A

23021 **120 MINUTES**

1. The system of linear equations $2x - y + 4z = 8; 3x + 2y - z = 5; x - 4y + 9z = 11$
   A) is inconsistent
   B) has $x = 2t, y = t + 1, z = t$ for any t as solution
   C) has unique solution
   D) has infinite number of solutions

2. The value of λ for which the system of equations $\lambda x - 4y = 6; 4x + y = 2;$ $3x - y = 5$ consistent is:
   A) -2 B) 2 C) -4 D) 0

3. The possible value of α for which $(\alpha I + A)^2 = 4A$ where $A = \begin{bmatrix} 1 & 0 \\ \alpha & 1 \end{bmatrix}$ is:
   A) 2 B) $\frac{1}{2}$ C) 1 D) -1

4. The limit of the function $f(x, y) = \frac{2xy^2}{x^2+y^4}$ as $(x, y) \longrightarrow (0,0)$ is:
   A) 0 B) infinite C) 2 D) Does not exist

5. Consider the function $f(x, y) = \log\left(\frac{1+x}{1-2y}\right)$. In which of the following region $f(x, y)$ is continuous?
   A) $\{(x, y) : x + 2y > 0\}$ B) $\{(x, y) : x + 2y < 0\}$
   C) $\{(x, y) : y \neq \frac{1}{2}\}$ D) $\{(x, y) : y \leq \frac{1}{2}\}$

6. Consider the initial value problem $\frac{dy}{dx} = y^2, y(0) = 1.$ In which of the following intervals unique solution exists?
   A) $(-\infty, 1)$ B) $(1, \infty)$ C) $(0, \infty)$ D) $(-\infty, \infty)$

7. The value of x for which the rank of the matrix $A = \begin{bmatrix} 2 & 1 & 2 \\ 1 & 1 & 1 \\ 2 & 0 & x \end{bmatrix}$ less than 3 is:
   A) -2 B) 2 C) 1 D) -1

8. The characteristic polynomial of the matrix $A = \begin{bmatrix} 5 & -2 \\ 4 & -4 \end{bmatrix}$ is:
   A) $\lambda^2 - \lambda - 12$ B) $\lambda^2 - \lambda + 12$
   C) $\lambda^2 + \lambda + 12$ D) $\lambda^2 - 9\lambda - 12$

9. The value of integral $\iint_R x dx dy$ in the region bounded by the lines $x = 0 : y = 0$ and $x + y = 1$ is:

A) 0 B) $\frac{1}{6}$ C) $\frac{1}{3}$ D) 1

10. The particular integral of the differential equation $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} - 6y = x$

A) $\frac{1}{5}e^x$ B) $-\frac{1}{5}x$ C) $-\frac{1}{5}e^x$ D) $\frac{1}{5}x$

11. The polar coordinates (r, θ) of the point $(2\sqrt{3}, -2)$ satisfying $r \geq 0$ and $0 \leq \theta < 2\pi$ is:

A) $(4, \frac{\pi}{6})$ B) $(4, \frac{7\pi}{6})$ C) $(4, \frac{11\pi}{6})$ D) $(4, \frac{5\pi}{6})$

12. Which of the following is an eigen vector corresponding to an eigen value of the matrix $A = \begin{bmatrix} 4 & -5 \\ 1 & -2 \end{bmatrix}$ is:

A) $\begin{pmatrix} 1 \\ 5 \end{pmatrix}$ B) $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$ C) $\begin{pmatrix} -1 \\ 5 \end{pmatrix}$ D) $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$

13. Which of the following is true?

A) All matrices are diagonalizable
B) A matrix is diagonalizable only if all its eigen values are distinct
C) All real symmetric matrices are diagonalizable
D) All invertible matrices are diagonalizable

14. The matrix associated with the quadratic form $4x^2 - 8xy + 2y^2$ is:

A) $A = \begin{pmatrix} 2 & 4 \\ 4 & 2 \end{pmatrix}$ B) $A = \begin{pmatrix} 4 & -4 \\ -4 & 2 \end{pmatrix}$

C) $A = \begin{pmatrix} 4 & 8 \\ 8 & 2 \end{pmatrix}$ D) $A = \begin{pmatrix} 4 & -8 \\ -8 & 2 \end{pmatrix}$

15. The general solution of the differential equation $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 13y = 0$ is:

