

153/2017



Assistant Engineer (Civil)- Harbour Engineering

Question Booklet

Question Booklet

Alpha Code

Serial Number

Medium of Question : English

Date of Test : 19/12/2017

Total Number of Questions : 100

Time : 75 Minutes

Maximum Marks : 100

INSTRUCTIONS TO CANDIDATES

1. The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.
6. The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.



1. The first non-brahmin who rang the temple bell of Guruvayur Temple
A) K. Kelappan B) T. K. Madhavan C) Ayyankali D) P. Krishnapillai
2. The Goods and Services Tax (GST) came into existence on
A) 1st July 2017 B) 15th July 2017
C) 1st August 2017 D) 14th August 2017
3. The Article that mentions about Lok Sabha Speaker and Deputy Speaker
A) Article 329 B) Article 96 C) Article 93 D) Article 316
4. The first General Secretary of SNDP Yogam formed in 1903
A) Sree Narayana Guru B) K. P. Karuppan
C) A. K. Gopalan D) Kumaranasan
5. Gandhiji first visited Kerala on 18th August 1920 at Kozhikode. Who translated Gandhiji's speech into Malayalam ?
A) Sankaran Nair B) Madhavan Nair
C) K. P. Kesavamenon D) T. K. Kelappan
6. The national leader who praised Ayyankali as an "untiring warrior" ?
A) Subhashchandra Bose B) Mahatma Gandhi
C) Jawaharlal Nehru D) Moulana Abul Kalam Azad
7. India's first Lunar probe "Chandrayan 1" confirmed the presence of what in moon ?
A) Air B) Water C) Rock D) Mercury
8. How many members were there in the drafting committee of Indian Constitution ?
A) 8 B) 7 C) 9 D) 10
9. Sree Narayana Guru built a temple for Saradadevi in 1912 at
A) Sivagiri B) Aluva
C) Varkala D) Chempazhanthi
10. Carrying two month old baby in her arms, who participated Civil Disobedience Movement in Kerala ?
A) A. V. Kutti Malu Amma B) Anna Chandi
C) Lalith Prabhu D) Akkamma Cheriyan
11. The Nobel Prize Winner of 2017 for literature
A) Patrik Modiyano B) Bob Dylan
C) Moyan D) Thomas transtromer

Q No.	
1	D
2	A
3	C
4	D
5	B
6	B
7	B
8	B
9	A
10	A
11	B



12. 'Sadhu Jana Doothan' was a magazine charted by
 A) G. Sankarakurup B) Chandumenon C) John Joseph D) Kesava Dev
13. The most outstanding feature of Indian Constitution is
 A) Rigidity B) Rule of Law C) Flexibility D) Sovereignty
14. Pradhan Manthri Jhan Dhan Yojana is a nation-wide scheme launched by Indian Govt. for
 A) Online booking of LPG Cylinder
 B) Financial inclusion of every individual who does not have bank account is to be achieved
 C) Health Insurance for Indian poor
 D) Providing employment assurance
15. The Ezhava Memorial was submitted to
 A) Sree Moolam Thirunal B) Chithiram Thirunal
 C) Swathi Thirunal D) Sethu Lakshmi Bai
16. How many schedules does Right to Information Act, 2005 have ?
 A) 3 B) 4 C) 5 D) 2
17. The national leader who participated Vaikom Satyagraha on the basis of Gandhiji's advice
 A) Vinobha Bave B) Patel
 C) Lala Lajpathrai D) Jawaharlal Nehru
18. Ayyankali burnt Ooruttu Ambalam School in connection with
 A) Kallumala Samaram
 B) Kandala Lahala
 C) Nedumangad Lahala
 D) Perinad Lahala
19. NITI Ayog is a Govt. of India Policy to replace
 A) National Human Rights Commission
 B) Finance Commission
 C) Planning Commission
 D) National Statistical Commission
20. The literary journal which is known as the Ezahava Gazette
 A) Vivekodayam B) Mithavathi
 C) Bhasha Poshini D) Gaja Kesari

