

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO.

TR/TES/PRE/CIVIL/DEGREE/(Gr. I)/2025

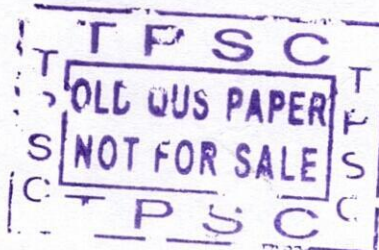
Test Booklet Series

**TEST BOOKLET
GENERAL STUDIES
AND ENGINEERING APTITUDE**



(Signature of the Candidate)

(Invigilator's Signature)



Time Allowed – 2 hours (Two hours)

Maximum Marks – 100

INSTRUCTIONS

1. PLEASE CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **ENCODE CLEARLY THE TEST BOOKLET SERIES A, B, C OR D AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**
3. This Test Booklet contains 100 items (questions). Each question, carrying one (1) mark only, has four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose **ONLY ONE** response for each item.
4. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See the directions in the Answer Sheet.
5. All items carry equal marks.
6. Before you proceed to mark in the Answer Sheet the responses to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instruction printed in the reverse side of your OMR sheet..
7. After you have completed filling in responses in the Answer Sheet and the Examination is completed, you should handover the Answer Sheet to the Invigilator only. You are permitted to take the Test Booklet.
8. Sheets for rough work are appended on the Test Booklet at the end.
9. **Penalty for wrong answers :**
 - (a) There will be four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-fourth** of the marks assigned to that question will be deducted as penalty.
 - (b) If a candidate gives more than one answer, it will be treated as a **Wrong Answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
 - (c) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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Four options are given against each of the following questions. Select the best/correct option from among the four options and encode in the Answer Sheet by using **Black Ball Point Pen** only as per examples given below :

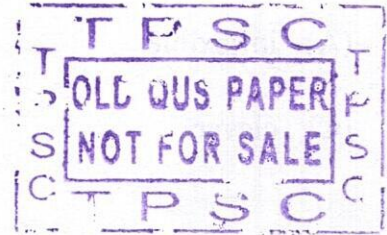
Example : P : Aunt Polly wanted to trap Tom ____ damaging confessions.

☒ (A) into (B) with (C) by (D) on

Example Q : Let's watch ____ movie ; I mean 'Pathar Panchali'.

(A) a (B) an ☒ (C) the (D) No article is needed.

PART-I



Choose the correct option following the instruction given against each question.

1×10=10

I. Fill in the blanks with appropriate prepositions from the choices given in Question Nos. 1 and 2.

1. The writer is evidently enamoured ____ the subject.

- (A) of (B) by
(C) with (D) None of these

2. Ambition does not always conduce ____ ultimate happiness.

- (A) with (B) to
(C) for (D) of

II. Choose the correct article to fill in the blanks given in Question Nos. 3 to 4. If no article is needed choose option D.

3. We go to ____ Church on Sundays.

- (A) a (B) an
(C) the (D) No article is needed.

4. He is _____ honour to his profession.

(A) an

(B) a

(C) the

(D) None of these

III. Choose the correct option to find the similar meaning of the underlined words in Question Nos. 5 and 6.

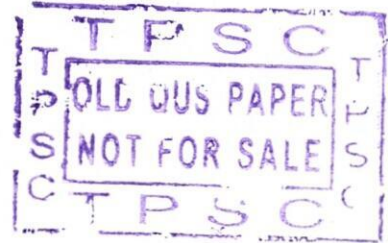
5. He is adamant to his decisions.

(A) inflexible

(B) soft

(C) clever

(D) bold



6. He could understand the imminent danger.

(A) valid

(B) doubtful

(C) impending

(D) cruel

IV. Select the correct option which is closest to the opposite in meaning of the underlined words in Question Nos. 7 to 8.