A) $e^{-2x}(A\cos 3x + B\sin 3x)$

B) $e^{-3x}(A\cos 2x + B\sin 2x)$

C) $e^{2x}(A\cos 3x + B\sin 3x)$

D) $e^{3x}(A\cos 2x + B\sin 2x)$

16. If $f(x,y) = 4x^2 - 8xy - 2y^2$, then $x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y}$ is equal to:

A) $f(x,y)$ B) $-f(x,y)$ C) $2f(x,y)$ D) 0

17. Suppose $\omega = \sqrt{x^2 + y^2}$; $x = \cos\theta$; $y = \sin\theta$. The value of $\frac{d\omega}{d\theta}$ at $\theta = \frac{\pi}{2}$ is:

A) 1 B) 0 C) -1 D) 2

18. $f(x,y) = y^2 + x^2y + x^4$ has:
A) Minimum at (0, 0)
B) Maximum at (0, 0)
C) Both maximum and minimum at (0, 0)
D) Neither maximum nor minimum at (0, 0)

19. The critical point of $f(x,y) = x^2 + xy - y^2 - 4x + 3y - 1$ is:
A) (2, 1) B) $(-1,2)$ C) (1, 3) D) (1, 2)

20. The power series expansion of $\sum_{n=0}^{\infty}(1+x)^n$ is valid in the interval:

A) (0, 2) B) $(-1,1)$ C) $(-2,0)$ D) $(1,0)$

21. The series $\sum_{n=0}^{\infty} \frac{1}{2n(2n+1)}$ converges to:

A) log 2 B) 1 C) 2-log 2 D) 1-log 2

22. Which of the following inequalities is true?

A) $\cos x \geq 1 + \frac{1}{x^2}$ for all real x

B) $\sin x \leq x - \frac{x^2}{2}$ for $x > 0$

C) $\cos x \geq 1 - \frac{1}{x^2}$ for all real x

D) $\sin x \leq x + \frac{x^2}{2}$ for $x > 0$

23. Which of the following differential equations has $y = x(c_1 + c_2\, logx)$ as general solution?

A) $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = 0$ B) $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = x$

C) $x^2\frac{d^2y}{dx^2} - 4y = 0$ D) $x^2\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = 0$

24. The middle term in the Taylor series expansion of $\left(2x - \frac{1}{3x^2}\right)^6$ is:

A) $-\frac{40}{9x^3}$ B) $\frac{40}{9x^3}$ C) $-\frac{10}{9x^3}$ D) $\frac{40x^3}{9}$

25. Sum infinity of the series $\frac{4}{3!} + \frac{7}{5!} + \frac{10}{7!} + \cdots \infty$ is:

A) 0 B) $\frac{e^2-4e+2}{2e}$ C) $\frac{e^2-4}{2e}$ D) $\frac{e^2-2e+2}{2e}$

26. The constant term in the Fourier series expansion of

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi}, & 0 \leq x \leq \pi \end{cases}$$ is:

A) $-\pi$ B) $\frac{\pi}{2}$ C) -2π D) 0

27. A particle moves along the curve whose parametric equations are given by $x = t^2 - 1, y = 2t$ and $z = t^2 - 1$, where t denotes the time. The acceleration at $t = 1$ is:

A) $2\hat{\imath} + 2\hat{\jmath} + 2\hat{k}$ B) $\hat{\imath} - 2\hat{\jmath} + 2\hat{k}$
C) $2\hat{\imath} + 2\hat{\jmath}$ D) $2\hat{\imath} + 2\hat{k}$

28. The particular solution of the differential equation $\frac{d^2y}{dx^2} - y = e^x \sin x$ is:

A) $-\frac{e^x(2\cos x - \sin x)}{5}$ B) $\frac{e^x(2\cos x + \sin x)}{5}$

C) $\frac{e^x(2\cos x - \sin x)}{5}$ D) $-\frac{e^x(2\cos x + \sin x)}{5}$

29. The unit tangent vector at the point $\left(0, 2, \frac{\pi}{2}\right)$ on the curve $\bar{r} = 2\cos\theta\hat{\imath} + 2\sin\theta\hat{\jmath} + 2\theta\hat{k}$ is:

A) $\frac{-\hat{\imath}+\hat{k}}{\sqrt{2}}$ B) $\frac{\hat{\imath}+\hat{k}}{\sqrt{2}}$ C) $\frac{\hat{\imath}-\hat{k}}{\sqrt{2}}$ D) $\frac{\hat{\imath}+\hat{\jmath}+\hat{k}}{\sqrt{3}}$

30. The value of 'a' such that $\phi(x, y, z) = ax^2y^2 + 24y^2z - zx^2$ has maximum directional derivative 12 at the point (2, 1, 1) in the direction parallel to x −axis is:

A) 4 B) 6 C) 7 D) 1

31. The series $\sum_{n=1}^{\infty} \frac{1}{(n+2)(n+3)}$ is:

A) Divergent B) Converges to $\frac{1}{3}$

C) Converges to 0 D) Converges to $\frac{1}{4}$

32. If $\sum_{n=0}^{\infty} \frac{\sqrt{n+1}-\sqrt{n}}{n^p}$ is a series of positive terms, then the series:

A) Converges for all p B) Converges if $p > \frac{1}{2}$

C) Converges if $p \leq \frac{1}{2}$ D) Diverges for all p

33. Laplace transform of $sin^2 3t$ is:

A) $\frac{18}{s(s^2-36)}$ B) $\frac{18}{s(s^2+36)}$ C) $\frac{12}{s(s^2-36)}$ D) $\frac{24}{s(s^2+36)}$

34. If $\vec{A} = 2t^2\hat{\imath} + (t^2+1)\hat{\jmath} + t\hat{k}$ and $\vec{B} = t\hat{\imath} + t^2\hat{\jmath} + \hat{k}$, the modulus of $\frac{d}{dt}(A \times B)$ at $t = 0$ is:

A) 1 B) $\sqrt{2}$ C) 0 D) $\frac{1}{\sqrt{2}}$

35. If $\vec{r} = t^2\hat{\imath} + 4t\hat{\jmath} - \hat{k}$ then $\int_0^1 \left(\vec{r}.\frac{d\vec{r}}{dt}\right) dt$ is:

A) 17 B) $\frac{17}{2}$ C) $\frac{15}{2}$ D) 8

36. If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$, then grad $|\vec{r}|$, where $r = |\vec{r}|$ is:

A) $\frac{\vec{r}}{r}$ B) $\vec{r}$ C) $\frac{\vec{r}}{r^2}$ D) $-\frac{\vec{r}}{2r^2}$

37. The value of n for which $r^n\vec{r}$, where $r = |\vec{r}|$ irrotational is:

A) -3 B) 3 C) 1 D) -1

38. Which of the following is **not** true?

A) $curl(\vec{A} + \vec{B}) = curl\,\vec{A} + curl\,\vec{B}$

B) $div(\vec{A} + \vec{B}) = div\,\vec{A} \times div\,\vec{B}$

C) $curl(\phi\vec{A}) = (grad\phi) \times \vec{A} + \phi curl\,\vec{A}$

D) $curl(grad\phi) = 0$

39. The inverse Laplace transform of $\frac{4(s-2)}{s^2-4s+8}$ is:

A) $4e^{2t}sin2t$ B) $4e^{-2t}cos2t$

C) $4e^{2t}cos2t$ D) $\frac{e^{2t}cos2t}{4}$

40. The Fourier sine transform $F(\omega)$ of $f(x) = e^{-x}$ is:

A) $\frac{1}{1+\omega^2}$ B) $\frac{2\omega}{1+\omega^2}$ C) $\frac{1}{1-\omega^2}$ D) $\frac{\omega}{1+\omega^2}$

41. Two coplanar concurrent forces of magnitude 5 N and 6 N makes an angle 60^o with each other, then the magnitude of the resultant is:

A) 9.5 N B) 6.4 N C) 8.7 N D) 12.3 N

42. A body is said to move with Simple Harmonic Motion if its acceleration, is:

A) Always directed away from the centre, the point of reference
B) Proportional to the square of the distance from the point of reference
C) Proportional to the distance from the point of reference and directed towards it
D) Inversely proportion to the distance from the point of reference

43. A car travels with a speed of 12 m/s when accelerated at 0.1 m/s^2 from its rest position. What is the distance travelled?

A) 1440 m B) 144 m C) 720 m D) 72 m

44. The area under a velocity time graph gives:

A) Acceleration B) Displacement
C) Velocity D) Mass

45. When a body is moving along a circular path its velocity is directed towards:

A) Center B) Normal
C) Tangent D) Parallel to circle

46. A free body diagram is the sketch of:

A) A body in motion that shows bending forces of the body
B) An undisturbed body that shows external forces of the body
C) A moving body that shows internal forces of the body and reaction forces
D) An isolated body that shows external forces of the body and reaction forces

47. A rigid body rotates with an angular momentum L. If the kinetic energy is halved, what will be the angular momentum?

A) L B) L/2 C) $L/\sqrt{2}$ D) 2L

48. If simple harmonic motion of a pendulum dies after some time due to energy dissipation by viscous forces in air the oscillation is said to be:

A) Undamped B) Damped C) Free D) Forced

49. A spring mass system is oscillating with a frequency 'f' in a lift at rest. If the lift is slowly accelerated upwards, the frequency of the spring mass system will:
A) Remain the same B) Increase
C) Decrease D) Become zero

50. What is the frequency with which a forced harmonic oscillator vibrates?
A) Their natural frequency
B) Frequency of applied periodic force
C) Difference between natural frequency and frequency of applied periodic force
D) Sum of natural frequency and frequency of applied periodic force

51. When two waves of same amplitude with a phase difference of 180^0 superimpose the amplitude of the resultant is:
A) Same as single wave B) Double of single wave
C) Thrice of single wave D) Zero

52. Calculate the least thickness of a soap film (refractive index 1.5) that will result in destructive interference in reflected light if light of wavelength 600 nm is incident normally on it.
A) 200 nm B) 400 nm C) 600 nm D) 800 nm

53. When a compact disc (used in audio and video systems) is seen in sunlight rainbow like colours can be seen. This can be explained on the basis of:
A) Interference B) Diffraction
C) Polarization D) None of these

54. How many lenses are used in Fraunhofer diffraction?
A) Two convex lenses B) Two concave lenses
C) One concave lens D) One convex lens

55. The incident wavefronts in Fresnel and Fraunhofer diffraction are respectively:
A) Planar and planar B) Planar and spherical
C) Spherical and planar D) Spherical and spherical

56. The concept of matter wave was proposed by:
A) Werner Heisenberg B) Erwin Schrodinger
C) Albert Einstein D) Louis de Broglie

57. Among the following particles which are all moving with the same velocity, the one having the smallest wavelength is:
A) Electron B) Proton C) Neutron D) Cricket ball

58. Which of the following is **not** a characteristic of a wavefunction?
A) Physically significant B) Continuous
C) Single valued D) Finite

59. If the error in the measurement of the lifetime of an atom in the excited state is $(1/\pi) \times 10^{-7}$ s, what will be the uncertainty in frequency of light emitted by the atom?

A) 2.5 MHz B) 2.5 Hz C) 2.5 kHz D) 0.25 MHz

60. Which one of the following is an example of a zero dimensional nanostructure?

A) Nanoparticles B) Nanorods
C) Nanotube D) Nanosheet

61. The colour of nano gold particles is:

A) Yellow B) Gold C) Red D) Variable

62. Which of the following relations between loudness (L) and intensity (I) of sound is correct?

A) $I \alpha \log L$ B) $I \alpha \log L^2$

C) $L \alpha \log I$ D) $L \alpha \log L^2$

63. Time required for sound to decay by 60 dB:

A) Echo time B) Reverberation time
C) Delay time D) Transient time

64. Which of the following is **not** an acoustical defect?

A) Reverberation B) Absorption
C) Formation of echoes D) Sound foci

65. The change in length of a ferromagnetic material when placed in a magnetic field is known as:

A) Piezoelectric effect
B) Inverse piezoelectric effect
C) Electromagnetic induction
D) Magnetostriction effect

66. The echo of a pulse of ultrasonic waves from a sonar returns after 1 s. If the velocity of ultrasonic waves is 1600 m/s the distance of the obstacle is:

A) 1600 m B) 1200 m C) 800 m D) 400 m

67. Laser medium in Ruby laser is:

A) Aluminium oxide
B) Chromium oxide
C) Chromium oxide doped with aluminium ions
D) Aluminium oxide doped with chromium ions

68. Which information about the light scattered from an object is recorded in a hologram?
A) Amplitude only
B) Phase only
C) Neither amplitude nor phase
D) Both amplitude and phase

69. An optic fibre in which the refractive index of the core is uniform throughout and undergoes an abrupt change at the cladding boundary is known as
A) Uniform index fibre B) Step index fibre
C) Graded index fibre D) Scale index fibre

70. The numerical aperture of an optic fibre with acceptance angle of 30^0 in air will be:
A) 0.5 B) 0.7 C) 1 D) 1.5

71. Which among the following is used in redox titrations?
A) $KMnO_4$ B) $K_2Cr_2O_7$
C) $(NH_4)_4Ce(SO_4)_4 \cdot 2H_2O$ D) All of these

72. The platinum conductor in a SHE is coated with platinum black. This is done to:
A) Increase its specific surface area
B) Prevent corrosion
C) Prevent dissolution of the metal
D) Keep the solution saturated

