



INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI

भारतीय प्रौद्योगिकी संस्थान तिरुपति



Yerpedu – Venkatagiri Road, Yerpedu Post, Tirupati District, A.P – 517619

**Examination for Non-Teaching Positions**  
**ADV No. IITT/STAFFREC/02/2023 dated 23-08-2023**

**JUNIOR TECHNICIAN – CE**

**OBJECTIVE TEST**

Maximum Marks: 50

Time: 60 Minutes

<i>Candidate Name</i>	
<i>Post Serial Number</i>	
<i>Signature of Invigilator</i>	

**General Instructions:**

Please read the following instructions carefully:

1. This test booklet contains 8 pages. Immediately after the commencement of the examination, you should check that this test booklet does not have any unprinted or torn or missing pages or items etc. If so, get it replaced.
2. This test booklet contains 50 multiple choice questions. Each Question carries 1 mark. Select the correct answers and mark on the OMR sheet.
3. You have to mark only one answer otherwise it will be counted as wrong answer.
4. Use blue/black ink ball point pen for darkening the circles on the OMR answer sheet only. Do not use Pencil.
5. Folding, wrinkling or putting any unwanted mark or damaging the OMR answer sheet is prohibited. The candidate will be responsible for invalidation of the OMR answer sheet by doing such deeds.
6. Any kind of electronic devices, including smart watches, mobiles, programmable calculators, and/or any paper chits, letters or printouts are not allowed inside the examination hall.
7. You have to hand-over the answered OMR sheet and the test booklet to the invigilator after the examination.

ANSWER ALL QUESTIONS

1. The ideal compaction equipment for compacting sandy soil deposit is:  
(a) Sheep-foot roller                      (b) Vibratory Roller  
(c) Pneumatic tyred roller              (d) Power roller
2. Capillary rise in a soil  
(a) is independent of particle size of soil  
(b) increases with increase in particle size of soil  
(c) decreases with increase in particle size of soil  
(d) increases with porosity of soils
3. Sand replacement method is used to determine  
(a) Field density of soil  
(b) Specific gravity in the laboratory  
(c) Equivalent mass of fine grained soils  
(d) Angle of repose
4. The liquid limit, plastic limit and shrinkage limit of a soil sample are 40, 20 and 15, respectively. Its plasticity index is  
(a) 5                      (b) 25                      (c) 20                      (d) 2
5. The values of  $D_{60}$ ,  $D_{30}$  and  $D_{10}$  of a soil are 1.5 mm, 0.5 mm and 0.1 mm, respectively. Its uniformity coefficient is  
(a) 15                      (b) 3                      (c) 5                      (d) 1.67
6. Quick sand condition is related to  
(a) Upward seepage                      (b) Downward seepage  
(c) Earthquake                      (d) Vibratory compaction
7. The number of soil layers used in Standard Proctor compaction test using mould of 1000 cc volume is  
(a) 5 layers              (b) 3 layers              (c) 2 layers              (d) Single layer
8. The maximum size of clay size particle is  
(a) 2 micron                      (b) 75 micron  
(c) 0.002 micron                      (d) 0.075 micron
9. Direct shear test was conducted on a dense clean sand under a normal stress of 100 kPa. The shear stress at failure was found to be 100 kPa. The expected shear strength parameters are  
(a)  $c' = 0$ ,  $\phi' = 45^\circ$                       (b)  $c' = 5$  kPa,  $\phi' = 45^\circ$   
(c)  $c' = 0$ ,  $\phi' = 30^\circ$                       (d)  $c' = 100$  kPa,  $\phi' = 0$
10. The relation between modulus of elasticity  $E$ , modulus of rigidity  $G$  and Poisson's ratio  $1/m$  is  
(a)  $E = G \left(1 + \frac{1}{m}\right)$                       (b)  $E = G \left(1 - \frac{1}{m}\right)$   
(c)  $E = 2G \left(1 + \frac{1}{m}\right)$                       (d)  $E = 2G \left(1 - \frac{1}{m}\right)$

11. A point of contraflexure in a beam occurs at a point where  
 (a) B.M. changes sign (b) S.F changes sign  
 (c) Loading becomes zero (d) B.M and S.F. becomes zero
12. Shear force at the free end of a cantilever beam is  
 (a) maximum (b) zero (c)  $\frac{wL^2}{4}$  (d)  $\frac{wL^2}{8}$
13. Along the neutral axis of a simply supported beam, fibers  
 (a) do not undergo strain (b) undergo minimum strain  
 (c) undergo maximum strain (d) none of these
14. Critical loads on long columns by Euler's formula is given by  $P_e = \frac{EI\pi^2}{(\kappa L)^2}$ . The effective length factor,  $k$ , for column with both ends fixed is  
 (a) 1 (b) 2 (c) 0.5 (d) 0.75
15. Quick lime is  
 (a) Calcium oxide (b) Calcium hydroxide  
 (c) Calcium carbonate (d) none of these
16. As per IS specification, the final setting time for Ordinary Portland Cement is  
 (a) 30 minutes (b) 60 minutes  
 (c) 10 hours (d) 24 minutes
17. Gypsum is added to Portland cement during its manufacture so that it may  
 (a) accelerate the setting time (b) retard the setting time  
 (c) decrease the burning temperature (d) facilitate grinding
18. Compared to mild steel, cast iron has  
 (a) high compressive strength (b) low tensile strength  
 (c) both (a) and (b) (d) none of these
19. Flash point is the  
 (a) time at which cement sets initially  
 (b) time of final setting  
 (c) lowest temperature at which the vapour of bitumen can be ignited in air  
 (d) all of these
20. Workability of concrete mix is determined by  
 (a) slump test (b) tensile strength test  
 (c) compaction factor test (d) flexural strength test
21. M20 grade of concrete approximates  
 (a) 1:2:4 mix (b) 1:1.5:3 mix (c) 1:3:6 mix (d) 1:3:4 mix
22. As per IS specifications the size of cube for compressive strength of cement is approximately