12	C
13	C
14	B
15	A
16	D
17	A
18	B
19	C
20	A



21. A pumped storage plant is a
 A) Peak load plant
 B) Run-off river plant
 C) High head plant
 D) Base load plant
22. If a water tank, partially filled with water is being carried on a truck, moving with a constant horizontal acceleration, the level of liquid will
 A) Rise and fall alternately on the front side of the tank
 B) Fall on the rear side of the tank
 C) Rise on the rear side and fall on the front side of the tank
 D) Remain the same on both sides of the tank
23. The unit of dynamic viscosity of a fluid is
 A) m^2/s
 B) Ns/m^2
 C) Pas/m^2
 D) kgs^2/m^2
24. In a Bernoulli equation, used in pipe flow, each term represents
 A) Energy per unit weight
 B) Energy per unit mass
 C) Energy per unit volume
 D) Energy per unit flow length
25. For steady incompressible flow through a closed-conduit of uniform cross-section, the direction of flow will always be
 A) From higher to lower elevation
 B) From higher to lower pressure
 C) From higher to lower velocity
 D) From higher to lower piezometric head
26. While planning a water supply reservoir, as compared to an irrigation reservoir the design yield may be kept
 A) Higher
 B) Lower
 C) Equal
 D) Lower or higher, as per designer's discretion
27. The metacentre is
 A) Centroid of the displaced volume of fluid
 B) Centre of pressure of the displaced volume of fluid
 C) Point of intersection of buoyant force and gravitational force
 D) Point of intersection of buoyant force and centre line of body
28. Consider the following statements related to a venturimeter.
 1. The velocity of flow in the main pipe is greater and the pressure is lesser than that at the throat section.
 2. The velocity of flow in the main pipe is lower and the pressure is larger than that at the throat section.
 3. The pressure difference between the main pipe and throat section is positive.
 4. The pressure difference between the main pipe and throat section is negative.

21	A
22	C
23	C
24	A
25	B
26	B
27	D
28	A

Which of these statements are not correct ?

- A) 1 and 4
 B) 1 and 2
 C) 2 and 4
 D) 3 and 4



29. In a Francis turbine, the runner blades are radial at the inlet and the discharge leaves the runner radially at the exit. For this turbine
- The relative velocity is radial at the outlet
 - The absolute velocity is radial at the outlet
 - The guide vane angle is 90°
 - The velocity of flow is constant

30. A centrifugal pump has its impeller of 50 cm diameter at inlet, and it rotates at 1200 rpm. The tangential velocity of the impeller at the inlet is
- $16\pi\text{m/s}$
 - $10\pi\text{m/s}$
 - $12\pi\text{m/s}$
 - None of these

31. A test used for determining the biological quality of drinking water is
- Acidity test
 - Coliform test
 - Iodine test
 - Vidal test

32. Consider the following statements.

- Chlorination of water kills the viruses of polio, viral hepatitis and jaundice.
- Treatment of water with ozone removes the chlorine from water.

Which of these statements is/are correct ?

- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
33. If A is to the South of B and C is to the East of B. In what direction is A with respect to C ?
- North-East
 - North-West
 - South-East
 - South-West
34. How many even numbers are there in the following sequence of numbers which are immediately followed by an odd number as well as immediately preceded by an even number ?
- 8, 6, 7, 6, 8, 9, 3, 2, 7, 5, 3, 4, 2, 2, 3, 5, 5, 2, 2, 8, 1, 1, 9
- One
 - Three
 - Five
 - None of these

35. If $\frac{8^n \times 2^3 \times (16)^{-1}}{2^n \times 4^2} = \frac{1}{4}$, then the value of n is

- 3
- $3/2$
- 1
- $2/3$

36. Find the sum to n terms of the series $6 + 66 + 666 + \dots$

- $10^{n+1} - 9n - 10$
- $10^{n+1} - 9n - 10/81$
- $2(10^{n+1} - 9n - 10)$
- None of these

