

**ENGLISH**

**I: Complete the sentences**

1. The pilot was \_\_\_\_\_ injured, he died within half an hour.  
A. seriously  
B. fatally  
C. fatefully  
D. vitally
  
2. The punch made the boxer \_\_\_\_\_ in pain.  
A. wince  
B. gape  
C. grumble  
D. fumble
  
3. Since one cannot read every book, one should be content with making a \_\_\_\_\_ selection.  
A. normal  
B. standard  
C. moderate  
D. judicious

**II. In each of the following questions, out of the four alternatives, choose the one, which can be substituted for the given word/sentence**

4. Music sung or played at night below a person's window  
A. serenade  
B. sonnet  
C. lyric  
D. primo
  
5. A government by the nobles  
A. Democracy  
B. Bureaucracy  
C. Autocracy  
D. Aristocracy

6. A man of lax moral
- A. Ruffian
  - B. Licentious
  - C. Pirate
  - D. Vagabond

**III. In the following sentences given below, a word is underlined. For each of the underlined word, 4 words are listed below each sentence. Choose the word nearest in meaning to the underlined word.**

7. The boy gave a vivid description of all that happened.
- A. brilliant
  - B. fresh
  - C. explanatory
  - D. picturesque
8. It is compulsory for all the students to join this tour.
- A. regular
  - B. necessary
  - C. dutiful
  - D. obligatory
9. The teacher felt that the student lacked discrimination in the study of his data.
- A. imagination
  - B. good taste
  - C. good judgement
  - D. objectivity

**IV. In the following sentences given below, a word is underlined. For each of the underlined word, 4 words are listed below each sentence. Choose the word which is closest to the opposite in meaning of the underlined word.**

10. Self-reliance has been adopted as an important objective of economic planning in modern India.
- A. refused
  - B. forsaken
  - C. denied
  - D. discarded
11. He was in a dejected mood.
- A. jubilant
  - B. rejected
  - C. irritable
  - D. romantic
12. There was a marked deterioration in his condition.
- A. improvement
  - B. revision
  - C. reformation
  - D. amendment

**V. In each of the following questions, a sentence has been given in Active (or Passive) Voice. Out of the four alternatives suggested select the one which best expresses the same sentence in Passive (or Active) voice**

13. His pocket has been picked.
- A. They have his pocket picked.
  - B. Picking has been done to his pocket.
  - C. Picked has been his pocket.
  - D. Someone has picked his pocket.
14. My uncle promised me a present.
- A. A present was promised by my uncle to me.
  - B. I was promised a present by my uncle.
  - C. I had been promised a present by my uncle.
  - D. I was promised by my uncle a present.

15. Who is creating this mess?  
A. Who has created this mess?  
B. By whom has this mess been created?  
C. By whom this mess is being created?  
D. By whom is this mess being created?
16. A lion may be helped even by a little mouse.  
A. A little mouse may even help a lion.  
B. Even a little mouse may help a lion.  
C. A little mouse can even help a lion.  
D. Even a little mouse ought to help a lion.

**VI. Please complete the sentences with suitable alternatives.**

17. She expects that her son \_\_\_\_\_  
A. can return  
B. may return  
C. should return  
D. None of the above
18. All felt that he \_\_\_\_\_ a cheat.  
A. may be  
B. can be  
C. might be  
D. None of the above
19. She \_\_\_\_\_ alone as it was raining heavily.  
A. must not leave  
B. must not have left  
C. should not leave  
D. None of the above
20. You \_\_\_\_\_ obey your parents.  
A. should  
B. ought to  
C. must  
D. None of the above

## MATHEMATICS

1. 2 marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each drawing. The probability that the first drawn marble is red and second is white is:
  - a. 0.06333
  - b. 0.05333
  - c. 0.02433
  - d. 0.05666
2. If  $L\{f(t)\} = \frac{e^{-1/s}}{s}$ , then  $L\{e^{-t}f(3t)\}$  is
  - a.  $s$
  - b.  $s+1$
  - c.  $s-1$
  - d.  $s^2$
3. The directional derivative of  $f(x, y, z) = 4e^{2x-y+z}$  at the point  $(1, 1, -1)$  in the direction towards the point  $(-3, 5, 6)$  is
  - a.  $\frac{-20}{9}$
  - b.  $\frac{20}{9}$
  - c.  $\frac{9}{20}$
  - d.  $\frac{-9}{20}$
4. The integral equation  $\int_0^\infty f(x) \sin xt \, dx = \begin{cases} 1, & 0 \leq t < 1 \\ 2, & 1 \leq t < 2 \\ 0, & t \geq 2 \end{cases}$  is
  - a.  $\frac{2}{\pi x} (1 + \cos x - 2 \cos 2x)$
  - b.  $\frac{2}{\pi x} (1 - \cos x + 2 \cos 2x)$
  - c.  $\frac{2}{\pi x} (\cos x - 2 \cos 2x)$
  - d.  $\frac{2}{\pi x} (\cos x - 2 \cos 2x - 1)$
5. By dividing  $[0, 1]$  into 4 equal sub intervals, the value of  $\int_0^1 \frac{dx}{1+x}$  (using trapezoidal rule) correct to 3 decimal places is:
  - a. 0.693
  - b. 0.694
  - c. 0.697
  - d. 0.699