7. He has penchant for writing satirical poems.

(A) dislike

(B) bias

(C) repulsion

(D) hatred

8. Adversity is the source of numerous vices.

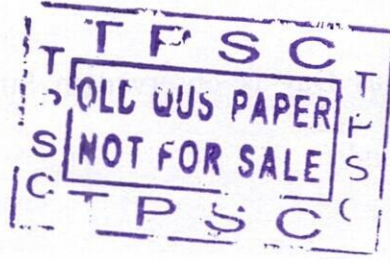
(A) wealth

(B) prosperity

(C) luxury

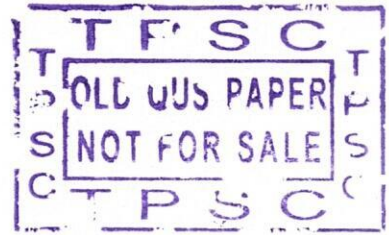
(D) money

- V. Choose the correct sentence from the option given in Question Nos. 9 and 10.
9. (A) I have got my M. Sc. degree in 1998.
(B) Our neighbours had repeated the same activities if we had not brought facts to their notice.
(C) I enquired of him whether he would accompany me to Dharamshala.
(D) No sooner the clock strikes 6 then all the employees rushed out of office.
10. (A) She will pay as soon as she receives the parcel.
(B) Our history can be seen as a long evolutionary dialectical development in which there have been painstaking forgiving of rational and moral self.
(C) On Friday evening, I and Mamta has taken a coach for Patna.
(D) Silver, as well as cotton, has fallen in price.



PART- II

11. The Tripura Merger Agreement was signed in New Delhi on
(A) 15th October, 1949 (B) 9th September, 1949
(C) 15th October, 1947 (D) 9th August, 1949
12. The title of "Bharat Bhaskar" was conferred upon Rabindranath Tagore by the Maharaja
(A) Bir Bikram Kishore Manikya (B) Bir Chandra Manikya
(C) Radha Kishore Manikya (D) Krishna Kishore Manikya
13. Who is the author of the book "A Passage to India"?
(A) E. M. Forster (B) Nirad C Chaudhury
(C) Mawlana Abul Kalam Azad (D) Mahatma Gandhi
14. The Christmas Day is observed in Summer in
(A) Greenland (B) Finland
(C) Italy (D) Brazil
15. Who was the Chief Guest for the Indian Republic Day Celebration-2025 ?
(A) President of Maldives (B) Prime Minister of Nepal
(C) President of Indonesia (D) President of Egypt
16. Who was the President of Bangladesh when Sheikh Hasina was ousted in August, 2024 ?
(A) Abdul Hamid (B) Md. Zillur Rahman
(C) Sahabuddin Chuppu (D) Md. Yunus



17. India won the ODI cricket series between India and England held in India in 2025 by a margin of
- (A) 2-0 (B) 3-1
(C) 3-0 (D) 3-2
18. Name the country which occupies the top most position in the recently published "World Happiness Report-2025."
- (A) Denmark (B) Sweden
(C) Finland (D) Austria
19. The Indian State which launched Chief Minister's Mobile Operation Theatre (CMMOT) on the 76th Republic Day of India is ____.
- (A) Gujarat (B) Mizoram
(C) Uttar Pradesh (D) Nagaland
20. Which of the following statements is/are correct in respect of 'India Energy Week'?
- (i) This event highlights India's significance as a Global Energy Market.
(ii) The First India Energy Week took place in Goa.
(iii) The Second India Energy Week took place in Bengaluru.
(iv) The Third India Energy Week took place in New Delhi.
- (A) (i), (ii) and (iii) (B) (i) and (iv)
(C) (i) and (ii) (D) (i) and (iii).

PART-III

21. A cantilever is subjected to a concentrated load W at the mid-point of the span. The slope at the free-end will be
- (A) $\frac{WL^2}{6EI}$ (B) $\frac{WL^2}{2EI}$
(C) $\frac{WL^2}{3EI}$ (D) $\frac{WL^2}{8EI}$
22. The product EI is called
- (A) Flexural rigidity (B) Torsional rigidity
(C) Second moment of area (D) None of these
23. A simply supported beam is subjected to a uniformly distributed load. Which one of the following statement is true ?
- (A) Maximum or minimum shear force occurs where the curvature is zero.
(B) Maximum or minimum bending moment occurs where the shear force is zero
(C) Maximum or minimum bending moment occurs where the curvature is zero.
(D) Maximum bending moment and maximum shear force occur at the same section.
24. For a circular column having its ends hinged, the slenderness ratio is 160. The $\frac{l}{d}$ ratio of the column is
- (A) 80 (B) 57
(C) 40 (D) 20
25. Which one of the following is true example of a statically determinate beam ?
- (A) One end is fixed and the other end is simply supported.
(B) Both the ends are fixed.
(C) The beam overhangs over two supports.
(D) The beam is supported on three supports.