29	B
30	B
31	B
32	B
33	D
34	A
35	A
36	C



37. A, B, C and D play a game of cards. A says to B, if I give you 8 cards, you will have as many as C has and I shall have 3 less than what C has. Also, if I take 6 cards from C, I shall have twice as many as D has. If B and D together have 50 cards, how many cards has A got ?
A) 40 B) 37 C) 27 D) 23
38. Which of the following factors contribute to formation of photochemical smog ?
1. Stable atmosphere
2. NO_x
3. Solar insolation
4. CO
A) 1, 2, 3 and 4 B) 2, 3 and 4 only C) 1 and 4 only D) 1, 2, and 3 only
39. During consolidation process of clayey soils, indicate the sequence of occurrence of the following events in the order from first to last.
1. Load being taken up by the pore water
2. Load being taken up by the soil grains
3. Drainage of water from the pores of the soil
A) 1, 2 and 3 B) 2, 3 and 1 C) 1, 3 and 2 D) 2, 1 and 3
40. The local scour depth in front of a semicircular shaped rectangular pier having width equal to w aligned parallel to the flow below the surrounding bed is
A) $2w$ B) $1.2w$ C) $1.5w$ D) w
41. Soundness test of cement is carried out to determine its
A) Free lime content B) Alumina content
C) Iron oxide content D) Durability under sea water
42. What treatment is adopted for making timber fire-resistant ?
A) ASCU treatment B) Abel's process
C) Tarring D) Creosoting
43. Which of the following statements are the important characteristics of a slow sand filter ?
1. Cleaning of filter is done by scraping and sand removal.
2. Lack of pre-treatment.
3. Greater efficiency of bacterial removal as compared to rapid sand filter.
4. Efficient in colour, taste and odour removal.
A) 1, 2, 3 and 4 B) 1, 2 and 4 only C) 2, 3 and 4 only D) 1, 2 and 3 only
44. If w is the percentage of water required for normal consistency of cement, water to be added for determination of initial setting time is
A) $0.5w$ B) $0.62w$ C) $0.75w$ D) $0.85w$

37	A
38	D
39	C
40	A
41	A
42	B
43	A
44	D



45. Hardness of water is caused by the presence of calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions. Which are the least soluble forms of calcium and magnesium at normal water temperature ?
- A) CaCl_2 and MgCO_3 B) $\text{Ca}(\text{HCO}_3)_2$ and MgCl_2
 C) $\text{Ca}(\text{OH})_2$ and $\text{Mg}(\text{HCO}_3)_2$ D) CaCO_3 and $\text{Mg}(\text{OH})_2$
46. The number of bricks required per cubic metre of brick masonry is
 A) 400 B) 450 C) 500 D) 550
47. The spacing of tile drains to relieve waterlogged land is directly proportional to the
 A) Depth of drain below the ground surface
 B) Depth of impervious strata from the drain
 C) Depth of drain below the water level
 D) Coefficient of permeability of the soil to be drained
48. Which one of the following correctly defines aquiclude ?
 A) A saturated formation of earth material which not only stores water but also yields it in sufficient quantity
 B) A formation through which only seepage is possible and thus the yield is insignificant compared to an aquifer
 C) A geological formation which is neither porous nor permeable
 D) A geological formation which is essentially impermeable to the flow of water
49. Which one of the following sections performs better on the ductility criterion ?
 A) Balanced section B) Over-reinforced section
 C) Under-reinforced section D) Non-prismatic section
50. Which one of the following pairs is not correctly matched ?
- | | |
|----|---|
| 45 | D |
| 46 | C |
| 47 | D |
| 48 | D |
| 49 | C |
| 50 | A |
- A) $\text{BOD}/\text{COD} = 0$: Waste – water is toxic
 B) $\text{BOD}/\text{COD} \leq 0.2$: Acclimatization of seed is necessary
 C) $\text{BOD}/\text{COD} \geq 0.6$: Waste – water is non biodegradable
 D) $\text{BOD} = \text{COD} = 0$: Waste – water is devoid of organic matter
51. Which one of the following filters should be recommended for protected rural water supply project ?
 A) Pressure filter B) Slow sand filter
 C) Diatomaceous earth filter D) Rapid sand filter
52. For cement-concrete, the stress-strain curve is approximately linear upto
 A) $\frac{3}{4}$ of ultimate stress B) $\frac{5}{8}$ of ultimate stress
 C) $\frac{1}{2}$ of ultimate stress D) $\frac{1}{3}$ of ultimate stress



