

Section – Mathematics

1. If $z \neq 0$ be a complex number such that $\left|z - \frac{1}{z}\right| = 2$, then the maximum value of $|z|$ is

A) $\sqrt{2}$

C) $\sqrt{2} - 1$

B) 1

D) $\sqrt{2} + 1$
2. The conjugate of a complex number is $\frac{1}{i-1}$ then that complex number is

A) $\frac{-1}{i-1}$

C) $\frac{1}{i+1}$

B) $\frac{-1}{i+1}$

D) $\frac{1}{i-1}$
3. If $f(x)$ is a quadratic equation such that $f(1) + f(2) = 0$, and -1 is a root of $f(x) = 0$ then the other root of $f(x) = 0$ is

A) $\frac{-5}{8}$

C) $\frac{5}{8}$

B) $\frac{-8}{5}$

D) $\frac{8}{5}$
4. If x is real the maximum value of $\frac{3x^2+9x+17}{3x^2+9x+7}$ is

A) $\frac{1}{4}$

C) 1

B) 41

D) $\frac{17}{7}$
5. The number of integers greater than 6,000 that can be formed, using the digits 3, 5, 6, 7 and 8, without repetition, is

A) 120

C) 216

B) 72

D) 192
6. The positive integer n so that $\lim_{x \rightarrow 1} \left(\frac{x^n - 3^n}{x - 3} \right) = 108$ is

A) 1

C) 3

B) 2

D) 4
7. The value of $\lim_{x \rightarrow 0} (\sin x)^{\tan x}$ is

A) 1

C) $1/e$

B) $1/2$

D) e
8. If $\frac{{}^{n+2}C_6}{{}^{n+2}P_2} = 11$, then n satisfies the equation

A) $n^2 + n - 110 = 0$

C) $n^2 + 3n - 108 = 0$

B) $n^2 + 2n - 80 = 0$

D) $n^2 + 5n - 84 = 0$
9. If the 10th term of an AP is $1/20$ and its 20th term is $1/10$, then the sum of its first 200 terms is

A) 50

C) 100

B) $50 \frac{1}{4}$

D) $100 \frac{1}{2}$
10. If the line $2x + y = k$ passes through the point which divides the line segment joining the points (1,1) and (2,4) in the ratio 3:2, then k is equal to

- A) $\frac{29}{5}$ B) 5
C) 6 D) $\frac{11}{5}$
11. if $A = \begin{pmatrix} 2-k & 2 \\ 1 & 3-k \end{pmatrix}$ is a singular matrix, then the value of $5k - k^2$ is
A) 0 B) 6
C) -4 D) 4
12. If $\tan x = \frac{b}{a}$, then the value of $a \cos 2x + b \sin 2x$ is
A) a B) a - b
C) a + b D) b
13. If $\tan A$ and $\tan B$ are the roots of $x^2 - ax + b = 0$, then the value of $\sin^2(A + B)$ is
A) $\frac{a^2}{a^2 + (1-b^2)}$ B) $\frac{a^2}{a^2 + b^2}$
C) $\frac{a^2}{(a+b)^2}$ D) $\frac{b^2}{a^2 + (a-b)^2}$
14. The equation of the normal of $x^2 + y^2 - 2x + 4y - 5 = 0$ at (2, 1) is
A) $y = 3x - 5$ B) $2y = 3x - 4$
C) $y = 3x + 4$ D) $y = x + 1$
15. Let $P(x)$ be a quadratic polynomial such that $P(0) = 1$. If $p(x)$ leaves remainder 4 when divided by $x - 1$ and it leaves remainder 6 when divided by $x + 1$; then
A) $P(2) = 11$ B) $P(2) = 19$
C) $P(-2) = 19$ D) $P(-2) = 11$
16. The number of ways of selecting 15 teams from 15 men and 15 women, such that each team consists of a man and a woman, is
A) 1120 B) 1840
C) 1960 D) 1240
17. Let $f(x) = x - [x]$ then $x \in \mathbb{R}$ then $f(1/2)$ is
A) $\frac{3}{2}$ B) 1
C) 0 D) -1
18. The value of $\lim_{n \rightarrow \infty} \left(\frac{1+2^3+3^3+\dots+n^3}{n^4} \right)$ is equal to
A) 0 B) 2
C) $\frac{1}{3}$ D) $\frac{1}{4}$
19. If $x^y y^x = 16$, then the value of $\frac{dy}{dx}$ at (2, 2) is
A) 0 B) 1
C) -1 D) 2
20. The area under the curve $y = x^2$ and the lines $x = -1$, $x = 2$ and X-axis is
A) 3 sq. units B) 5 sq. units
C) 7 sq. units D) 9 sq. units