6. If  $u = x^2 - y^2$ ,  $x = 2r - 3s + 4$ ,  $y = -r + 8s - 5$ , then  $\frac{\partial u}{\partial r} =$
- $4x + 2y$
  - $2x + 4y$
  - $4x - 2y$
  - $2x - 4y$
7. The total mass of the region in the cube  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $0 \leq z \leq 1$  with density at any point given by  $xyz$  is
- $1/8$
  - $2/3$
  - $5/7$
  - $3/2$
8. Two circles  $x^2 + y^2 - 4x + 10y + 20 = 0$  and  $x^2 + y^2 + 8x - 6y - 24 = 0$
- Touch externally
  - Touch internally
  - Are orthogonal
  - Are disjoint
9. If the vectors  $xi + j - 2k$ ,  $i + j + 3k$ ,  $8i + 5j$  are coplanar, then the value of  $x$  is
- 2
  - 5
  - 2
  - 5
10. The Laplace transformation of the following function using second translation theorem:  $4\sin(t-3)u(t-3)$  is
- $e^{3s} \frac{4}{(s^2+1)}$
  - $e^{3s} \frac{4}{(s^2-1)}$
  - $e^{-3s} \frac{4}{(s^2+1)}$
  - $e^{-3s} \frac{4}{(s^2-1)}$

11. The integral of  $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$  is
- $\frac{\pi}{2}$
  - $\frac{\pi}{4}$
  - $\frac{\pi}{8}$
  - $\frac{\pi}{6}$
12. The  $\int y^2 dx - 2x^2 dy$  along the parabola  $y = x^2$  from  $(0, 0)$  to  $(2, 4)$  is
- $48/5$
  - $-48/5$
  - $8/5$
  - $48$
13. If  $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$  is given by  $T(x, y, z) = (x + y + z, y + z, z)$  for  $(x, y, z) \in \mathbb{R}^3$  then  $T^{-1}(x, y, z)$  is
- $(x - y, y - z, z - x)$
  - $(x, y - z, z - x)$
  - $(x - y, y - z, z)$
  - $(x + y, y + z, z)$
14. If C is the midpoint of AB and P is a point outside AB, then
- $PA + PB = PC$
  - $PA + PB + PC = 0$
  - $PA + PB = 2PC$
  - $PA + PB + 2PC = 0$
15. If A be a  $3 \times 3$  matrix with Eigen values  $1, -1, 0$  then the determinant of  $I + A^{100}$  is
- 6
  - 4
  - 9
  - 100
16. The radius of curvature for the curve  $y = e^x$  at  $(0, 1)$  is
- $\sqrt{2}$
  - $2\sqrt{2}$
  - $\frac{1}{\sqrt{2}}$
  - $\frac{1}{2\sqrt{2}}$

17. The mean value of a sine wave over half a cycle is
- 0.318 x maximum value
  - 0.707 x maximum value
  - Peak value
  - 0.637 x maximum value
18. Regula Falsi method is used for
- Solution of ordinary differential equation
  - Differential of a function
  - Integration of a function
  - Solution off an algebraic (or) transcendental equation
19. The order of the pole of  $\frac{(e^x-1)}{z^4}$  is
- 3
  - 1
  - 2
  - 4
20. If C is unit circle  $|z|=1$  then  $\int_C \bar{z} dz =$
- 0
  - 1
  - $2\pi i$
  - $4\pi i$



# CIVIL

1. Which of the following has more fire resisting characteristics?

- a) Marble
- b) Lime stone
- c) Compact sand stone
- d) Granite

2. The rocks which are formed due to cooling of magma at a considerable depth from earth's surface are called

- a) Plutonic rocks
- b) Hypabyssal rocks
- c) Volcanic rocks
- d) Igneous rocks

3. Plywood has the advantage of

- a) Greater tensile strength in longer direction
- b) Greater tensile strength in shorter direction
- c) Same tensile strength in all directions
- d) None of the above

