning point is-
- (1) Back sight (2) Foresight
(3) Intermediate sight (4) None of the above
33. A survey done to understand the heavenly bodies is known as-
- (1) Celestial survey (2) Astronomical survey
(3) Photographic survey (4) Aerial survey
34. In India which technology is highly adopted for fluoride removal?
- (1) Aeration (2) Lime soda technique
(3) Nalgonda Method (4) Ozonation
35. For pipes, turbulent flow occurs when Reynolds number is-
- (1) Less than 2000 (2) Between 2000 and 4000
(3) More than 4000 (4) None of the above
36. An isobar is a line which connects all points below the ground surface at which-
- (1) The local ground elevation is same (2) The settlement is same
(3) The vertical stress is same (4) The ground elevation is varying
37. Undisturbed tests are required for conducting-
- (1) Hydrometer Test (2) Shrinkage Limit Test
(3) Consolidation Test (4) Specific Gravity Test

38. The earth pressure behind a bridge abutment is-
- (1) Active (2) Passive
(3) At rest (4) Constant always and everywhere
39. Bulking of sand is maximum if moisture content is about-
- (1) 2% (2) 4%
(3) 5% (4) 10%
40. The diameter of needle in Vicat apparatus for initial setting time is-
- (1) 0.5 mm (2) 1 mm
(3) 5 mm (4) 10 mm
41. Tie bars in CC roads are at-
- (1) Expansion joints (2) Contraction joints
(3) Warping joints (4) Longitudinal joints
42. It is a common practice to design a highway to accommodate traffic volume corresponding to-
- (1) 30th hour (2) Peak hour
(3) ADT (4) 15-min peak hour
43. The two main gases obtained from anaerobic decomposition are-
- (1) Ammonia and CO₂ (2) CO₂ & CH₄
(3) CH₄ & Hydrogen sulphide (4) Ammonia and CH₄
44. As per IS:456 the value of f_y at outermost tension fiber is-
- (1) $0.02 + (f_y/1.5 E_s)$ (2) $0.0035 + (f_y/1.5E_s)$
(3) $0.002 + (f_y/1.15E_s)$ (4) $0.002 + (f_y/1.5E_s)$
45. The R.L. of the point 'A' which is on floor is 100m and back sight reading on 'A' is 2.445m. If the foresight reading on the point 'B' which is on ceiling is 2.745m, the R.L. of point 'B' will be-
- (1) 94.80 m (2) 99.71 m
(3) 100.29 m (4) 105.20 m
46. Hydraulic lime is obtained by-
- (1) Fly ash (2) Burning of kankar
(3) Red stone (4) Calcination of pure clay
47. Excess of silica in the clay-
- (1) Makes the brick brittle & weak (2) Changes the colour of brick from red to yellow
(3) Improves impermeability and durability of the brick (4) Makes the brick crack and warp on drying

48. Neoprene is suitable for use in-
- (1) Joinery work (2) Floors of dance halls
(3) Bearing of bridges (4) Hard duty rubber coating of floors
49. In a transit theodolite, and incidental error due to eccentricity of Verniers is primarily encountered by-
- (1) Reading both the verniers (2) Reading different part of main scale
(3) Reading right and left faces (4) Taking both right swing readings
50. If a radius of curvature of a simple curve is 229.2 m, then its degree of curvature is-
- (1) 2° (2) 3°
(3) 5° (4) 10°
51. The Reduced Levels (RLs) of the points P and Q are +49.600 m and + 51. 870 m respectively. Distance PQ is 20 m. The distance (in m from P) at which the +51.00 m contour cuts the line PQ is-
- (1) 15.00 m (2) 12.33 m
(3) 3.52 m (4) 2.27 m
52. List I lists tools/instruments while List II lists the method of surveying. Match the tool/instrument with the corresponding method of surveying.

List I		List II	
P.	Alidade	(i)	Chain surveying
Q.	Arrow	(ii)	Levelling
R.	Bubble tube	(iii)	Plane table surveying
S.	Stadia hair	(iv)	Theodolite surveying

- | | P | Q | R | S |
|-----|-------|------|-------|-------|
| (1) | (iii) | (ii) | (i) | (iv) |
| (2) | (ii) | (iv) | (iii) | (i) |
| (3) | (i) | (ii) | (iv) | (iii) |
| (4) | (iii) | (i) | (ii) | (iv) |

53. Match list I (Test) with list II (property) and select the correct answer-

List I		List II	
A.	Proctor test	(i)	Grain size analysis
B.	Vane test	(ii)	Shear strength
C.	Penetration test	(iii)	Bearing capacity
D.	Hydrometer test	(iv)	Compaction