26. The extremities of any diameter on Mohr's Circle represent
- (A) Principal stresses (B) Normal stresses on planes at 45°
- (C) Shear stresses on planes at 45° (D) Normal and shear stresses on a plane
27. The polar modulus for a hollow shaft of outer diameter (D) and inner diameter (d) is
- (A) $\frac{\pi}{4} (D^2 - d^2)$ (B) $\frac{\pi}{16} (D^3 - d^3)$
- (C) $\frac{\pi}{32} (D^3 - d^3)$ (D) $\frac{\pi}{32} (D^4 - d^4)$
28. Water cement ratio may be defined as a ratio of
- (A) Volume of water to that of the cement in a concrete mix
- (B) Weight of water to that of the cement in a concrete mix
- (C) Volume of water to that of the concrete in a concrete mix
- (D) Both (A) and (B)
29. For batching 1 : 2 : 4 concrete mix by volume, the ingredients required per bag of cement are
- (A) 50 kg of cement ; 70kg of fine aggregate ; 140 kg of coarse aggregate.
- (B) 50 kg of cement ; 70 litres of fine aggregate ; 140 litres of coarse aggregate.
- (C) 50 kg of cement ; 100 kg of fine aggregate ; 200 kg of coarse aggregate.
- (D) 50 kg of cement ; 100 litres of fine aggregate ; 140 litres of coarse aggregate.
30. For M 150 concrete, the unit punching shear strength of concrete is taken as
- (A) 10 kg/cm^2 (B) 20 kg/cm^2
- (C) 30 kg/cm^2 (D) 40 kg/cm^2

31. If the effective depth of a doubly reinforced concrete beam is 'd', and maximum stress in steel and concrete be 'c' and 't' respectively, then the neutral axis depth factor 'K' is given by

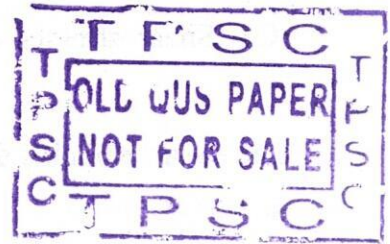
(A) $K = \frac{mc + t}{mc}$

(B) $K = \frac{mc}{mc + t}$

(C) $K = \frac{mc - t}{mc}$

(D) $K = \frac{mc}{mc - t}$

Where m = Modular Ratio.



32. The design of an eccentrically loaded steel column should be revised, if

(A) $\frac{f'_c}{f_c} + \frac{f'_b}{f_b} > 1$

(B) $\frac{f'_c}{f_c} - \frac{f'_b}{f_b} < 1$

(C) $\frac{f'_c}{f_c} + \frac{f'_b}{f_b} < 1$

(D) $\frac{f'_c}{f_c} - \frac{f'_b}{f_b} > 1$

Where f_c = Allowable working stress in compression on the member subjected to axial load only

f'_c = Calculated average axial compression stress

f_b = Maximum allowable bending compressive stress on the extreme fibre, and

f'_b = Calculated bending stress in extreme fibre

33. Shrinkage of concrete depends upon

(A) relative humidity of the atmosphere

(B) passage of time

(C) applied stress

(D) Both (A) and (B)

34. The compound which is largely responsible for initial setting and early strength gain of ordinary Portland cement is

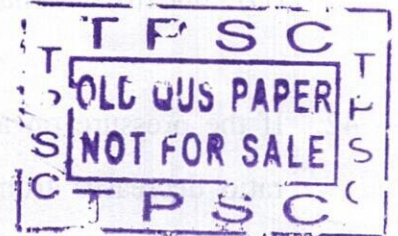
(A) C_3A

(B) C_3S

(C) C_2S

(D) C_4AF

35. The correct sequence of workability test(s) in order of their application from low to high workability is
- (A) slump test, compacting factor test and vee-bee consistometer
 - (B) Vee-bee consistometer, slump test and compacting factor test
 - (C) Vee-bee consistometer, compacting factor test and slump test
 - (D) Compacting factor test, vee-bee consistometer and slump test
36. Why are bricks soaked in water before using the brick masonry ?
- (A) For removing dust
 - (B) For reducing air voids
 - (C) For preventing depletion of moisture from mortar
 - (D) For reducing efflorescence
37. Seasoning of timber is required to
- (A) soften the timber
 - (B) harden the timber
 - (C) straighten the timber
 - (D) remove sap from timber
38. Letter of Intent is
- (A) issued to contractor
 - (B) issued by contractor
 - (C) issued to government authority
 - (D) issued by government authority
39. Given that scope of the construction work is well defined with all its drawings specifications, quantities and estimates, which one of the following types of contract would be most preferred ?
- (A) EPC contract
 - (B) Percentage rate contract
 - (C) Item rate contract
 - (D) Lump sum contract