21. The total area enclosed by $y = |x|$, $|x| - 1$ and $y = 0$ is

- A) 1 sq. unit
C) 3 sq. unit

- B) 2 sq. unit
D) 4 sq. unit

22. If $\left(\frac{n}{4}\right)$, $\left(\frac{n}{5}\right)$, and $\left(\frac{n}{6}\right)$ are in A.P., then n can be

- A) 9
C) 11

- B) 14
D) 12

23. The sum of $\sum_{n=1}^{21} \frac{3}{(4n-1)(4n+3)}$ is equal to

- A) $\frac{7}{87}$
C) $\frac{14}{87}$

- B) $\frac{7}{29}$
D) $\frac{21}{29}$

24. If $A(\theta) = \frac{1}{-\tan\theta} \tan\theta$ and $AB = I$, then $(\sec^2\theta) B$ is equal to

- A) $A(\theta)$
C) $A(-\theta)$

- B) $A(\theta/2)$
D) $A(-\theta/2)$

25. If $A = \begin{pmatrix} x & -2 \\ 3 & 7 \end{pmatrix}$ and A^{-1} and $A^{-1} = \begin{pmatrix} 7/34 & 1/17 \\ -3/34 & 2/17 \end{pmatrix}$, then the value of x is

- A) -3
C) 4

- B) 3
D) -4

26. The maximum value of $f(x) = \sin x (1 + \cos x)$ is

- A) $\sqrt[3]{3}/4$
C) $\sqrt[3]{3}$

- B) $\sqrt[3]{3}/2$
D) $\sqrt{3}$

27. The value of $\frac{1}{\cos 290^\circ} + \frac{1}{\sqrt{3}\sin 250^\circ}$ is

- A) $\frac{\sqrt{3}}{4}$
C) $\frac{2}{\sqrt{3}}$

- B) $\frac{4}{\sqrt{3}}$
D) $\frac{\sqrt{3}}{2}$

28. If the points $(3q, 0)$, $(0, 3p)$ and $(1, 1)$ are collinear, then which one of the following is correct?

- A) $\frac{1}{p} + \frac{1}{q} = 0$
C) $\frac{1}{p} + \frac{1}{q} = 3$

- B) $\frac{1}{p} + \frac{1}{q} = 1$
D) $\frac{1}{p} + \frac{3}{q} = 1$

29. If the line $y = 7x - 25$ meets the circle $x^2 + y^2 = 25$ at points A and B , then the distance between A and B is

- A) $\sqrt{10}$
C) $5\sqrt{2}$

- B) 10
D) 5

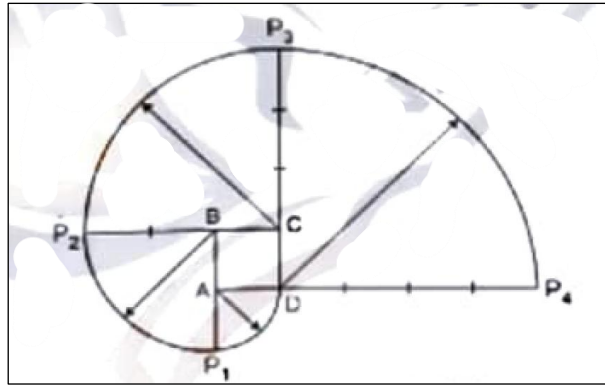
30. The number of terms in the expansion of $((a + b + c)^{10})$ is

