

NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

Recruitment for the post of Junior Engineer (Civil)

[Ref – Recruitment Notice No./NITRR/R-1/Advt./2023/161 dated 13.07.2023]

Time Allowed: 3 hours

Maximum Marks: 100

Name of the Candidate: _____ App. No. _____

Serial Number of the Response Evaluation Sheet _____

Signature of Candidate

Signature of Invigilator

INSTRUCTIONS TO THE CANDIDATES:

1. This booklet consists of 16 pages and 100 questions. Please check that this Question Booklet does not have any missing or torn pages or items, if so, get it replaced by another Question Booklet.
2. You have to mark all your responses ONLY on the separate Response Sheet provided. It should not be folded or mutilated. No additional Response Sheet shall be provided.
3. Use only Black Ball point pen for filling all particulars of Question Booklet, Response Sheet as well as **darkening the circle** of the Response in the Response Sheet.
4. This Question Booklet **contains 100 Multiple Choice Questions**, and each question is followed by four alternative answer options for examples A, B, C and D out of **which only one most appropriate option is** to be chosen. You need to darken the most appropriate correct circle of the Response Sheet by black ball point pen.
5. For each question, darken only one circle on the Response Evaluation Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as invalid. **Cutting/ Alterations/ Corrections** are not permitted. Answers once darkened cannot be changed in the Response sheet. If you do not wish to attempt a question, leave all the circles in corresponding row blank and in such condition zero marks will be awarded for that question.
6. Every correct answer will be awarded 1 mark and **-0.25** will be deducted for each wrong answer. **No marks for non-attempted/invalid/cutting/alteration responses would be assigned.**
7. Use of **Electronic Gadgets**, Pager, Mobile Phone, Scientific Calculator etc. are strictly prohibited. Use of Unfair Means will lead to the cancellation of candidature. Do not carry any loose paper.
8. Blank spaces and blank pages at the end of this Booklet can be used for Rough Work.
9. Strictly adhere to disciplines during the course of examination and you are not permitted to leave the Examination Hall until the end of the test.
10. Return the Question Booklet and Response Sheet to the Invigilator after completion of examination, else your candidature treated as cancelled.

1. Fifteen solid spheres are made by melting a solid metallic cone of base diameter 2cm and height 15cm. The radius of each sphere is:

- a) $\frac{1}{2}$
- b) $\frac{1}{4}$
- c) $\frac{1}{3}\sqrt{2}$
- d) $\frac{1}{3}\sqrt{4}$

2. If $96 \div 3 = 32$ and $288 \div 8 = 36$, then $408 \div 6 = ?$

- a) 62
- b) 60
- c) 64
- d) 68

3. The length of a tangent drawn from a point at a distance of 10 cm of circle is 8 cm. The radius of the circle is

- a) 4 cm
- b) 5 cm
- c) 6 cm
- d) 7 cm

4. In a certain code language, 'CAPTURES' is coded as '24111206182219', 'DECORATE' is coded as '23524159175'. What is the code for 'EDUCATOR' in that code language?

- a) 2246326201218
- b) 2246322601218
- c) 2246326201219
- d) 224632620218

5. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

DMQ, HUZ, LCI, PKR, ?

- a) TSB
- b) TSA
- c) TRA
- d) TMO

6. What is the full form of GUI?

- a) Graphical User Interface
- b) Graphical Utility Interface
- c) Graphical User Inference
- d) Graphical User Insertion

7. Select the most appropriate option to fill in the blank. The anchor gave us a welcome, a pleasant smile and a bouquet on reaching the hotel.

- a) Warm
- b) Worth
- c) Winning
- d) wonderful

8. Select the correct passive voice form for the given sentence. Rashi was writing a letter to her husband.

- a) A letter was being written by Rashi to her husband.
- b) A letter were being written by Rashi to her husband.
- c) A letter was been written by Rashi to her husband.
- d) A letter were been written by Rashi to her husband.

9. What is the name of the rover sent to the moon surface by ISRO ?

- a) Vikram
- b) Chandra
- c) Pragyaan

d) Gyaan

10. The radius of the top and bottom of a bucket of slant height 35 cm are 25 cm and 8 cm. The curved surface of the bucket is:

- (a) 4000 sq.cm
- (b) 3500 sq.cm
- (c) 3630 sq.cm
- (d) 3750 sq.cm

11. Who among the following has been honored with the Global Indian Award 2023 by the Canada India Foundation?

- a) Shantanu Narayen
- b) C Vijayakumar
- c) K. Krithivasan
- d) Sudha Murty

12. What is the function of the BIOS?

- a) It boots the computer.
- b) It manages the hardware.
- c) It provides a user interface.
- d) All of the above.