53. The consistent of cement which act as binder are
 A) Sand and Silica
 B) Carbon and Silica
 C) Tricalcium Silicate, Dicalcium Silicate and Carbon
 D) Tricalcium Silicate, Dicalcium Silicate and Tri-Calcium Aluminate
54. As per IS 456 the cross sectional area of longitudinal steel in a column should not be less than
 A) 0.8% of the area of the column
 B) 1.5% of the area of the column
 C) 2.5% of the area of the column
 D) 5% of the area of concrete
55. The relation between modulus of rupture f_{cr} , splitting strength f_{cs} and direct tensile strength f_{ct} is given by
 A) $f_{cr} = f_{cs} = f_{ct}$
 B) $f_{cr} > f_{cs} > f_{ct}$
 C) $f_{cr} < f_{cs} < f_{ct}$
 D) $f_{cs} > f_{cr} > f_{ct}$
56. The ratio of the diameter of reinforcing bars and the slab thickness is
 A) 1/4
 B) 1/5
 C) 1/6
 D) 1/8
57. Consider the following statements.
 1. Welded structures are usually lighter than riveted structures.
 2. Weldings allows the arrangement of structural components in such a manner that the joint provides maximum efficiency.
 3. During welding, the member do not get distorted.
 Of the statements
 A) 1, 2 and 3 correct
 B) 1 and 2 are correct
 C) 2 and 3 are correct
 D) 1 and 3 are correct
58. When the effect of wind or earthquake load is considered in the design of rivets and bolts for steel structures, by what percentage the permissible stresses may be exceeded ?
 A) 15%
 B) 25%
 C) 50%
 D) 33.33%
59. Traps are used in household drainage system to
 A) Prevent entry of foul gases in the house
 B) Restrict the flow of water
 C) Provide a partial vacuum
 D) Trap the solid wastes
60. Reflection cracking is observed in
 A) Flexible pavement
 B) Rigid pavement
 C) Rigid overlay over flexible pavement
 D) Bituminous overlay over cement concrete pavement

Q. No.	
51	C
52	C
53	D
54	A
55	B
56	D
57	A
58	D
59	A
60	D



61. Consider the following situations.

1. Traffic volume entering from all roads is less than 300 vehicle per hour.
2. Pedestrian volume is high.
3. Total right turning traffic is high.
4. A road is in a hilly region.

A rotary will be more suitable than control by signals in situations listed against.

- A) 1 and 3 B) 1 and 4 C) 2 and 4 D) 2 and 3

62. For different concrete specimens, each hydrated to the same degree, the permeability is

- A) Higher with lower water cement ratio and higher cement content
- B) Lower with lower water cement ratio and higher cement content
- C) Lower with higher water cement ratio and lower cement content
- D) Lower with higher water cement ratio and higher cement content

63. A contractor wishes to determine a suitable combination of manual labour and machine work for the excavation of a multistorey construction. For every cubic metre of excavation, 3 man-hours are needed, or 0.2 machine-hour. Costs involved are Rs. 20 per man-hour and Rs. 500 per machine-hour. The total quantity of excavation is estimated to be 4000 cum. The optimal quantity of excavation to be done manually for minimum total cost will be

- A) 1500 cum B) 1800 cum C) 2250 cum D) 2500 cum

64. A building with a gabled roof will experience pressure on its leeward slope which is

- A) Always +ve B) Always -ve
- C) Sometimes +ve and otherwise -ve D) Zero

65. Consider the following statements.

Entrainment of air in concrete is done so as to

1. Increase the workability
2. Increase the strength
3. Increase the resistance to freezing and thawing

Which of the above statements is/or correct ?

- A) 1, 2 and 3 B) 1 only C) 1 and 3 only D) 3 only

66. Consider the following statements in work breakdown structure.

1. It is a graphical representation of entire programme
2. The Top-Down approach to planning is adopted
3. The Down-Top approach to planning is adopted
4. It is suitable for complex projects

Which of the above statements is/are correct ?

- A) 1 only B) 2 and 4 C) 3 and 4 D) 4 only

61	A
62	B
63	C
64	B
65	C
66	A

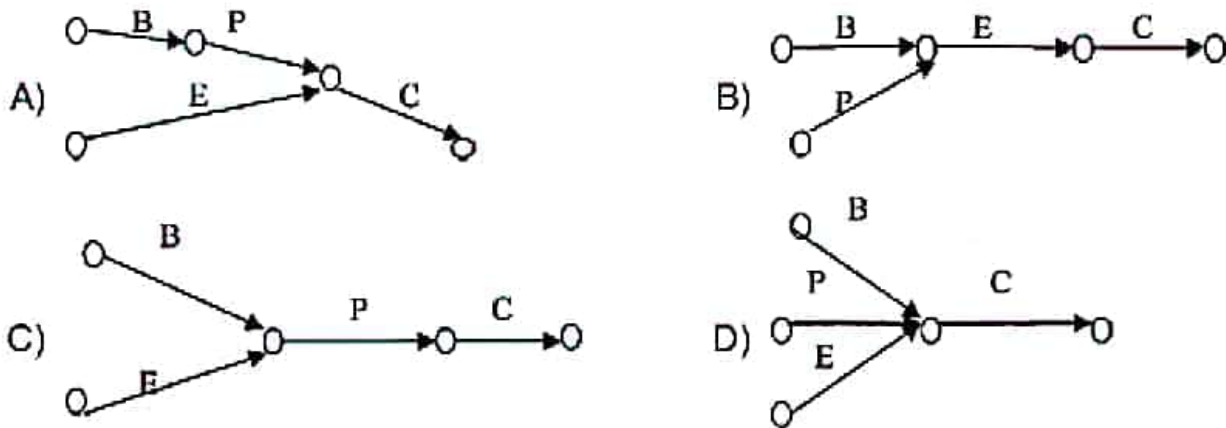
67. A thin cylinder of thickness 't', width 'b' and internal radius 'r' is subjected to a pressure 'p' on the entire internal surface. What is the change in radius of the cylinder ? (μ is the Poisson's ratio and E is the modulus of elasticity)