40. In a cantilever beam carrying gravity load, main reinforcement is provided

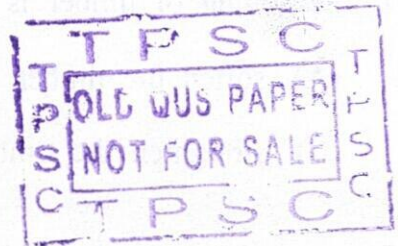
- (A) above the neutral axis (B) as vertical stirrups
(C) as a helical reinforcement (D) below the neutral axis.

41. The neutral stress is

- (A) transmitted through the points of contact of the interconnected particles of soil.
(B) transmitted to the soil base through the pore water
(C) independent of the depth of water above the soil mass
(D) due to external load acting on the soil

42. If the pressure on a clay layer increases slightly from 'p' to 'p + δp ' and the void ratio decreases from e_0 to e , then the co-efficient of compressibility is given by

- (A) $\frac{e}{p}$ (B) $\frac{e_0}{\delta p}$
(C) $\frac{e}{\delta p}$ (D) $\frac{e - e_0}{\delta p}$



43. The co-efficient of passive earth pressure for cohesionless granular soils is given by

- (A) $\frac{1 + \sin \phi}{1 - \sin \phi}$ (B) $\frac{1 - \sin \phi}{1 + \sin \phi}$
(C) $\frac{1 + \cos \phi}{1 - \cos \phi}$ (D) $\frac{1 - \cos \phi}{1 + \cos \phi}$

Where ϕ is the angle of internal friction of the soil.

44. The settlement of a footing (S_F) in sandy soil is given by

(A) $\frac{S_P}{B_P} \times B_F$

(B) $\frac{S_P}{B_F} \times B_P$

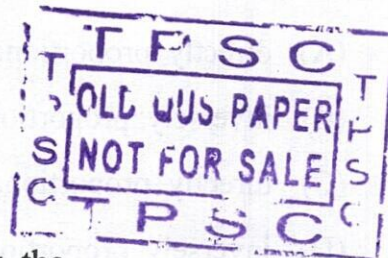
(C) $\frac{S_P}{\left[\frac{B_P(B_F + 30.48)}{B_F(B_P + 30.48)} \right]^2}$

(D) $\frac{S_P(B_P + 30.48)^2}{(B_F + 30.48)^2}$

Where $S_F \Rightarrow$ Settlement of plate in bearing test

$B_P \Rightarrow$ Width of the plate

$B_F \Rightarrow$ Width of the footing



45. The critical height in the stability of a soil slope is the

(A) minimum height at which it is possible for the sloped bank of soil to be stable

(B) maximum height at which it is possible for the sloped bank of the soil to be stable

(C) minimum vertical height of the soil in an open excavation

(D) maximum vertical height of the soil in an open excavation

46. The metacentric height of two floating bodies A and B are 1m and 1.5m respectively. Select the correct statement from the following