13. In the following question, select the odd word pair from the given alternatives.

- a) Amphibian – Frog
- b) Crockery – Cup
- c) Insect – Butterfly
- d) Rodent – Lizard

14. In September 2023, which of the following events Indian women's Heeral

Sadhu, Kartika Jagadeeswaran and Aarathy Kasturi Raj secured bronze medals at the Asian Games 2023?

- a) 3000m relay race
- b) speed skating 3000m relay
- c) speed skating 2000m relay
- d) 2000m relay race

15. Who was the project director of the Aditya L1 mission sent by ISRO ?

- a) Kalpana Kalahasti
- b) M Vanitha
- c) Nigar Shaji
- d) Ritu Karidhal

16. Who among the following has been awarded 2023 Nobel Prize in Physiology or Medicine?

- a) Kariko, and Drew Weissman
- b) Svante Pääbo and Drew Weissman
- c) John Clauser and Katalin Kariko
- d) Annie Ernaux and Svante Pääbo

17. If the numbers a, b, c, d, e form an A.P., then the value of $a - 4b + 6c - 4d + e$ is

- a) 0
- b) 1
- c) -1
- d) 2

18. In October 2023, which of the following countries inaugurated the first "Whoosh" high-speed railway in Southeast Asia, a key

project under the Belt and Road Infrastructure initiative of China?

- a) Cambodia
- b) Indonesia
- c) Vietnam
- d) Timor-Leste

19. Select the option that can be used as a one-word substitute for the given group of words.

One who mediates in a deal or complex situation

- a) Equaliser
- b) Solicitor
- c) Pacifier
- d) Negotiator

20. Select the most appropriate synonym of the word 'stagnant' from the following sentence. Reeta was motionless after knowing that her brother had become mentally unstable after seeing the fatal accident on Tuesday night.

- a) Motionless
- b) Fatal
- c) Unstable
- d) Accident

21. The sag of 50 m tape weighing 4 kg under 5 kg tension is roughly

- a) 0.043 m
- b) 0.053 m
- c) 0.063 m
- d) 0.083 m

22. For complete chemical reactions percentage of water required X% of weight of cement. The value of X is

- a) 23
- b) 38
- c) 40
- d) 42

23. If the length of a transition curve is to be introduced between a straight and a circular curve of radius 500 m is 90 m, the maximum perpendicular offset for the transition curve, is

- a) 0.70 m
- b) 1.70 m
- c) 2.70 m
- d) 3.70 m

24. A sedimentation tank is designed to treat a flow rate of 1,000 m³/day. If the average flow velocity in the tank is 0.3 m/s, what is the surface area of the tank?

- a) 35 m²
- b) 40 m²
- c) 45 m²
- d) 50 m²

25. Which of the following building material have high Seismic resistance and flexibility of nailed joints.

- a) Husk
- b) Bamboo
- c) Timber
- d) Ply

26. The whole circle bearing of a line is 290° . Its reduced bearing is

- a) $N 20^\circ E$
- b) $N 20^\circ W$
- c) $N 70^\circ W$
- d) $S 70^\circ E$

27. What is the primary purpose of the Montreal Protocol?

- a) To address issues related to freshwater resource management
- b) To regulate the emission of greenhouse gases
- c) To protect the ozone layer by phasing out the production and use of ozone-depleting substances
- d) To establish global standards for wildlife conservation

28. In an AC circuit, what is the phase relationship between current and voltage in a purely inductive load?

- a) Voltage leads current by 90 degrees
- b) Voltage lags current by 90 degrees
- c) Voltage is in phase with current
- d) Voltage leads current by 180 degrees

29. Final setting time of OPC is X times Rapid hardening cement. The value of X is –

- a) 0.5
- b) 0.6
- c) 0.8

d) 1

30. The horizontal angle between true meridian and magnetic meridian is known

- a) Bearing
- b) Magnetic declination
- c) Dip
- d) Convergence

31. If the reduced bearing of a line AB is $N60^\circ W$ and length is 100 m, then the latitude and departure respectively of the line AB will be