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

54. A footing of $2\text{m} \times 1\text{m}$ exerts a uniform pressure of 150 kN/m^2 on the soil. Assuming a load dispersion of 2 vertical to 1 horizontal, the average vertical stress (kN/m^2) at 1.0 m below the footing is-

- | | |
|--------|---------|
| (1) 75 | (2) 80 |
| (3) 50 | (4) 100 |

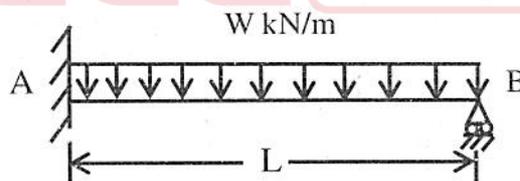
55. An unsupported excavation is made to the maximum possible depth in a clay soil having $\gamma_t=18 \text{ kN/m}^3$, $C=100 \text{ kN/m}^2$, $\phi=30^\circ$. The active earth pressure, according to Rankin's theory, at the base level of excavation is-

- | | |
|-----------------------------|----------------------------|
| (1) 115.47 kN/m^2 | (2) 54.36 kN/m^2 |
| (3) 27.18 kN/m^2 | (4) 13.25 kN/m^2 |

56. For a given shear force across a symmetrical 'I' section, the intensity of shear stress is maximum at the-

- | | |
|---|--|
| (1) junction of the flange and the web, but on web. | (2) junction of the flange and the web, but on the flange. |
| (3) centroid of the section | (4) extreme fibres |

57. In the propped cantilever beam carrying a uniformly distributed load of $W\text{N/m}$, shown in the following figure, the reaction at the support B is-

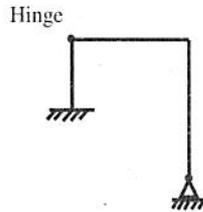


- | | |
|---------------------|---------------------|
| (1) $\frac{5}{8}WL$ | (2) $\frac{3}{8}WL$ |
| (3) $\frac{1}{2}WL$ | (4) $\frac{3}{4}WL$ |

58. Two beams of same material have equal cross-sectional area. If one beam has square cross-section and the other has circular cross-section-

- (1) Both the beam will be equally strong (2) Circular section will be stronger
(3) Square section will be stronger (4) Strength depends on loading condition

59. For the plane frame as shown in the figure, the degree of kinematic indeterminacy neglecting axial deformation, is-



- (1) 3 (2) 5
(3) 7 (4) 9

60. The intensity of u.d.l. which, when it acts over the entire span of 1m of a cantilever beam of rectangular cross-section of width of 100 mm and depth 200 mm, would produce a maximum shear stress of 1.5 N/mm^2 , is-

- (1) 30 kN/m (2) 26.6 kN/m
(3) 20 kN/m (4) 36.6 kN/m

61. The bulk modulus of K , modulus of elasticity E and Poisson's ratio is $\frac{1}{m}$, then which of the following is true-

- (1) $E = 3K\left(1 + \frac{2}{m}\right)$ (2) $E = 3K\left(1 - \frac{1}{m}\right)$
(3) $E = 3K\left(1 - \frac{2}{m}\right)$ (4) $E = 3K\left(1 + \frac{1}{m}\right)$

62. Consider the following statements-

- I- The economic spacing of a roof truss depends on cost of purlins and cost of roof covering.
II- Purlins provided over roof trusses are designed as a continuous as per IS:800.
III- Bearing stiffeners are provided in a plate girder to prevent web buckling.

The correct statements are-

- (1) I, II and III are correct (2) Only I and III are correct
(3) II and III are correct (4) I and II are correct

