

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

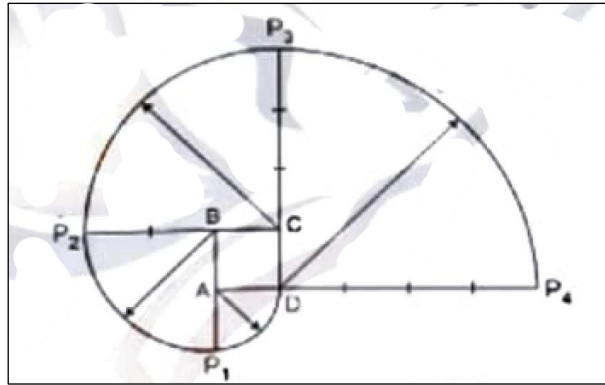
D) $100 \frac{1}{2}$
10. If the line $2x + y = k$ passes through the point which divides the line segment joining the points (1,1) and (2,4) in the ratio 3:2, then k is equal to

- 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
 B) 2 sq. unit
 C) 3 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
 B) 14
 C) 11
 D) 12
23. The sum of $\sum_{n=1}^{21} \frac{3}{(4n-1)(4n+3)}$ is equal to
 A) $\frac{7}{87}$
 B) $\frac{7}{29}$
 C) $\frac{14}{87}$
 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) $A(\theta)$
 B) $A(\theta/2)$
 C) $A(-\theta)$
 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
 B) 3
 C) 4
 D) -4
26. The maximum value of $f(x) = \sin x (1 + \cos x)$ is
 A) $\sqrt[3]{3}/4$
 B) $\sqrt[3]{3}/2$
 C) $\sqrt[3]{3}$
 D) $\sqrt{3}$
27. The value of $\frac{1}{\cos 290^\circ} + \frac{1}{\sqrt{3} \sin 250^\circ}$ is
 A) $\frac{\sqrt{3}}{4}$
 B) $\frac{4}{\sqrt{3}}$
 C) $\frac{2}{\sqrt{3}}$
 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) $\frac{1}{p} + \frac{1}{q} = 0$
 B) $\frac{1}{p} + \frac{1}{q} = 1$
 C) $\frac{1}{p} + \frac{1}{q} = 3$
 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) $\sqrt{10}$
 B) 10
 C) $5\sqrt{2}$
 D) 5
30. The number of terms in the expansion of $((a + b + c)^{10})$ is
 A) 55
 B) 66
 C) 21
 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
- C) Spiral

- B) Cycloid
- D) Epicycloids

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

- A) Circle
- C) Parabola

- B) Straight line
- D) Hyperbola

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Section – Mechanical Engineering

51. The groove in the body of the drill which allows the chips to come out is known as
- | | |
|-----------------|-----------|
| A) Chip breaker | B) Flute |
| C) Lip | D) Margin |
52. _____ is one in which two assembled parts are always free to move relative to each other in the assembly.
- | | |
|-------------------|---------------------|
| A) Transition fit | B) Interference fit |
| C) Shrinkage fit | D) Clearance fit |
53. What is the upper limit of the component size $\varnothing 25^{+0.007}_{-0.007}$?
- | | |
|-----------|-----------|
| A) +0.007 | B) 25.007 |
| C) -0.007 | D) 24.993 |
54. In ECM, the material removal is due to
- | | |
|--------------|---------------------|
| A) Corrosion | B) Ion displacement |
| C) Erosion | D) Fusion |
55. In Abrasive jet machining, work piece material of removed by which of the following means?
- | | |
|------------------------|--------------------|
| A) Vaporization | B) Electro plating |
| C) Mechanical abrasion | D) Corrosion |
56. Why fins are provided on a heat transfer surface?
- A) Pressure drop of the fluid should be minimized
 - B) Increase turbulence in flow for enhancing heat transfer
 - D) Surface area is maximum to promote heat transfer
 - C) Increase temperature gradient so as to enhance heat transfer
57. Heat transfer in liquid and gases takes place by
- | | |
|---------------|-----------------------------|
| A) Conduction | B) Convection |
| C) Radiation | D) Convection and radiation |
58. COP of a domestic refrigerator is
- | | |
|----------------|---------------------------------------|
| A) more than 1 | B) equal to 1 |
| C) Less than 1 | D) depends upon the weather condition |
59. Lancashire boiler is of
- A) Stationary fire tube-type
 - B) Horizontal multi-tubular water tube type
 - C) vertical tubular fire tube type
 - D) vertical water tube type
60. Tho two non-intersecting and non-parallel shafts can be connected by
- | | |
|---------------------|---------------------|
| A) spur gears | B) helical gears |
| C) herringbone gear | D) skew bevel gears |
61. The chuck is used to
- | | |
|--------------------------|------------------------|
| A) hold the cutting tool | B) hold the jaws |
| C) hold the work piece | D) hold the tail stock |

62. which of the following forging operation is Heading?