- A) 55
C) 21

- B) 66
D) 11

Section – Basic of Computer Science

31. Which of the following is not a type of computer code?
- A) EDIC
 - B) BCD
 - C) ASCII
 - D) EBCDIC
32. What is Workbook in Excel?
- A) A single worksheet
 - B) A collection of Charts
 - C) A temporary File
 - D) An Excel file containing one or more worksheets
33. Indicate which of the following is not true about an interpreter
- A) Interpreter is a kind of translator
 - B) Interpreter generates an object code from the source code
 - C) Interpreter analyses source code every time it executed
 - D) interpreter executes line by line
34. A set of rules followed by each computer present on a network is called
- A) Protocol
 - B) HTTP
 - C) Domain
 - D) Web
35. Which Unix command is used for listing files in the current directory?
- A) List
 - B) ls
 - C) wc
 - D) ps
36. What is the full form of FAT?
- A) File Attribute Table
 - B) Format Access Term
 - C) File Allocation Table
 - D) Format allocation Table
37. What is the shortcut key used to detect spelling and grammar errors in MS-Word?
- A) Shift +F7
 - B) Ctrl +F7
 - C) Alt +F7
 - D) F7
38. The origin of the internet was developed from the concept of
- A) Microsoft
 - B) IBM
 - C) ARPANET
 - D) Web
39. Convert $(52)_{16}$ into its decimal equivalent
- A) 28
 - B) 83
 - C) 80
 - D) 82
40. In MS-Power Point, which menu can you find features like slide design, slide layout etc?
- A) Insert Menu
 - B) Format Menu
 - C) Tools Menu
 - D) Slide Show Menu



- A) Involute
B) Cycloid
C) Spiral
D) Epicycloids

50. The equation $y^2 = 4x$ represents

- A) Circle
B) Straight line
C) Parabola
D) Hyperbola

61. For a fully saturated soil sample, the degree of saturation is
A) 0
B) 0.5
C) 0.75
D) 1.0
62. What will be the degree of saturation of a soil sample whose specific gravity $G=2.7$, void ratio $e=0.66$ and water content $w = 20\%$?
A) 85.88%
B) 90.91%
C) 81.81%
D) 92.92%
63. Excess of oxides of iron makes the brick:
A) Red in colour
B) pink in colour
C) Dark blue in colour
D) Yellow in colour
64. The hot molten material occurring naturally below the surface of the Earth is called
A) Lava
B) Slag
C) Magma
D) Tuff
65. What is the meaning of bulking of sand?
A) Increase in volume of sand due to moisture adsorption
B) Increase in weight of sand due to moisture adsorption
C) Increase in mass of sand due to moisture absorption
D) Increase in strength of sand due to moisture absorption
66. What is the purpose of coagulation on sedimentation?
A) To Increase the settling velocity of particles
B) To decrease the settling velocity of particles
C) To maintain the pH of water
D) To increase the turbidity of water
67. What does PERT stand for in the context of construction management?
A) Project Evaluation and Review Technique
B) Programme Evaluation and Review Technique
C) Project Execution and Resource Tracking
D) Project Execution and Resource Tracking
68. The final technical authority of a project is
A) Executive Engineer
B) Superintending Engineer
C) Chief Engineer
D) Joint Executive Engineer
69. The result of the ring and ball softening point on asphalts given in terms of
A) Viscosity
B) Time
C) Flow
D) Temperature
70. The function of dowel bars in concrete pavement is to
A) Resist bending
B) Resist tension
C) Resist shear
D) Transfer load from one slab to the adjacent one