63. A symmetrical channel section is made of a material which is equally strong in tension and compression. It is used as a simply supported beam with its web horizontal to carry vertical loads. It will be-
- (1) Strongest if the web is used as a top face (2) Strongest if the web is used as a bottom face
- (3) Equally strong in (1) and (2) (4) Not possible to state which of the above statement is correct
64. In the simplified design of angle iron purlins, which one of the following assumption would not be valid-
- (1) Load component acting normal to the slope is considered (2) Bending moment about the minor axis is considered
- (3) Allowable bending stress is not reduced (4) Slope of the roof should not exceed 30°
65. In a counterfort retaining wall, the main reinforcement is provided on the-
- (i) Bottom face in front counterfort
(ii) Inclined face in front counterfort
(iii) Bottom face in back counterfort
(iv) Inclined face in back counterfort
- The correct answer is-
- (1) (i) and (ii) (2) (ii) and (iii)
(3) (i) and (iv) (4) (iii) and (iv)
66. In a plain concrete pedestal of M35 grade, the maximum bearing pressure at the base is found to be 40N/mm^2 . Find the depth of footing, if the projection beyond the column is 300 mm.
- (1) 3.1 m (2) 2.6 m
(3) 2.4 m (4) 1.9 m
67. In case of two way slab, the limiting deflection of the slab is-
- (1) Primarily a function of the long span (2) Primarily a function of the short span
(3) Independent of long or short spans (4) Dependent on both long and short spans
68. Drops are provided in flat slabs to resist-
- (1) thrust (2) bending moment
(3) torsion (4) shear

69. **Assertion A:** According to IS: 456; over reinforced sections are not permitted.
Reason R: There is ductile failure of over reinforced section.
Select your answer based on the coding system given below-
- (1) Both A and R are true and R is the correct explanation of A (2) Both A and R are true and R is not the correct explanation of A
(3) A is true but R is false (4) A is false but R is true
70. The maximum diameter that a capillary tube can have to ensure that a capillary rise of at least 6 mm is achieved when the tube is dipped into a body of liquid with surface tension = 0.08 N/m and density = 900 kg/m³, is-
- (1) 3 mm (2) 6 mm
(3) 5 mm (4) 8 mm
71. A horizontal water jet with a velocity of 10 m/s and cross-sectional area of 10 mm² strikes a flat plate held normal to the flow direction. The density of water is 1000 kg/m³. The total force on the plate due to the jet is-
- (1) 100 N (2) 10 N
(3) 0.1 N (4) 1 N
72. A person standing on the bank of a canal drops a stone on the water surface. He notices that the disturbances on the water surface is not travelling upstream. This is because the flow in the canal is-
- (1) Sub-critical (2) Super-critical
(3) Steady (4) Uniform
73. A trapezoidal channel is 10.0 m wide at the base and has a side slope of 4 horizontal to 3 vertical. The bed slope is 0.002. The channel is lined with smooth concrete (Manning's N = 0.012). The hydraulic radius (in m) for a depth of flow of 3 m is-
- (1) 20.0 (2) 3.5
(3) 3.0 (4) 2.1
74. A catchment area of 60 ha has a run off coefficient of 0.40. If a storm of intensity 3 cm/h and duration longer than the time of concentration occurs in the catchment, then what is the peak discharge?
- (1) 2.0 m³/s (2) 3.5 m³/s
(3) 4.5 m³/s (4) 2.5 m³/s

75. A 8 hours unit hydrograph of catchment is triangular in shape with a base width of 64 hours and peak ordinate of $20 \text{ m}^3/\text{s}$. The equilibrium discharge of S-curve obtained by using this 8 hours unit hydrograph is-

- (1) $60 \text{ m}^3/\text{s}$ (2) $80 \text{ m}^3/\text{s}$
(3) $100 \text{ m}^3/\text{s}$ (4) $800 \text{ m}^3/\text{s}$

76. Khosla's formula for assessing pressure distribution under weir floors are based on-

- (1) Potential flow in permeable layers just beneath the floors (2) Boundary layer flow with pressure drop longitudinally
(3) Conformal transformation of potential flow into the W plane (4) Simplification of 3-D flow

77. Force considered for the analysis of an elementary profile of a gravity dam under empty reservoir condition are-

- (1) Uplift pressure (2) Water pressure
(3) Self-weight (4) Wave pressure

78. The following characteristics pertain to the sand filters used in the water industry:

- I. Filtration rate is $1 \text{ to } 4 \text{ m}^3/(\text{m}^2 \text{ day})$
II. Typical duration of operation in one run is 24 to 72 hours
III. Operation cost is low

Which of the above characteristics pertain to slow sand filters?

- (1) I, II and III (2) I and II
(3) II and III (4) I and III

79. Match the following-

- | | |
|--------------|--------------------------|
| List I | List II |
| (A) Hardness | (i) Winkler method |
| (B) Chlorine | (ii) EDTA method |
| (C) DO | (iii) Orthotolidine test |
| (D) Chloride | (iv) Mohr method |

Codes-

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

80. Consider the following impurities-

- (i) CO_2 and H_2S
- (ii) Finely divided suspended matter
- (iii) Disease causing bacteria
- (iv) Excess alkalinity

The correct sequence of the removal of these impurities in a water treatment plant is-

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

81. A waste water sample of 2 ml is made upto 300 ml in BOD bottle with distilled water. Initial DO of the sample is 8 mg/l and after 5 days it is 2 mg/l. What is its BOD?