(A) The bodies A and B have equal stability

(B) The body A is more stable than body B

(C) The body B is more stable than body A

(D) The bodies A and B are unstable

47. An orifice is said to be large, if
- (A) the size of the orifice is large
 - (B) the velocity flow is large
 - (C) the available head of liquid is more than 5 times the height of orifice
 - (D) the available head of liquid is less than 5 times the height of orifice
48. The total pressure on the top of a closed cylindrical vessel completely filled with a liquid is
- (A) directly proportional to (radius)²
 - (B) inversely proportional to (radius)²
 - (C) directly proportional to (radius)⁴
 - (D) inversely proportional to (radius)⁴
49. Which of the following rain gauge does not produce the mass curve of precipitation as record
- (A) Symon's Raingauge
 - (B) Tripping-Bucket Raingauge
 - (C) Weighing-Bucket type Gauge
 - (D) Natural syphon Gauge
50. An Instantaneous Unit Hydrograph is a hydrograph of
- (A) Unit duration and infinitely small rainfall excess
 - (B) Infinitely small duration and of unit rainfall excess
 - (C) Infinitely small duration and of unit rainfall excess of infinitely small area
 - (D) Unit rainfall excess of infinitely small area.
51. Kennedy's Critical Velocity (V_o) as non-silting-none-scouring velocity is related to the depth of flow (D) by the relation
- (A) $V_o = 0.55D^{0.64}$
 - (B) $V_o = 0.55D^{0.54}$
 - (C) $V_o = 0.65D^{0.54}$
 - (D) $V_o = 0.75D^{0.64}$

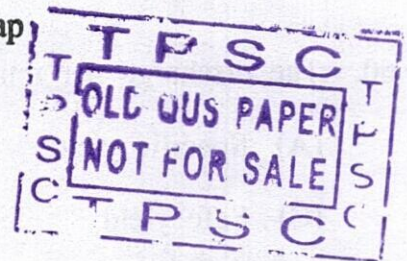


52. Chlorine can not be applied to water
- (A) as free ammonia gas (B) as bleaching powder or hypochlorite
- (C) as chloramines (D) as chloride dioxide
53. The detention period for grit chamber for waste water treatment may vary from
- (A) 30 to 60 seconds (B) 45 to 90 seconds
- (C) 90 to 120 seconds (D) 120 to 180 seconds
54. Factors not affecting Bacterial efficiency of chlorine are
- (A) Turbidity (B) Presence of metallic compounds
- (C) Ammonia compound (D) Coagulants used
55. Service pipe is known as the
- (A) Pipe from distribution main of the water supply to the plumbing system of the house
- (B) Pipe from water treatment works to the distribution mains
- (C) Pipe from plumbing system of the house to the tap
- (D) Pipe connecting different distribution mains
56. Formula used to design storm water runoff is
- (A) $Q = (1/360).C.I.A$ (B) $Q = (360).C.I.A$
- (C) $Q = (1/36).C.I.A$ (D) $Q = (36).C.I.A$

Where $Q \Rightarrow$ runoff in cumec, $C \Rightarrow$ Co-efficient of runoff

$I \Rightarrow$ intensity of rainfall in mm/hr.

$A \Rightarrow$ catchment area in hectares



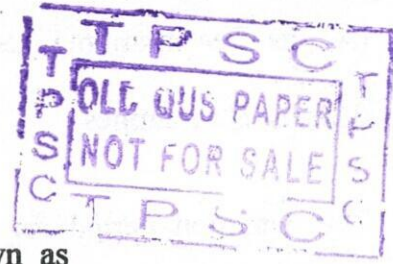
57. pH value of dairy waste water is approximately

(A) 6.2

(B) 7.2

(C) 8.2

(D) 5.2



58. Depth-area-duration curves of precipitation are drawn as

(A) minimizing envelopes through the appropriate data points

(B) maximizing envelopes through the appropriate data points

(C) best fit mean curves through the appropriate data points

(D) best fit straight lines through the appropriate data points.

59. The slope-area method is extensively used in

(A) development of rating curves

(B) estimation of flood discharge based on high water marks

(C) cases where shifting control exists

(D) cases where back-water effect is present

60. The discharge per unit drawdown of a well is known as

(A) Specific yield

(B) Specific storage

(C) Safe yield

(D) Specific capacity

61. Consumptive use determination by use of equations comprises of

(A) Penman Method

(B) Balney-Criddle Method

(C) Hargreaves Class-A Pan Evaporation Method

(D) All of the above methods

62. Trap efficiency of a reservoir is defined as
- (A) The per cent of the inflowing sediment which is retained in the reservoir
 - (B) The per cent of the outflow sediment from the reservoir
 - (C) The per cent of the sediment retained in the unit volume of the reservoir
 - (D) The per cent of the sediment in the unit volume of the water outgoing from the reservoir.