- A) $p^2 r \frac{(2-\mu)}{Et}$ B) $pr^2 \frac{(2-\mu)}{Et}$ C) $pr^2 \frac{(2-\mu)}{2Et}$ D) $p/r^2 \frac{(1-\mu)}{Et}$

68. Consider the following tasks.

1. Placing of reinforcement (P) for roof slab cannot start before bending of reinforcement (B) and erection of frame work (E).
2. As soon as placing of reinforcement is finished, concreting (C) will follow.

The correct activity on arrow diagram representing for the above task is



69. Terzaghi's Consolidation theory is applicable to one-dimensional consolidation test

- A) For small load increment ratios
- B) For large load increment ratios
- C) For a load increment ratio of nearly one
- D) In situations where there is no excess pore pressure

67	C
68	C
69	B
70	A
71	B

70. Which one of the following pairs is NOT correctly matched ?

- A) Visco-elastic material – Small plastic zone
- B) Strain hardening material – Stiffening effect
- C) Orthotropic material – Different properties in three perpendicular directions
- D) Isotropic material – Same physical property in all directions at a point

71. Two circular footings of diameters D_1 and D_2 are resting on the surface of a purely cohesive soil. The ratio $D_1/D_2 = 2$. If the ultimate load carrying capacity of the footing of diameter D_1 is 200 kN/m^2 , then the ultimate bearing capacity (in kN/m^2) of the footing of diameter D_2 will be

- A) 100
- B) 200
- C) 314
- D) 571



72. In the case of a pile foundation, negative skin friction may occur at a load which is
- A) Lower than the designed load B) Higher than the designed load
C) Equal to the designed load D) Of any magnitude

73. Consider the following statements.

1. Underreamed piles are designed as bearing piles.
2. In multiple-bulb underreamed piles, the bulbs are spaced at 1.5 to 2 times the diameter of the underream, the centre of the first underream being at a minimum depth of 1.75 m.
3. The length of traditional underreamed pile ranges from 3 m to 4 m

Which of these statements is/are correct ?

- A) 2 and 3 B) 1 and 2 C) 2 only D) 1 and 3

74. Working from the whole to the part is followed as the fundamental principle of surveying so as to

1. Distribute errors
2. Improve ease of working
3. Prevent accumulation of errors
4. Compensate errors in a way
5. Refer to a common datum, say MSL

72	B
73	D
74	C
75	A
76	D
77	D
78	B

- A) 1, 2 and 4 B) 1, 3 and 5 C) 3 and 4 D) 2 and 5

75. A propped cantilever beam of span, l is loaded with UDL of intensity w /unit length, all through the span. Bending moment at the fixed end will be

- A) $wl^2/8$ B) $wl^2/2$ C) $wl^2/12$ D) $wl^2/24$

76. If a three hinged parabolic arch is subjected to uniformly distributed load of w/m over entire horizontal span, then horizontal thrust will be

- A) $wl^2/3h$ B) $wl^2/4h$ C) $wl^2/6h$ D) $wl^2/8h$

77. A simply supported beam of length $(a + b)$ carries a concentrated load, W at a distance 'a' from one end. If EI is the flexural rigidity of the beam, then deflection under the load will be

- A) $\frac{Wa^2}{6EI(a+b)}a^2$ B) $\frac{Wb^2}{6EI(a+b)}$ C) $\frac{Wa^2b^2}{4EI(a+b)}$ D) $\frac{Wa^2b^2}{3EI(a+b)}$