73. 'Black nickel' is a dark coating which is primarily composed of :
A) Nickel sulfamate
B) Metallic nickel and Cu
C) Nickel sulfide and metallic Zn and Ni
D) Metallic nickel coated with platinum

74. The cathode material in a Lithium ion battery is:
A) $LiCoO_2$ B) Graphite
C) Lithium titanate D) Silicon

75. The range of UV-Vis spectroscopy is
A) 200 –780 nm B) $4000 - 400\ cm^{-1}$
C) $10^6 - 10^{11}$ Hz D) 1 – 10 nm

76. The microwave active molecules from among CO_2, N_2, HCl, NH_3, CO is:

A) HCl and NH_3 only
B) CO and CO_2 only
C) HCl, NH_3 and CO only
D) N_2 only

77. The CH proton in isopropyl chloride will split into a---- in ^{1}H-NMR spectroscopy.

A) doublet B) triplet C) quartet D) septet

78. A DTG is a plot of:

A) mass v. Temperature
B) dm/dT v. Temperature
C) ΔH/dt v. Temperature
D) ΔT v. Temperature

79. The intense violet colour of $KMnO_4$ is due to:

A) LMCT transition
B) d – d transition
C) MLCT transition
D) fluorescence

80. Which is true regarding Hydrothermal synthesis employed in the synthesis of nanomaterials?

A) It uses water at room temperature and pressure
B) It uses water above its boiling point at high pressure
C) It uses water at its boiling point at low pressure
D) It uses ice cold water at extremely low pressures

81. Identify the **wrong** statement from among the following:

A) Gas chromatography is limited to volatile and thermally stable samples
B) HPLC has much lower choice of mobile phases than in GC
C) A chemically inert carrier gas like N_2 of Ar is used in GC
D) HPLC can handle any soluble compound regardless of volatility

82. The decreasing order of priority of groups according to CIP rules is correctly represented as:

A) $-OH > -CHO > -COOH > -CH_2OH$
B) $-CH_2OH > -CHO > -COOH > -OH$
C) $-OH > -COOH > -CHO > -CH_2OH$
D) $-COOH > -CHO > -CH_2OH > -OH$

83. A C_{60} fullerene has a cage-like fused-ring structure. It is made of ---- hexagons and ----- pentagons respectively.

A) 12 and 20 B) 20 and 12 C) 20 and 20 D) 12 and 12

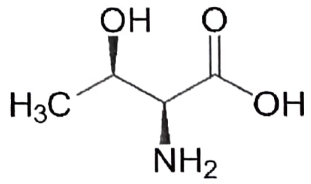
84. Which among the following statements is true regrading HDPE?

A) The structure is branched
B) Its softening temperature is high compared to LDPE
C) It has a low crystallinity compared to LDPE
D) Its tensile strength is less compared to LDPE

85. How many stereoisomers are possible for glucose?

A) 2 B) 4 C) 8 D) 16

86. The structure of threonine is given below. This stereoisomer is ---, ---- threonine.



A) 2S, 3R B) 2R, 3S C) 2R, 3R D) 2S, 3S

87. Which among the following is **not** a conducting polymer?

A) Polyaniline B) Polypyrrole
C) Polylacticacid D) Polyacetylene

88. °Fr (degree French) is a unit of hardness of water. It is the number of parts of $CaCO_3$ equivalent hardness in ----- parts of water.

A) 7×10^3 B) 1×10^6 C) 1×10^5 D) 7×10^4

89. Chlorination of water to such an extent that living organisms as well as organic impurities in water are destroyed is termed as-----.

A) Total chlorination B) Break point chlorination
C) Free Residual chlorination D) Both B and C

90. The following techniques can be used for the desalination of brackish water. The best technique which is effective and economical among these is ----.

A) Distillation B) Freezing
C) Electrodialysis D) Reverse osmosis

91. Output of the compiler is:
A) Object code B) High level code
C) Both (A) and (B) D) None of these

92. Role of the lexical analyzer is:
A) Divide the program into tokens
B) Remove comment lines
C) Remove whitespaces
D) All of these

93. Average time complexity of bubble sort is:
A) O(nlogn) B) O(n)
C) O(1) D) None of these

94. What will be the output of the following code?

```
main ()
{
 int a=20, c;
 float b=3;
c=a/b;
printf ("%d", c);
}
```

A) 6 B) 6.6 C) 6.0 D) 0.66

95. What will be the output of the following code?

```
int main()
{
 int a=6,b=2;
b=b*(a=10);
printf ("%d", b);
 return 0;
}
```