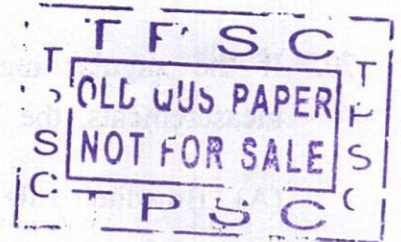
63. The discharge (Q) over an ogee shaped spillway is given by

- (A) $Q = CL_e He^{3/2}$
- (B) $Q = CL_e He$
- (C) $Q = CL_e He^{3/2}$
- (D) $Q = CL_e He^{5/2}$

Where 'C' is a variable co-efficient, 'Le' is the effective length of the crest, 'He' is the total head on the crest.

64. The width of carriageway for Two Lanes, with raised kerbs, as standardised by Indian Roads Congress is

- (A) 3.75 meter
- (B) 7.0 meter
- (C) 7.5 meter
- (D) 5.5 meter



65. As per Indian Road Congress (IRC), lateral friction co-efficient is

- (A) 0.10
- (B) 0.15
- (C) 0.25
- (D) 0.4

66. If N is the algebraic difference in grades, S is the minimum sight distance in meters, the length of summit curve is

- (A) $NS/4.4$
- (B) $NS^2/4.4$
- (C) $(NS)^2/4.4$
- (D) $N^2S/4.4$

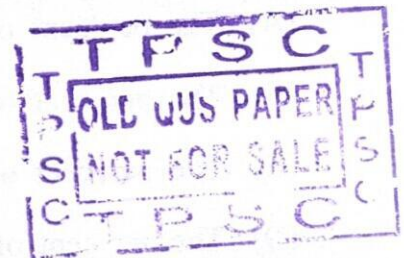
67. If the radius of curvature of a hill road is 50m, the % grade compensation should be

(A) $60/R$

(B) $70/R$

(C) $75/R$

(D) $80/R$



68. If 'V' is speed in kilometer per hour and 'S' is average center to center spacing of vehicles, then basic capacity of a single lane is

(A) $1000 S/V$

(B) $100 S/V$

(C) $1000 V/S$

(D) $100 V/S$

69. For design of flexible pavement of Group Index Method, the traffic volume (Commercial vehicles) is considered medium if the number of vehicles per day is

(A) Less than 50

(B) 50 to 300

(C) 300 to 500

(D) Over 500

70. If the angular measurements of a traverse are more precise than the linear measurements, the balancing of the traverse is done by

(A) Bowditch rule

(B) Transit rule

(C) Empirical rule

(D) All of these

71. CBR is a measure of

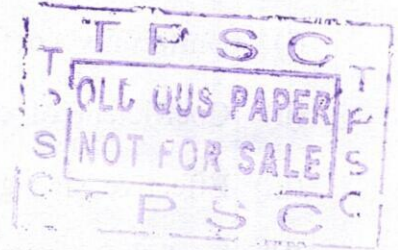
(A) Soil classification

(B) Soil strength

(C) Relative stiffness of paving material

(D) Shear strength under lateral confinement

72. The Le Chatelier apparatus is used to determine
- (A) Compressive strength of Cement (B) Fineness of Cement
- (C) Setting time of Cement (D) Soundness of Cement
73. A column size of 450mm×600mm has unsupported length of 3.0m and is braced against side sway in both directions. According to IS : 456-2000, the minimum eccentricities (in mm) with respect to major and minor principal axes are
- (A) 20.0 and 20.0 (B) 26.0 and 21.0
- (C) 26.0 and 20.0 (D) 21.0 and 15.0
74. When is an RCC roof slab is designed as a two way slab ?
- (A) If the slab is continuous over two opposite edges only
- (B) If the slab is un-supported at one edge only
- (C) If the ratio of spans in two directions is > 2
- (D) If the ratio of spans in two directions is < 2
75. A pre-tensioned concrete member of section 200 mm×250 mm contains tendons of area 500 mm² at centre of gravity of the section. The prestress in the tendons is 1000 N/mm². Assuming modular ratio as 10, the stress (N/mm²) in concrete is
- (A) 11 (B) 9
- (C) 7 (D) 15
76. The permissible stress in axial tension σ_{st} in steel member on the net effective area of the section shall not exceed the following value (f_y is the yield stress)
- (A) $0.80 f_y$ (B) $0.75 f_y$
- (C) $0.60 f_y$ (D) $0.50 f_y$



77. For avoiding the limit state collapse, the safety of RC structures is checked for appropriate combinations of Dead Load (DL), imposed load or Live Load (LL), Wind Load (WL) and Earthquake Load (EL). Which of the following load combinations is NOT considered ?