- a) +50 m, +86.6 m
- b) +86.6 m, -50 m
- c) +50 m, -86.6 m
- d) +70.7 m, -50 m

32. Normal consistency of OPC is

- a) 10%
- b) 20%
- c) 30%
- d) 40%

33. Hardness of aggregate is determined by

- a) Deval abrasion test
- b) Los Angeles test
- c) Both of them
- d) None of these

34. Brick walls are measured in sq. m if the thickness of the wall is

- a) 10 cm
- b) 15 cm
- c) 20 cm
- d) None of these

35. After fixing the plane table to the tripod, the main operations which are needed at each plane table station are

- (i) Levelling
- (ii) Orientation
- (iii) Centering

The correct sequence of these operations is

- a) (i), (ii), (iii)
- b) (i), (iii), (ii)
- c) (iii), (i), (ii)
- d) (ii), (iii), (i)

36. In CPWD contracts, what is the purpose of "Liquidated Damages" clauses?

- a) To specify the type of beverages to be provided during project meetings

b) To define penalties that the contractor must pay if they fail to complete the project within the agreed-upon time

c) To outline the process for obtaining a construction license

d) To regulate the use of liquid sealants in construction projects

37. Cloud computing refers to

a) a model for delivering IT services where resources are retrieved from the internet through web-based tools, while traditional computing relies on on-premises hardware and software.

b) a method of data storage that uses magnetic tapes, while traditional computing uses hard disk drives.

c) a type of gaming console, while traditional computing involves board games.

d) a type of computing that operates only during rainy weather.

38. What is the primary purpose of the Montreal Protocol?

a) To address issues related to freshwater resource management

b) To regulate the emission of greenhouse gases

c) To protect the ozone layer by phasing out the production and use of ozone-depleting substances

d) To establish global standards for wildlife conservation

39. A reverse osmosis plant is used to desalinate seawater. If the plant produces 10,000 liters of freshwater per day and the concentration of dissolved salts in the feedwater is 35,000 mg/L, what is the daily salt rejection rate in grams?

- a) 3,500 g/day
- b) 35,000 g/day
- c) 350,000 g/day
- d) 3,500,000 g/day

40. How much power (in watts) consumed by a device with a resistance of 20 ohms when connected to a voltage of 120 volts.

- a) 720
- b) 560
- c) 930
- d) 530

41. In a construction project, the original contract value was 5 million INR, but due to change orders and additional work, the final contract value increased to 6.5 million INR. What is the percentage increase in the contract value?

- a) 50%

- b) 30%

- c) 70%

- d) 20%

42. Which of the following is the correct formula for Gross irrigation requirement?

- a) $C_u - R_e$
- b) $CIR + \text{leaching losses}$
- c) NIR/N_a
- d) FIR/N_c

43. The undrained shear strength of the remoulded clayey soil is 15 kPa. The sensitivity of the sample is found to be 20. Find out the corresponding compressive strength of the remoulded sample in kPa.

- a) 1.33
- b) 13.33
- c) 30
- d) 300

44. In the sand replacement method, if the mass of sand filling the calibrating container is 1450g and the volume of the calibrating container is 1000cm³, then its bulk density is _____ g/cm³

- a) 450
- b) 1.45
- c) 45
- d) 17

45. In a factory, there are 100 employees. Over the course of a year, there were 15 workplace accidents. What is the Accident Rate (AR) per 100 employees?

- a) 15
- b) 20
- c) 65
- d) 42

46. The quantity of water that can be diverted from the river into the main canal has no dependency on which of the following factor?

- a) The water available in the river
- b) The capacity of the main canal
- c) Water demand of the branch canals
- d) The capacity of the branch canal

47. What does "PPE" stand for in the context of workplace safety?

- a) Personal Protective Equipment
- b) Public Product Efficiency
- c) Product Placement Evaluation
- d) Personnel Policy Enforcement

48. For 100 sq. m cement concrete (1: 2: 4) 4 cm thick floor, the quantity of cement required, is

- a) 0.90 m^3
- b) 0.94 m^3
- c) 0.98 m^3
- d) 1.00 m^3

49. For a particular loading condition unsaturated clay layer undergoes 30 % consolidation in 180 days. What would be the additional time required for a further 20 % consolidation to occur

- a) 320 days
- b) 220 days
- c) 280 days
- d) 160 days

50. A dumpy level is set up with its eye-piece vertically over a peg. The height from the top of peg to the centre of the eye-piece is 1.540 m and the reading on peg is 0.705 m. The level is then setup over . The height of the eye-piece above peg is 1.490 m and a reading on is 2.195 m. The difference in level between and is

- a) 2.900 m
- b) 3.030 m
- c) 0.770 m
- d) 0.785 m

51. The design speed of a highway cross section is 90 kmph. On a space restricted area an overtaking zone has to be established where it is not possible to provide overtaking sight distance length. So, a substitute of OSD has been given. What will be the length of overtaking distance opted for geometric design? Assume longitudinal friction is 0.35, acceleration of 0.3 m/s^2 .