- A) Embossing
B) Coining
C) Piercing
D) Upsetting

63. A dynamometer is a device used for the measurement of

- A) chip thickness ratio
B) wear of the cutting tool
C) deflection of the cutting tool
D) forces during metal cutting

64. Quartz is a

- A) ferroelectric material
B) ferromagnetic material
C) piezoelectric material
D) diamagnetic material

65. In Electro-Discharge Machining (EDM), the tool is made of

- A) Copper
B) High speed steel
C) Cast Iron
D) Plain carbon steel

66. In ECM process, the electrolyte used is

- A) Petrol
B) Water
C) Air
D) Brine solution

67. Gases responsible for depletion of Ozone layer are

- A) CO_2 , CFC, CH_4
B) SO_2 , NO_2 , CH_4 ,
C) CO, SO_2 , CH_4
D) CFC, NO, Cl_2

68. Carnot cycle has maximum efficiency for

- A) reversible engine
B) Irreversible engine
C) diesel engine
D) petrol engine

69. Heat transfer takes place as per

- A) Zeroth law of thermodynamics
B) First law of thermodynamics
C) Second law of thermodynamics
D) Stefan's law

70. Circular pitch of n spur gear is defined as _____ (if d= diameter, t= no. of teeth.)

- A) $\pi d/t$
B) d/t
C) t/d
D) $t/\pi d$

71. A Hartnell governor is a

- A) Pendulum type governor
B) Spring loaded governor
C) Dead weight governor
D) Inertia governor

72. Rope brake dynamometer uses

- A) Oil as lubricant
B) water as lubricant
C) grease as lubricant
D) no lubricant

73. If t_o , t_m , and t_p represent the optimistic, most probable and pessimistic time for a project, then by probability analysis, most probable expected time

- A) $\frac{t_o + 4t_m + t_p}{6}$
B) $\frac{t_o + 6t_m + t_p}{6}$
C) $\frac{t_o + t_m + t_p}{3}$
D) $\frac{2t_o + 4t_m + 2t_p}{6}$

74. The full form of PERT is
- A) Program Estimation and Rating technique
 - B) Project Evaluation and Review technique
 - C) Project Estimation and Review technique
 - D) Program Evaluation and Review technique
75. Which part of the Lathe Machine is called the Live center?
- A) Carriage
 - B) Tail Stock
 - C) Head Stock
 - D) Lead screw
76. Self centered chuck has _____ number of jaws
- A) 10
 - B) 1
 - C) 2
 - D) 3
77. Railway rails are normally made of
- A) High carbon
 - B) Mild steel
 - C) Alloy steel
 - D) Tungsten steel
78. The effect of alloying nickel to copper is
- A) to raise hardness
 - B) to impart free-machining properties
 - C) to improve hardness and strength
 - D) to improve welding characteristics
79. Amplitude of oscillation of tool in USM ranges between
- A) 0.1-10 μm
 - B) 10-40 μm
 - C) 50-100 μm
 - D) 100-1000 μm
80. _____ of thermodynamics is used to understand the concept of energy conservation.
- A) Zeroth law
 - B) First law
 - C) Second law
 - D) None of the above
81. An open system is one in which
- A) mass does not cross boundaries of the system, though energy may do so
 - B) neither mass nor energy crosses the boundaries of the systems
 - C) both mass and energy cross the boundaries of the systems
 - D) mass crosses the boundaries of the systems but not the energy
82. For reversible adiabatic process change in entropy is
- A) maximum
 - B) minimum
 - C) negative
 - D) Zero
83. Steam turbines operates on
- A) Carnot cycle
 - B) Joule cycle
 - C) Rankine cycle
 - D) Brayton cycle
84. Which is the process used to produce heat in nuclear power plants?
- A) Fission of uranium
 - B) Fusion of uranium
 - C) Internal Combustion of uranium
 - D) Neutron absorption by uranium

85. The first nuclear reactor was set up in India at
A) Bombay
B) Tarapur
C) Ratna Pratap sagar
D) Kalpakkam
86. The size of the gear is usually specified by?
A) Circular pitch
B) Module
C) Base diameter
D) Pitch circle diameter
87. In belt drives, the condition which causes forward motion of driver without carrying belt with it is called
A) Idling of belt
B) slip of belt
C) compounding of belt
D) creep of belt
88. Normalising operation is carried out in
A) Air
B) Furnace
C) Water
D) Oil
89. A gate
A) acts as a reservoir for the molten metal
B) delivers molten metal into the mould cavity
C) delivers molten metal from the pouring basin to runner
D) used to stop the flow of molten metal
90. Which of the following is not a multi-point cutting tool?
A) Drill
B) Parting tool
C) Reamer
D) Milling cutter
91. Which of the following is a type of direct measuring instrument?
A) Scriber
B) Divider
C) Vernier Caliper
D) Oddleg Caliper
92. External taper can be accurately measured with the help of
A) Sine bar and slip gauge
B) Precision balls and height gauge
C) Dividing head
D) Clinometer
93. Vibration analysis is a technique adopted under
A) Breakdown maintenance
B) Proactive maintenance
C) Predictive maintenance
D) Preventive maintenance
94. Control charts for attribute are concerned with
A) Checking if the variable is out of control
B) Qualitative checking of defects
C) Direct measurement of the variable for control
D) The actual measurement of the parameter, comparing with a standard

95. What do we say to all units aggregate that's about a study?

- A) Sample
- B) Unit
- C) Universe or Population
- D) Frame

96. Water pre-heater is known as

- A) Super heater
- B) Economiser
- C) Hot well
- D) Vaporiser

97. The refrigerator which does not require compressor is known as

- A) Vapour absorption refrigerator
- B) Vapour compression refrigerator
- C) Electrolux refrigerator
- D) Carnot refrigerator

98. In a throttling process

- A) Heat transfer takes place
- B) work is done by expanding the steam
- C) internal energy of the steam changes
- D) steam enthalpy remains constant

99. A kinematic chain requires at least

- A) 2 links and 3 turning pairs
- B) 3 links and 4 turning pairs
- C) 4 links and 4 turning pairs
- D) 5 links and 4 turning pairs

100. Which type of brake is commonly used in cars?

- A) Internal expanding shoe brake
- B) Band brake
- C) Band and block brake
- D) Shoe brake