4. Due to attack of dry rot, the timber

- a) Cracks
- b) Shrinks
- c) Reduces to powder
- d) None of these

5. Inner part of a timber log surrounding the pitch, is called

- a) Sapwood
- b) Cambium layer
- c) Heart wood
- d) None to these

6. The basic purpose of a retarder in concrete is
- To increase the initial setting time of cement paste in concrete
  - To decrease the initial setting time of cement paste in concrete
  - To render the concrete more water tight
  - To improve the workability of concrete mix
7. Quick lime
- Generates heat when added to water
  - Reacts with carbon dioxide
  - May be used for white-washing
  - All the above
8. A heavy ladder resting on floor and against a vertical wall may not be in equilibrium if
- Floor is smooth and wall is rough
  - Floor is rough and wall is smooth
  - Both floor and wall are rough
  - Both floor and wall are smooth
9. Free body diagram is an
- Isolated joint with only body forces acting on it
  - Isolated joint with internal forces acting on it
  - Isolated joint with all the forces, internal as well as external, acting on it
  - None of the above
10. At a given instant ship 'A' is travelling at 6 km/h due east and ship 'B' is travelling at 8 km/h due north. The velocity of 'B' relative to 'A' is

- a) 7 km/hrs
- b) 2 km/hrs
- c) 1 km/hrs
- d) 10 km/hrs

11. The centre of gravity of a homogeneous body is the point at which the whole

- a) Volume of the body is assumed to be concentrated
- b) Area of the surface of the body is assumed to be concentrated
- c) Weight of the body is assumed to be concentrated
- d) All the above

12. The C.G. of the shaded area of the below figure whose curve OM is a parabola from y-axis, is

- a)  $a/4$
- b)  $3a/4$
- c)  $3b/10$
- d)  $3a/10$

13. The inherent property of a body which offers reluctance to change its state of rest or uniform motion, is

- a) Weight
- b) Mass
- c) Inertia
- d) Momentum

14. Too wet concrete may cause

- a) Weakness of concrete
- b) Excessive laitance
- c) Segregation
- d) All the above

15. The ratio of various ingredients (cement, sand, aggregates) in concrete of grade M 200, is

- a) 1 : 2 : 4
- b) 1 : 3 : 6
- c) 1 : 1½ : 3
- d) 1 : 1 : 2

16. The load carrying capacity of a helically reinforced column as compared to that of a tied column is about

- a) 5 % less
- b) 10 % less
- c) 5 % more
- d) 10 % more

17. Water cement ratio is generally expressed in volume of water required Per

- a) 10 kg
- b) 20 kg
- c) 30 kg
- d) 50 kg

18. Under-reamed piles are generally

- a) Driven piles
- b) Bored piles
- c) Precast piles
- d) All the above

19. Accurate determination of water content, is made by

- a) Calcium carbide method
- b) Sand bath method

- c) Alcohol method
- d) Oven-drying method

20. Sand particles are made of

- a) Rock minerals
- b) Kaolinite
- c) Illite
- d) Montmorillonite

21 The ratio of the volume of water present in a given soil mass to the total volume of its voids, is known

- a) Porosity
- b) Void ratio
- c) Percentage voids
- d) Degree of saturation

22. A pycnometer is used to determine

- a) Voids ratio
- b) Dry density
- c) Water content
- d) Density index

23. Plasticity index is defined as the range of water content between

- a) Liquid and plastic limit
- b) Plastic limit and semi solid limit
- c) Semi-solid limit and liquid limit
- d) Liquid limit and solid limit

24. Consider the following activities in a building construction:

- a) Concreting of roof slabs
- b) Brick-jelly lime concrete terracing
- c) Erection of form work for slab
- d) Construction of parapet wall in terrace

The correct sequence of these activities is

- a) 1, 3, 2, 4
- b) 3, 1, 4, 2
- c) 3, 1, 2, 4
- d) 1, 3, 4, 2

26. If  $t_o$ ,  $t_p$  and  $t_m$  are the optimistic, pessimistic and most likely time estimates of an activity respectively, the expected time  $t$  of the activity will be

- a.  $t_o + 3t_m + t_p/3$
- b.  $t_o + 4t_m + t_p/4$
- c.  $t_o + 4t_m + t_p/5$
- d.  $t_o + 4t_m + t_p/6$

27. Critical path lies along the activities having total float

- a) Positive
- b) Negative
- c) Zero
- d) Same

28. A ship strikes the berth generally at an angle

- a.  $90^\circ$  with the face of the dock
- b.  $45^\circ$  with the face of the dock
- c.  $30^\circ$  with the face of the dock
- d.  $10^\circ$  with the face of the dock