- a) 353.33 m
- b) 706.66 m
- c) 153.66 m
- d) 307.32 m

52. A computer's CPU operates at a clock speed of 3.2 GHz (gigahertz). How many clock cycles does it complete in 2 seconds (in billions)?

- a) 2.5
- b) 3.9
- c) 6.4
- d) 12.8

53. In water treatment, what is the purpose of coagulation?

- a) To remove bacteria from the water
- b) To reduce the pH of the water
- c) To agglomerate small particles into larger, settleable flocs
- d) To add oxygen to the water

54. A transverse slope of 1 in 30 is constructed on a highway for the purpose of drainage only. What will be the longitudinal slope of the highway ?

- a) 1 in 15
- b) 1 in 20
- c) 1 in 60
- d) 1 in 33

55. For 12 mm thick cement plastering 1: 6 on 100 sq.m new brick work, the quantity of cement required, is

- a) 0.200 m^3
- b) 0.247 m^3
- c) 0.274 m^3
- d) 0.295 m^3

56. Which of the following statements is/are correct with respect to methods of valuation?

i) In Rental method of valuation, the net income by way of rent is found out by deducting all outgoings from the gross rent.

ii) In Development method of valuation, the building should be divided into four parts i.e. Walls, roofs, floor and doors, windows.

- a) Both statements are false
- b) Only statement i) is true.
- c) Only statement ii) is true
- d) Both statements are true.

57. What is the Annual Intensity of irrigation (AII)?

- a) Cultivable Command Area/Gross Irrigated Area
- b) Net Irrigated Area/Cultivable Command Area
- c) Cultivable Command Area/Net Irrigated Area
- d) Gross Irrigated Area/Cultivable Command Area

58. What is the SI unit of electrical current?

- a) Volt
- b) Ohm
- c) Ampere
- d) Watt

59. Feasibility study for highway alignment comes under which survey?

- a) Preliminary Survey
- b) Reconnaissance Survey
- c) Map Study
- d) Detailed Survey

60. Which of the following programming languages is primarily used for artificial intelligence (AI) and machine learning applications?

- a) Python

b) JavaScript

c) C++

d) HTML

61. A landfill has a capacity of 500,000 cubic meters. If it receives an average of 50,000 cubic meters of solid waste per year, how many years will it take to fill the landfill to its capacity?

- a) 5 years
- b) 10 years
- c) 15 years
- d) 20 years

62. For an area of 10000 km², what should be the prescribed length of national highway as per Lucknow Road plan?

- a) 100
- b) 200
- c) 400
- d) 800

63. On a hilly area, A vehicle is moving with a speed of 65 kmph on a super elevated curved portion of highway whose radius is 400 m. What will be the equilibrium super elevation that has to be provided for safe movement of the vehicle?

- a) 3.33 %

b) 4.7 %

c) 8.30%

d) 7 %

64. The quantity of water that is pumped into a farm distribution system is 2 cumec. 1.6 cumec is delivered to a turn-out, 1km from the well. Compute the conveyance efficiency.

a) 80%

b) 20%

c) 50%

d) 60%

65. In a traffic signal design, a total cycle time of 60 seconds has been provided. Out of which green time is prescribed as 36 seconds. If the saturation optimum flow rate is 1200 vehicle per hour then what will the capacity (Vehicle/hr) of the road?

a) 1200

b) 720

c) 400

d) 1440

66. If the radius of the contact area is 40 mm and thickness of the slab is 50 mm then what will be the equivalent radius of the resisting section?