- (1) 894 mg/l
- (2) 900 mg/l
- (3) 300 mg/l
- (4) 1200 mg/l

82. Which of the following sewage treatment methods has inherent problems of odour, ponding and fly nuisance?

- (1) UASB system
- (2) Activated sludge process
- (3) Trickling filters
- (4) Stabilization ponds

83. The working conditions in Imhoff tanks are-

- (1) aerobic only
- (2) anaerobic only
- (3) aerobic in lower compartment and anaerobic in upper compartment
- (4) anaerobic in lower compartment and aerobic in upper compartment

84. For a road with camber of 3% and the design speed of 80 km/hr, the minimum radius of the curve beyond which no super-elevation is needed is-

- (1) 1680 m
- (2) 944 m
- (3) 406 m
- (4) 280 m

85. As per IRC guidelines for designing flexible pavements by CBR method, the load parameter required is-

- (1) number of commercial vehicles per day
- (2) cumulative standard axles in msa
- (3) equivalent single axle load
- (4) number of vehicles (all types) during design life

86. The general requirement in constructing a reinforced concrete road is to place a single layer of reinforcement-
- (1) Near the bottom of the slab (2) Near the top of the slab
(3) At the middle (4) Equally distributed at the top and the bottom
87. The Pensky-Martens apparatus are used for conducting the test on bitumen for testing-
- (1) Fire point (2) Ductility
(3) Viscosity (4) Penetration
88. The dilatancy correction in Standard Penetration Test (SPT) is given by-
- (1) $N' = 15 + (N - 15)$ (2) $N' = 15 + \frac{1}{2}(N - 15)$
(3) $N' = 15 + \frac{1}{2}(N - 10)$ (4) $N' = 15 + (N - 10)$
89. The conditions required to be satisfied for the analysis of indeterminate structure are-
- (1) Equilibrium (2) Compatibility
(3) Force-displacement relationship (4) All of these
90. In slope deflection method, the joints are considered rigid when-
- (1) no change in value of the angles between members (2) 90° angle between the members in frame
(3) 180° angle between the members in beams (4) all of these
91. Maxwell's reciprocal theorem in structural analysis-
- (1) is true for any structure obeying Hooke's law (2) can be applied to the rotations caused by flexure, shear or torsion
(3) is useful in analyzing indeterminate structures (4) all of these
92. As per IS: 456-2000, the final deflection due to all loads including the effects of temperature, creep and shrinkage and measured from the as-cast level of the supports of floors, roofs and all other horizontal members, should not normally exceed-
- (1) span/250 (2) span/350
(3) 20 mm (4) Both (2) and (3)

93. For the overall cost of roof trusses to be minimum, the cost of trusses should be equal to-
- (1) twice the cost of purlins plus the cost of roof coverings
 (2) twice the cost of roof coverings plus the cost of purlins
 (3) the cost of roof coverings plus the cost of purlins
 (4) twice the cost of purlins plus twice the cost of roof coverings
94. Intermediate vertical stiffeners in plate girders are used to-
- (1) Prevent local buckling of the web
 (2) Prevent local buckling of the flange
 (3) Prevent excessive deflection
 (4) Increase the bearing strength of the web
95. The detention time for a water sedimentation tank using coagulated raw supplies may vary between-
- (1) 1 to 2 hours
 (2) 2 to 4 hours
 (3) 4 to 8 hours
 (4) 16 to 24 hours
96. The overflowing sheet of water on a weir is called-
- (1) Head
 (2) Nappe
 (3) Upstream
 (4) Crest
97. For a transition curve, the shape recommended by IRC is-
- (1) Spiral
 (2) Lemniscate
 (3) Cubic parabola
 (4) All of these
98. Asphalt concrete is a mix comprising of-
- (1) Fine aggregate, mineral filler and bitumen
 (2) Fine aggregate and bitumen
 (3) Coarse aggregate, fine aggregate, mineral filler and bitumen
 (4) Coarse aggregate, mineral filler and bitumen
99. On a right angled road intersection with two way traffic, the total number of conflict points are-
- (1) 32
 (2) 16
 (3) 24
 (4) 4
100. The shape of the STOP sign according to IRC: 67-2001 is-
- (1) Circular
 (2) Triangular
 (3) Octagonal
 (4) Rectangular

Space for Rough Work

[Handwritten scribbles]