71. Staggered rail joints are recommended when the track is
 A) On a horizontal curve
 B) On a bridge
 C) In a tunnel
 D) In a station yard
72. Surveys which are carried out to depict mountains, water bodies, woods and other details are Known as
 A) Cadastral surveys
 B) City surveys
 C) Topographical surveys
 D) Hydrographic surveys
73. Geodimeter is an instrument used for
 A) GPS
 B) EDM
 C) GTS
 D) EMR
74. Stone masonry is not used in building
 A) Arches
 B) Columns
 C) Lintels
 D) Roofs
75. Baluster is related to
 A) Staircase
 B) Floor
 C) Roof
 D) Door
76. In the analysis of rates of items, the contractor's profit is taken to be
 A) 12%
 B) 15%
 C) 10%
 D) 13%
77. The original cost of a property minus depreciation is its
 A) Salvage value
 B) Book value
 C) Capital Value
 D) Market value
78. Compressibility of fluids is inversely proportional to
 A) R, Reynold's number
 B) E, Young's modulus of elasticity
 C) G, modulus of rigidity
 D) K, bulk modulus
79. If C is Chezy's constant, n is Manning's coefficient and R is hydraulic radius, then
 A) $C = (1/n) R^{1/2}$
 B) $C = (1/n) R^{3/4}$
 C) $C = (1/n) R^{1/6}$
 D) $C = (1/n) R^{2/3}$
80. The term used to relate the volume of water and the area of crop it matures is
 A) Duty
 B) Delta
 C) Drip
 D) Drawdown
81. In simply supported beams, the slope is _____ at supports
 A) Minimum
 B) zero
 C) Maximum
 D) Uniform
82. Short columns primarily fail due to:
 A) Buckling
 B) Crushing
 C) Shear failure
 D) Fatigue
83. A round Steel rod of 100 mm diameter is bent into an arc of radius 100 m. What is the maximum stress in the rod? Take $E = 2 \times 10^5 \text{ N/mm}^2$.

- A) 100 N/mm²
C) 150 N/mm²

- B) 200 N/mm²
D) 300 N/mm²

84. Temporary structure erected to facilitate the construction of walls when the height is more than 1.5 m is known as

- A) Formwork
C) Centering

- B) Scaffolding
D) Shoring

85. A foundation is said to be shallow if its depth is _____ than its width.

- A) Equal to or lose
C) Double

- B) Greater than
D) Half

86. Which equipment is used to test the setting time of cement?

- A) Le-Chatlier
C) Universal testing machine (UTM)

- B) Pycnometer
D) Vicat apparatus

87. The quality of timber does not depend upon:

- A) Maturity of tree
C) Type of tree

- B) Time of felling
D) Size of tree

88. What does B.O.D stand for

- A) Biochemical oxygen Determination
C) Biochemical oxygen Density

- B) Biological Oxygen Demand
D) Biodegradable Organic Debris

89. CPM in construction management is used for:

- A) Project scheduling
C) Cost estimation

- B) Resource allocation
D) Quality control

90. The bottom-most layer of a flexible pavement is

- A) Base
C) sub-Base

- B) Sub-grade
D) Level-grade

91. The instrument used to determine the spot speed of a vehicle on a highway is

- A) Telescope
C) kaleidoscope

- B) Periscope
D) Endoscope

92. The test conducted on a road aggregate using the Los Angles testing machine is

- A) Attrition test
C) Ductility test

- B) Impact test
D) Abrasion test

93. The radius of a transition curve at the tangent point is

- A) Infinite
C) Same as that of the circular curve

- B) Zero
D) Half of that of the circular curve

94. The overall length of a turnout is the distance between the end of the stock rail and

- A) Toe of crossing
C) Throat of crossing

- B) Heel of crossing
D) Nose of crossing

95. The wheels of rolling stock are provided with flange on

- A) The outer side

- B) The inner side

C) Both inner and outer sides

D) Neither side

96. A half brick cut longitudinally, placed next to the first brick in a header course, is known as

A) King closer

B) Cornice

C) Queen closer

D) Corbel

97. The vertical member between treads of a stair case is called

A) Flight

B) Jamb

C) Riser

D) Spandrel

98. What is the value of the Froude number for critical flow in open channels?

A) > 1

B) < 1

C) 1

D) 0

99. Hydraulic jump is

A) Critical flow

B) Gradually varied flow

A) Uniform flow

D) Rapidly varied flow

100. A Pitot tube is used for measuring

A) Capillarity

B) Velocity of flow

C) Pressure

D) Rate of flow