a) 37.38 mm

b) 40 mm

c) 33.45 mm

d) 43.87 mm

67. Which is the flow through sewers available during non-rainfall period.

a) gradually varied flow

b) rapidly varied flow

c) dry weather flow

d) storm water flow

68. A 12 m long, 300 mm diameter concrete pile is driven in a uniform deposit of dense sand. Water table is at a great depth. Dry unit weight of soil is 18 KN/m³. The value of $N_q = 137$. If coefficient of internal friction is 40 degree, calculate the safe load carrying capacity of the pile ? Use FOS= 2.5

a) 2103.66 KN

b) 841.45 KN

c) 869.72 KN

d) NOT

69. What does the term "Hierarchy of Controls" in workplace safety refer to?

a) A ranking of employees based on their experience

b) A prioritized system for controlling occupational hazards, with elimination being the most effective control and personal protective equipment (PPE) being the least effective control

c) A system for reporting workplace accidents

d) A schedule of safety training sessions

70. In which of the following types of irrigation water is supplied to the crops throughout their crop period?

a) Perennial Irrigation

b) Flood Irrigation

c) Direct Irrigation

d) Storage Irrigation

71. What does "URL" stand for in the context of the internet and web browsing?

a) Uniform Resource Locator

b) Universal Registration List

c) User Reference Link

d) Unified Resource Library

72. A room is 4 m x 3 m with 20 cm walls all around. The estimate of walls by central line method will be

a. 12 m

b. 14.8 m

c. 15.6 m

d. 14 m

73. A tape of length 'l' and weight 'W' kg/m is suspended at its ends with a pull of kg, the sag correction is

(A) $l^3 W^2 / 24 P^2$

(B) $l^2 W^3 / 24 P^2$

(C) $l^2 W^2 / 24 P^3$

(D) $l W^2 / 24 P$

74. If liquidity index of a soil is greater than 1 then which of the following is true?

a) Soil is suitable for resting the foundation.

b) Soil is not suitable for resting the foundation.

c) Soil is suitable for shallow foundation only.

d) Cannot be commented.

75. A water desalination plant produces 100,000 liters of freshwater per hour. If the plant operates continuously for 24 hours, what is the total daily freshwater production in cubic meters (m^3)?

a) 2,400 m^3 /day

b) 24 m^3 /day

c) 240,000 m^3 /day

d) 1,000 m³/day

76. The peaking factor is defined by

- a) peak flow * average flow
- b) peak flow – average flow
- c) peak flow + average flow
- d) peak flow / average flow

77. A retaining wall is moving away from the c-φ backfill soil. The backfill is subjected to a surcharge of 50 kPa. The undrained cohesion of the soil will be 15 kPa. What should be the minimum friction angle that soil should possess to maintain zero active pressure intensity at the tip of the soil?

a) 28°

b) 14°

c) 25°

d) NOT

78. A rectangular channel has a width of 4 meters and a depth of 2 meters. If the channel slope is 0.01, what is the specific energy at a critical flow state?

a) 2.0 meters

b) 4.0 meters

c) 6.0 meters

d) 7.48 meters

79. A retaining wall is resting in a soil backfill which has the cohesion value as 20

kPa and coefficient of internal friction as 30 degrees and the wall is moving away from the backfill. The soil has a tensile strength of 15 kPa. Comment on the following.

a) Tensile crack will develop in the soil

b) Tensile crack will not develop in the soil

c) Soil is in the verge of having tensile cracks

d) Cannot be determined

80. In a partially saturated soil sample, the fraction of volume of soil solid and volume of water comes out to be 3.703. If the specific gravity of the soil solid is 2.65 then what is the natural water content of the soil sample?

a) 10.19%

b) 27%

c) 22.21 %

d) 11.25%

81. A standard steel tape of length 30 m and cross-section 15 × 1.0 mm was standardised at 25°C and at 30 kg pull. While measuring a base line at the same temperature, the pull applied was 40 kg. If the modulus of elasticity of steel tape is 2.2×10^6 kg/cm², the correction to be applied is

a) - 0.000909 m

b) + 0.0909 m

c) 0.000909 m

d) None of these

82. An earthen embankment is to compact to a dry density of 1.82 gm/cc at a moisture content of 12%. The bulk density and moisture content are 1.72 gm/cc and 6% at the site from where the soil is borrowed and transported at the site construction. How much excavation should be carried out in the pit of borrowed area for each cu-m of the embankment ?

a) 1.122 cumec

b) 2.11 cumec

c) 1.15 cumec

d) cannot be determined

83. What is the critical depth of flow in an open channel with a specific energy of 5 meters and a specific force of 10 N/m²?

a) 0.25 m

b) 1.0 m

c) 2.5 m

d) 5.0 m

84. A centrifugal pump is operating with a head of 20 meters and an efficiency of 75%. If the power input to the pump is 10 kW, what is the flow rate in cubic meters per second (m³/s)?