- (a) 7 cm
- (b) 10 cm
- (c) 15 cm
- (d) None of these

23. Cover at the end of the reinforcing bar in a beam is

- (a) 50 mm
- (b) twice the diameter of the reinforcement bars
- (c) four times the diameter of the reinforcement bar
- (d) 25 mm or twice the diameter of the bar, whichever is greater

24. Slenderness ratio of a steel member is

- (a)  $\frac{\text{Length}}{\text{minimum side dimension}}$
- (b)  $\frac{\text{Effective length}}{\text{radius of gyration}}$
- (c)  $\frac{\text{Effective length}}{\text{corresponding radius of gyration}}$
- (d)  $\frac{\text{Effective length}}{\text{least radius of gyration}}$

25. The effective length of battened column is

- (a) increased by 10%
- (b) increased by 20%
- (c) 0.8 times the actual length of column
- (d) 0.8 times the unsupported length of column

26. Eccentrically loaded columns are generally subjected to

- (a) axial compression and tension
- (b) bending stress and axial compression
- (c) shear stress and axial compression
- (d) torsional and shear stresses

27. Web crippling occurs due to

- (a) column action of web
- (b) failure of web under concentrated load
- (c) excessive bending moment
- (d) secondary bending moment

28. Test carried out to determine hardness property of road aggregates is

- (a) Aggregate crushing test
- (b) Los Angeles abrasion test
- (c) Aggregate impact test
- (d) Soundness test

29. For water bound macadams, the camber should be

- (a) 1 – 2 %
- (b) 2 – 2.5 %
- (c) 2.5 – 3 %
- (d) 3 – 4 %

30. Tie bars in cement concrete pavements are provided at

- (a) longitudinal joints
- (b) expansion joints
- (c) contraction joints
- (d) both (b) and (c)

31. A bituminous substance is tested for

- (a) consistency
- (b) specific gravity
- (c) softening point
- (d) all of these

32. The California Bearing Ratio method of flexible pavement design gives an idea about
- (a) quality of road making material
  - (b) traffic intensity
  - (c) characteristics of soil
  - (d) all of these
33. Which of the following statements is true?
- (a) Fluids take the shape of the container
  - (b) All fluids are incompressible
  - (c) Fluids deform continuously when a shear stress is applied
  - (d) None of the above
34. For flow of an ideal fluid in a horizontal pipe of constant diameter, the pressure drop along the direction of flow depends on
- (a) fluid viscosity
  - (b) pipe diameter
  - (c) velocity of flow
  - (d) None of the above
35. In the 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
36. Priming of a centrifugal pump is necessary for
- (a) increasing the discharge
  - (b) preventing air entrapment in the pump impeller
  - (c) increasing the head delivered by the pump
  - (d) None of the above
37. Cavitation will begin when
- (a) pressure is equal to saturated vapour pressure of the liquid
  - (b) pressure becomes more than critical pressure
  - (c) flow is increased
  - (d) pressure is increased
38. Friction factor for pipes depends on
- (a) rate of flow
  - (b) fluid density
  - (c) viscosity of fluid
  - (d) all of these
39. A Pitot tube is used to measure
- (a) velocity of flow
  - (b) pressure in the pipe
  - (c) density of the fluid
  - (d) None of the above
40. Which of these is used for measuring flow in an open channel?
- (a) V-notch
  - (b) Weir
  - (c) Both (a) and (b)
  - (d) None of the above
41. Principle of surveying followed to prevent accumulation of errors is
- (a) to work from whole to part
  - (b) to work from part to whole
  - (c) both (a) and (b)
  - (d) None of the above

42. Chain surveying is most suitable when
- (a) ground is fairly level and open with simple details
  - (b) area is small in extent
  - (c) plans are required on a large scale
  - (d) all of these
43. An imaginary line connecting the points of equal elevation on the ground surface is called
- (a) contour line
  - (b) contour interval
  - (c) horizontal equivalent
  - (d) contour gradient
44. Theodolite is an instrument used for measuring
- (a) horizontal angles
  - (b) vertical angles
  - (c) both (a) and (b)
  - (d) none of these
45. ABCD is a regular parallelogram plot of land whose angle BAD is  $60^\circ$ . If the bearing of the line AB is  $30^\circ$ , then the bearing of line CD is
- (a)  $90^\circ$
  - (b)  $120^\circ$
  - (c)  $210^\circ$
  - (d)  $270^\circ$
46. The distance between the points measured along a slope is 428m. If the angle of slope between the points is  $8^\circ$ , then the horizontal distance between the points is
- (a) 59.56 m
  - (b) 70.26 m
  - (c) 400 m
  - (d) 423.83 m
47. Closed contours with the higher value inwards represent a
- (a) depression
  - (b) hillock
  - (c) plain surface
  - (d) none of the above
48. The most important water quality parameter for domestic use is
- (a) carbonate hardness
  - (b) non-carbonate hardness
  - (c) coliform group of organisms
  - (d) chlorides
49. Most of the turbidity meters work on the scattering principle. The turbidity value so obtained is expressed in
- (a) CFU
  - (b) FTU
  - (c) JTU
  - (d) NTU
50. The average domestic water consumption per capita per day for an Indian city, as per IS 1172—963 may be taken as
- (a) 135 l/c/d
  - (b) 210 l/c/d
  - (c) 220 l/c/d
  - (d) 270 l/c/d

**ROUGH WORK**