(A) $0.9 \text{ DL} + 1.5 \text{ WL}$

(B) $1.5 \text{ DL} + 1.5 \text{ WL}$

(C) $1.5 \text{ DL} + 1.5 \text{ WL} + 1.5 \text{ EL}$

(D) $1.2 \text{ DL} + 1.2 \text{ LL} + 1.2 \text{ WL}$

78. The Liquid Limit (LL), Plastic Limit (PL) and Shrinkage Limit (SL) of a cohesive soil satisfy the relation

(A) $\text{LL} > \text{PL} < \text{SL}$

(B) $\text{LL} > \text{PL} > \text{SL}$

(C) $\text{LL} < \text{PL} < \text{SL}$

(D) $\text{LL} < \text{PL} > \text{SL}$

79. Consider the following statements :

A well graded sand should have

(i) Uniformity coefficient greater than 6

(ii) Coefficient of curvature between 1 and 3

(iii) Effective size greater than 1mm

Which of these statements are correct ?

(A) (i), (ii) and (iii)

(B) (i) and (ii)

(C) (i) and (iii)

(D) (ii) and (iii)

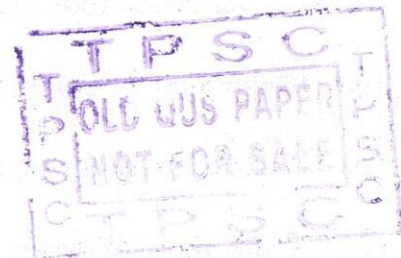
80. Which of the following statements is TRUE for the relation between discharge velocity and seepage velocity ?

(A) Seepage velocity is always smaller than discharge velocity

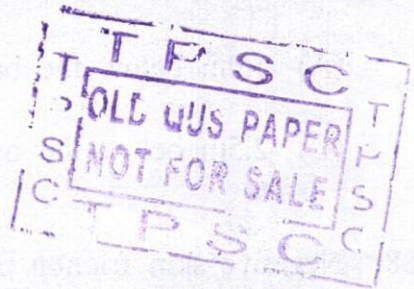
(B) Seepage velocity can never be smaller than discharge velocity

(C) Seepage velocity is equal to the discharge velocity

(D) No relation between seepage velocity and discharge velocity can be established.



81. The specific gravity and in-situ void ratio of the soil deposit are 2.71 and 0.85 respectively. The value of the critical hydraulic gradient is
- (A) 0.82 (B) 0.85
(C) 0.92 (D) 0.95
82. In a compaction test, as the compaction effort is increased, the optimum moisture content
- (A) decreases (B) remains same
(C) increases (D) increases first there after decreases
83. A footing of $2\text{m} \times 1\text{m}$ exerts an 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 1.0m before the footing is
- (A) 50 (B) 75
(C) 80 (D) 100
84. Identify the two FALSE statements from the following four statements :
- (i) The consolidation of soil happens due to change in total stress.
(ii) When standard penetration test are performed in fine sands before the water table, the dilation correction is applied after the overburden correction is applied.
(iii) Over consolidated clays will have predominantly cohesive strength as compared to the frictional strength.
(iv) Compaction of soils is due to expulsion of water
- (A) (ii) and (iii) (B) (i) and (iv)
(C) (i) and (iii) (D) (ii) and (iv)



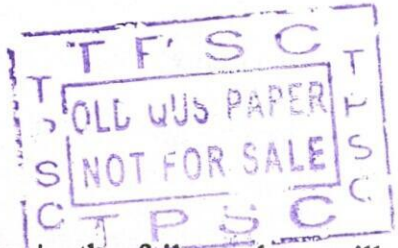
85. The time for a clay layer to achieve 90% consolidation is 15 years. The time required to achieve 90% consolidation of the layer were twice as thick, 3 times more permeable and 4 times more compressible would be

(A) 70 years

(B) 75 years

(C) 80 years

(D) 85 years



86. For a sample of dry, cohesionless soil with friction angle ϕ , the failure plane will be inclined to the major principal plane by an angle equal to

(A) ϕ

(B) 45°

(C) $45^\circ - \frac{\phi}{2}$

(D) $45^\circ + \frac{\phi}{2}$

87. Bearing capacity of a soil strata supporting a footing of size $3\text{m} \times 3\text{m}$ will not be affected by the presence of ground water table located at a depth which is