a) 0.500 m³/s

b) 0.685 m³/s

c) 1.000 m³/s

d) 1.500 m³/s

85. The star and grid pattern of road networks are adopted in

a) Nagpur road plan

b) Lucknow road plan

c) Bombay road plan

d) Delhi road plan

86. It was decided to construct a fabric filter, using bags of 0.45 m diameter and 7.5 m long, for removing industrial stack gas containing particulates. The expected rate of airflow into the filter is 10m³ /s. If the filtering velocity is 2.0 m/min, the minimum number of bags (rounded to nearest higher integer) required for continuous cleaning operation is

A) 27

b) 29

c) 31

d) 32

87. The Muskingum model of routing a flood through a stream reach is expressed as $O_2 = K_0I_2 + K_1I_1 + K_2O_1$, where K_0 , K_1 and K_2 are the routing coefficients for the concerned reach, I_1 and I_2 are the inflows to reach, and O_1 and O_2 are the outflows from the reach corresponding to time steps 1 and 2

respectively. The sum of K_0 , K_1 and K_2 of the model is

- a) -1
- b) -0.5
- c) 0.5
- d) 1

88. 7 days strength of concrete is "X" times 3 days strength. The value of "X" is

- a) 0.66
- b) 1.33
- c) 0.75
- d) 1.5

89. The Manning's equation is commonly used for the estimation of flow velocity in:

- a) Laminar flow in pipes
- b) Turbulent flow in open channels
- c) Open channel flow in natural streams and rivers
- d) Pressure flow in pumps

90. The bearings of the lines AB and BC are $146^\circ 30'$ and $68^\circ 30'$. The included angle ABC is

- a) 102°
- b) 78°

c) 45°

d) None of these

91. The dominating microorganisms in an activated sludge process reactor are

- a) aerobic heterotrophs
- b) anaerobic heterotrophs
- c) autotrophs
- d) phototrophs

92. The distance traveled by a moving vehicle during perception time and break reaction time is known as

- a) Sight distance
- b) Stopping distance
- c) Lag distance
- d) Braking distance

93. Calculation for Bearing Capacity of shallow foundation will be done based on General Shear Failure criteria when

- a. $e > 0.5$
- b. $e < 0.55$
- c. $50\% < R.D. < 70\%$
- d. $20\% < R.D. < 50\%$

94. A superspeedway in New Delhi has among the highest super-elevation rates of any track on the Indian Grand Prix circuit.

The track requires drivers to negotiate turns with a radius of 335 m and 33° banking. Given this information, the coefficient of side friction required in order to allow a vehicle to travel at 320 km/h along the curve is

- a) 1.761
- b) 0.176
- c) 0.253
- d) 2.530

95. For a curved portion of Single Lane highway, a radius of 350 m has been provided. The design speed is 60 kmph and the length of the vehicle is 6 m. what will be the value of extra widening that has to be provided?

- a) 5.14 cm
- b) 10.28 cm
- c) 38.89 cm
- d) None of the above

96. In a wastewater treatment plant, if the influent flow rate is 500,000 liters per day and the influent BOD is 200 mg/L, and the effluent BOD is 10 mg/L, what is the BOD removal efficiency?

- a) 75%
- b) 80%

- c) 90%
- d) 95%

97. A flownet below a dam consists of 24 equipotential drops and 7 flow channels. The difference between the upstream and downstream water levels is 6 m. The length of the flow line adjacent to the toe of the dam at exit is 1 m. The specific gravity and void ratio of the soil below the dam are 2.70 and 0.70, respectively. The factor of safety against piping is

- a) 1.67
- b) 2.5
- c) 3.4
- d) 4.0

98. Which document typically outlines the terms and conditions of a construction project and serves as a legal contract?

- a) Project blueprint
- b) Bill of quantities
- c) Contract document
- d) Inspection report

99. There is a construction of 15 storey building in progress. The site comprises of medium dense sand till 12m depth followed by bed rock. The shear strength parameters are supposed to be determined after 20 years

of completion of project. Which type of test would be the most suitable for this?

a Unconfined Compression Test

b) CD Triaxial Test

c) UU Triaxial Test

d) Direct Shear Test

100. Purpose of performing penetration test of bitumen is to find out

a) Viscosity

b) Workability

c) Flowability

d) softness or hardness