29. When a ship floats at its designed water line, the vertical distance from water line to the bottom of the ship is known as

- a. Beam
- b. Depth
- c. Free-board
- d. Draft

30. The stress in the wall of a thin cylinder subjected to internal pressure, is

- a. Hoop compression
- b. Shear
- c. Torsional shear
- d. Hoop tension

31. Factor of safety is the ratio of

- a. Yield stress to working stress
- b. Tensile stress to working stress
- c. Compressive stress to working stress
- d. Bearing stress to working stress

32. The distance between e.g. of compression and e.g. of tension flanges of a plate girder, is known as

- a. Overall depth
- b. Clear depth
- c. Effective depth
- d. None of these

33. The heaviest I-section for same depth is

- a. ISMB
- b. ISLB
- c. ISHB
- d. ISWB

34. By providing sufficient edge distance, which of the following failures of riveted joint can be avoided?

- a. Tension failure of the plate
- b. Shear failure of the rivet
- c. Shear failure of the plate
- d. Crushing failure of the rivet

35. The pipe which is used to carry the discharge from sanitary fittings like

bath rooms, kitchens etc. is called

- a. Waste pipe
- b. Soil pipe
- c. Vent pipe
- d. Anti-siphonage pipe

36. Standard EDTA (ethylene diamine tetra acetic acid) solution is used to determine the

- a. Hardness in water
- b. Turbidity in water
- c. Dissolved oxygen in water
- d. Residual chlorine in water

37. Average rate of water consumption per head per day as per Indian Standard is

- a. 100 liters
- b. 135 liters
- c. 165 liters
- d. 200 liters

38. Los Angeles testing machine is used to conduct

- a. Abrasion test
- b. Impact test
- c. Attrition test
- d. Crushing strength test

40. The property by virtue of which a liquid opposes relative motion between its different layers is called

- a. Surface tension
- b. Coefficient of viscosity
- c. Viscosity
- d. Osmosis

41. A fluid which obeys the Newton's law of viscosity is termed as
- Real fluid
  - Ideal fluid
  - Newtonian fluid
  - Non-Newtonian fluid
42. Dimensions of surface tension are
- $ML^0T^{-2}$
  - $ML^0T$
  - $ML r^2$
  - $ML^2T^2$
43. The diameter of main bars in R.C.C. columns, shall not be less than
- 6 mm
  - 8 mm
  - 10 mm
  - 12 mm
44. A fluid in equilibrium can't sustain
- Tensile stress
  - Compressive stress
  - Shear stress
  - Bending stress
45. When a tube of smaller diameter is dipped in water, the water rises in the tube with an upward \_\_\_\_\_ surface.
- Concave
  - Convex
  - Plane
  - None of these
46. An ideal flow of any fluid must satisfy
- Pascal law

- b. Newton's law of viscosity
- c. Boundary layer theory
- d. Continuity equation

47. A notch is used to measure \_\_\_\_\_ of liquids.

- a. Pressure
- b. Discharge
- c. Velocity
- d. Volume

48. After pre-stressing process is completed, a loss of stress is due to

- a. Shrinkage of concrete
- b. Elastic shortening of concrete
- c. Creep of concrete
- d. All the above

49. Side face reinforcement shall be provided in the beam when depth of the web in a beam exceeds

- a. 50 cm
- b. 75 cm
- c. 100 cm
- d. 120 cm

50. As per IS : 456, the reinforcement in a column should not be less than

- a. 0.5% and not more than 5% of cross-sectional area
- b. 0.6% and not more than 6% of cross-sectional area
- c. 0.7% and not more than 7% of cross-sectional area
- d. 0.8% and not more than 8% of cross-sectional area

51. The property of a material by which it can be drawn to a smaller section, due to tension, is called

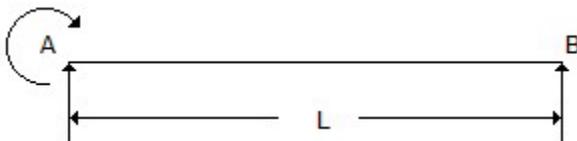
- a. Plasticity
- b. Ductility

- c. Elasticity
- d. Malleability

52. The value of Poisson's ratio always remains

- a. Greater than one
- b. Less than one
- c. Equal to one
- d. None of these

53. The B.M. diagram of the beam shown in below figure, is



- a. A rectangle
- b. A triangle
- c. A trapezium
- d. A parabola

54. The maximum deflection of a simply supported beam of length  $L$  with a central load  $W$ , is

- a.  $WL^2/48EI$
- b.  $W2L/24EI$
- c.  $WL^3/48EI$
- d.  $WL^2/8EI$

55. The weight of a foundation is assumed as

- a. 5% of wall weight
- b. 7% of wall weight
- c. 10% of wall weight
- d. 12% of wall weight
- e.