(A) 1.0m below the base of footing

(B) 1.5m below the base of footing

(C) 2.5m below the base of footing

(D) 3m below the base of footing

88. Negative skin friction in a soil is considered when the pile is constructed through a

(A) fill material

(B) dense coarse sand

(C) Over consolidated stiff clay

(D) Dense fine sand

89. A pile of 0.5m diameter and length 10m is embeded in a deposit of clay. The undrained strength parameters of the clay are cohesion = 60kN/m^2 and the angle of internal friction = 0. The skin friction capacity (kN) of the pile for an adhesioin factor of 0.6, is

(A) 671

(B) 565

(C) 283

(D) 106

90. A spillway discharges flood flow at a rate of $9\text{ m}^3/\text{sec}$ per metre width. If the depth of flow on the horizontal apron at the toe of the spillway is 46 cm, the tail water depth needed to form a hydraulic jump is approximately given by which of the following options ?

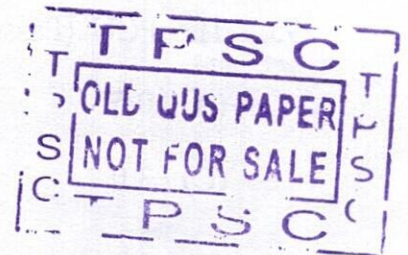
(A) 2.54m (B) 4.9m
(C) 5.77m (D) 6.23m

91. An urban area has a run-off coefficient of 0.35 and an area of 0.8 km^2 . The maximum depth of rainfall with a 30 year return period is as follows :

Duration (Min)	3	5	10	20	30	40
Depth of rainfall (mm)	10	15	20	25	30	35

If a culvert for drainage at the outlet of this area is to be designed for a time period of 30 years, estimate the peak flow rate. Take the time of concentration for the drainage area as 20 minutes

(A) $5.83\text{ m}^3/\text{sec}$ (B) $15.55\text{ m}^3/\text{sec}$
(C) $2.78\text{ m}^3/\text{sec}$ (D) $10.13\text{ m}^3/\text{sec}$



92. The super-elevation needed for a vehicle travelling at a speed of 60 km/h on the curve of radius 128m on a surface with a coefficient of friction 0.15 is

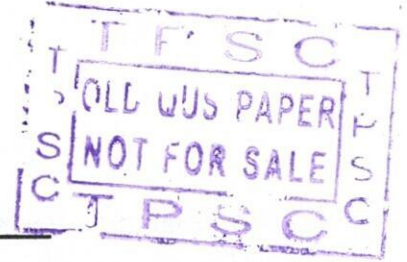
(A) 0.71 (B) 0.15
(C) 0.22 (D) 0.071

93. Bituminous materials are commonly used in highway construction because of their good

(A) tensile and compressive properties
(B) binding and water proofing properties
(C) shear strength and tensile properties
(D) bond and tensile properties

94. Match the following tests on aggregate and its properties

Test	Property
M Crushing test	1. Hardness
N Los Angles abrasion test	2. Weathering
O Soundness test	3. Shape
P Angularity test	4. Strength



Codes :

- M N O P
 (A) 2 1 4 3
 (C) 3 2 1 4

- M N O P
 (B) 4 2 3 1
 (D) 4 1 2 3

95. The PCU (Passenger Car Unit) value for cycle on an urban road is

- (A) 0.5 (B) 1.0
 (C) 3.0 (D) 4.0

96. The shape of the STOP sign according to IRC 67-2012 is

- (A) Circular (B) Triangular
 (C) Octagonal (D) Rectangular

97. As per IRC : 67-1012 ; traffic sign 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 with red background and white border

98. Which of the following set of terms does not relate operation of theodolite ?
- (A) Transiting and inverting (B) Face left and face right
(C) Right swing and left swing (D) Gauging and sounding
99. Which one of the following surveys is required in observations of stars ?
- (A) Astronomical survey (B) Cadastral survey
(C) Aerial survey (D) Photogrammetric survey
100. The system that uses the sun as a source of electro-magnetic energy and records the naturally radiated and reflected energy from the object is called
- (A) Geographical Information System (B) Global Positioning System
(C) Passive Remote Sensing (D) Active Remote sensing.