78. In the Euler's formula for buckling load, $P_E = \frac{n\pi^2EI}{l^2}$, value of factor n least in case of a column with

- A) Both ends fixed B) One end fixed and other free
C) One end fixed and other hinged D) Both ends hinged



79. If porosity is denoted by n and specific gravity of soil solids is G , then hydraulic gradient of the deposits to develop boiling of sand is given by
 A) $i_c = \frac{G-1}{1-n}$ B) $i_c = \frac{G-1}{1+n}$ C) $i_c = (G-1)(1-n)$ D) $i_c = (G-1)(1+n)$
80. Average yield from standard tube wells is of the order of
 A) 5 L/s B) 50 L/s C) 500 L/s D) 5000 L/s
81. If 60 ppm is concentration of suspended solids present in turbid raw water, then how much dry solids will be deposited per day in the tank assuming 70% removal in the basin and average specific gravity of the deposit is 2 ?
 A) 112 Kg B) 142 Kg C) 168 Kg D) 192 Kg
82. Which of the following statements explains the term pyrolysis ?
 A) Solid-waste is heated in closed containers in oxygen-free atmosphere
 B) Solid-waste is incinerated in presence of oxygen
 C) Wastewater is treated with oxygen
 D) Dissolved solids from water are removed by distillation
83. Ozone layer in the upper atmosphere is getting destroyed owing to its reaction with
 A) CO_2 B) Hydrogen peroxide
 C) Oxides of Nitrogen D) Chlorofluorocarbons
84. A combined value of flakiness and elongation index is to be determined for a sample of aggregates. The sequence in which the two tests are conducted is
 A) Elongation index test followed by flakiness index test on the whole sample
 B) Flakiness index test followed by elongation index test on the whole sample
 C) Flakiness index test followed by elongation index test on the non-flaky aggregates
 D) Elongation index test followed by flakiness index test on non-elongated aggregates
85. As per IRC : 67 : 2001, a traffic indicating the speed limit on a road should be of
 A) Circular shape with White Background and Red Border
 B) Triangular shape with White Background and Red Border
 C) Triangular shape with Red Background and White Border
 D) Circular shape and Red background and White Border

79	C
80	B
81	C
82	A
83	D
84	B
85	A
86	A

86. If the jam density is given as k_f and the free flow speed is given as μ_f , then men flow for a linear traffic speed-density model is given by
 A) $1/4 k_f \mu_f$ B) $1/3 k_f \mu_f$ C) $3/5 k_f \mu_f$ D) $2/3 k_f \mu_f$



87. The formation width of a double lane NH embankment is
 A) 7 m B) 7.4 m C) 11 m D) 12 m or more
88. Match List-I with List-II and select the correct answer : (No. of members 'm', No. of joints 'n', No. of reaction elements 'r').

List – I**(Type of Structure)**

- a. Plane frame
 b. Space truss
 c. Space truss

List – II**(Statical Indeterminacy)**

1. $m + r - 3n$
 2. $6m + r - 3n$
 3. $6m + r - 3n$
 4. $3m + r - 3n$

Codes :

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

87	D
88	A
89	A
90	D
91	A
92	C
93	C

89. In pressure penstock 4500 m long, water is flowing at a velocity of 4 m/s. If the velocity of the pressure wave travelling in the pipe, due to sudden complete closure of a valve at the downstream end, is given as 1500 m/s, what would be the period of oscillation in second under frictionless condition ?
 A) 6 B) 8 C) 9 D) 11
90. A shaft turns at 150 rpm under a torque of 1500 Nm. Power transmitted is
 A) $15\pi\text{kW}$ B) $10\pi\text{kW}$ C) $7.5\pi\text{kW}$ D) $5\pi\text{kW}$
91. Which one of the following is the correct statement ?
 In a gusseted base, when the end of the column is machined for complete bearing on the base plate, the axial load is assumed to be transferred to the base plate.
 A) Fully by direct bearing
 B) Fully through the fastenings
 C) 50% by direct bearing and 50% through fastenings
 D) 75% by direct bearing and 25% through fastenings
92. Which one of the following shovel excavators is considered most efficient in loading carriers ?
 A) Dipper shovel B) Dragline C) Backhoe D) Clamshell
93. Which type of brick masonry bond is provided for heavy loads on masonry ?
 A) English bond B) Zigzag bond
 C) Single Flemish bond D) Double Flemish bond