56. M 30 grade concrete means, its compressive strength of 15-cm cube, is 30 N/mm<sup>2</sup> after

- a. 3 days
- b. 7 days
- c. 21 days
- d. 28 days

57. A simply supported beam shall be deemed to be a deep beam if the ratio of its effective span to overall depth, is

- a. 2.0
- b. 2.5
- c. Less than 2
- d. Less than 2.5

58. The maximum area of compression reinforcement in a beam of cross section  $B \times D$  is limited to

- a. 0.02 BD
- b. 0.03 BD
- c. 0.04 BD
- d. 0.05 BD

59. A column of rectangular section is considered short, if both the slenderness ratios are less than

- a. 8
- b. 10
- c. 12
- d. 16

60. In compression members, the lap length of a bar should not be less than

- a.  $12 \phi$
- b.  $16 \phi$
- c.  $20 \phi$
- d.  $24 \phi$

61. In pressure supply mains, water hammer pressure is reduced by

providing

- a. Sluice valves
- b. Air valves
- c. Pressure relief valves
- d. None of these

62. Turbidity of raw water is a measure of

- a. Suspended solids
- b. Acidity of water
- c. B.O.D.
- d. None of these

63. The process of passing water through beds of granular materials, is called

- a. Screening
- b. Sedimentation
- c. Filtration
- d. None of these

64. The bacteria which require free oxygen for their survival, are called

- a. Aerobic bacteria
- b. Anaerobic bacteria
- c. Facultative bacteria
- d. None of these

65. For determining the velocity of flow of underground water, the most commonly used non-empirical formula is

- a. Darcy's formula
- b. Slichter's formula
- c. Hazen's formula
- d. Lacy's formula

66. Average annual rainfall at any station is the average of annual rainfall

over a period of

- a. 7 years
- b. 14 years
- c. 28 years
- d. 35 years

67. The brick laid with its length parallel to the face of a wall, is known as

- a. Header
- b. Stretcher
- c. Closer
- d. None of these

68. Black cotton soil is unsuitable for foundations because its

- a. Bearing capacity is low
- b. Permeability is uncertain
- c. Particles are cohesive
- d. Property to undergo a volumetric change due to variation of moisture content

69. The concrete slump recommended for foundations, is

- a. 25 to 50 mm
- b. 30 to 125 mm
- c. 50 to 100 mm
- d. 75 to 125 mm

70. A stair should not have pitch more than

- a. 25°
- b. 30°
- c. 40°
- d. 50°
- e.

71. Raft foundation are generally preferred to when the area required for individual footing, is more than

- a. 25% to total area
- b. 30% of total area
- c. 40% to total area
- d. 50% of total area

72. Dado is usually provided in

- a. Dining halls
- b. Bath rooms
- c. Living rooms
- d. Verandah (balcony)

73. In moment distribution method, the sum of distribution factors of all the members meeting at any joint is always

- a. Zero
- b. Less than 1
- c. 1
- d. Greater than 1

74. A simply supported beam deflects by 5 mm when it is subjected to a concentrated load of 10 kN at its centre. What will be deflection in a 1/10 model of the beam if the model is subjected to a 1 kN load at its centre?

- a. 5 mm
- b. 0.5 mm
- c. 0.05 mm
- d. 0.005 mm

75. A Nautical mile is

- a. One minute arc of the great circle passing through two points
- b. One minute arc of the longitude
- c. 1855.109 m
- d. All the above

76. International Date Line is located along

- a. Standard meridian
- b. Greenwich meridian
- c. Equator
- d.  $180^\circ$  longitude

77. Sinking fund is

- a. The fund for rebuilding a structure when its economic life is over
- b. Raised to meet maintenance costs
- c. The total sum to be paid to the municipal authorities by the tenants
- d. A part of the money kept in reserve for providing additional structures
- e. and structural modifications

78. Critical path

- a. Is always longest
- b. Is always shortest
- c. May be longest
- d. May be shortest

79. In a singly reinforced beam, the effective depth is measured from its Compression edge to

- a. Tensile edge
- b. Tensile reinforcement
- c. Neutral axis of the beam
- d. Longitudinal central axis

80. The maximum deflection of a structure should not normally exceed lesser of the span/350 or

- a) 10 mm
- b) 15 mm
- c) 20 mm
- d) 25 mm