A) 20 B) 2
C) Compilation Error D) None of these

96. Signed character has a range from:
A) 0 to 128 B) -128 to +127 C) 0 to 255 D) -255 to +255

97. 'strncat' string library function is used to:
A) Appends first n characters of a string at the end of another
B) Appends one string at the end of another
C) Copies first n characters of one string into another
D) Compares two strings without regard to case

98. What will be the output of the following code?

```
main()
{
char a[]= "India";
a++;
}
```

A) error, constant pointer cannot change
B) error, invalid operator
C) error, l value required
D) None of the above

99. What will be the output of the following code?

```
int main()
{
   {
        int n=10;
        n=20;
        n=n+10;
   }
printf("%d", n);
return 0;
}
```

A) 10 B) 20
C) Compilation error D) 30

100. What will be the output of the following code?

```
int main( )
{
char string1[ ] = "HELLO" ;
char string2[ ] = "HELLO" ;
int j;

j = strcmp( string1, string2 ) ;

printf( "%d\n", j) ;
return 0 ;
}
```

A) -1 B) 1
C) 0 D) None of these

101. What will be the output of the following code?

```
void main( )
{
printf( 3 + "C PROGRAMMING " ) ;
return 0 ;
}
```

A) ROGRAMMING B) C PROGRAMMING
C) OGRAMMING D) GRAMMING

102. The function used to open the file:
A) fclose() B) fread() C) fwrite() D) None of these

103. The function used to read the file's contents from memory:
A) fgetc() B) fputc() C) printf() D) scanf()

104. The parameter passing mechanism used in C language:
A) Call by value B) Call by reference
C) Both (A) and (B) D) None of these

105. What will be the output of the following code?

```
void main( )
{
int i;
for(i = 0; i<3; i++);
printf("%d", i);
}
```

A) 0,1,2 B) 3
C) Compilation error D) 4

Questions **106-110**. Read the passage and choose the most appropriate answer from the options provided.

Government By AI IsWhat We Need

I don't understand why people are worried about AI taking over government. The dinosaurs lasted 165 million years. The first 'upright apes' evolved only 5 million years ago and *Homo sapiens* didn't arrive on the scene until about 300,000 years ago.

We have only a few thousand years of recorded history. It isn't a great record. Our world is run by men with an insatiable lust for power and/or an insatiable greed for money. Despite the warnings of science on climate change, they continue to trash our only planet. The human race will be lucky if it lasts another 1000 years.

But a government run by AI would be completely logical. Isn't that the best hope for preserving humanity?

106. 'AI' stands for:
A) Artificial Intelligence B) Augmented Intelligence
C) Amplified Intelligence D) Artificial Intellect

107. A phrase in the passage has been italicised because it is:
A) Technical B) Scientific
C) Foreign D) Anthropological

108. The sentence 'It isn't a great record" is an instance of:
A) hyperbole B) hypersensitivity
C) metaphor D) understatement

109. Our history is approximately:
A) I65 million years B) 170 million years ±
C) 300000 years D) 1000 years ±

110. The word 'trash' is used in the passage as a/an:
A) noun B) verb
C) adjective D) adverb

111. Pick the closest synonym of 'inexpensive' from the following:
A) destitute B) niggardly
C) tawdry D) economical

112. Pick the closest antonym of 'unimportant' from the following:
A) authoritarian B) supercilious
C) seminal D) inconsequential

113. Pick the part of the sentence that contains an error or pick 'D' to indicate that there is no error in it:

Who's painting your living room blue?
A) B) C) D) (No error)

114. Which part of the following sentence has a comma missing?

Though somewhat tired she said she would stay a little longer.
A) B) C) D)

115. The expansion of 'etc':
A) ex cetra B) et cetera C) ex terac D) et cerac

116. Rearrange the sentences of the following paragraph in the correct order:

1. That evening I could not fall asleep.
2. Now that I knew her last illusion had vanished it was extremely difficult for me to go and see her.
3. But she also knew that up until the last month and unless some unforeseen accident should befall her, she would keep her presence of mind and even a certain physical activity.
4. I learned one day that my old friend Pauline, who had long ago been diagnosed with cancer, would not last the year, and the doctor had confessed the truth to her.
5. I decided, however, one evening to go there the next day.

A) 4, 5, 1, 2, 3 B) 4, 3, 2, 5, 1 C) 1, 4, 5, 2, 3 D) 4, 3, 1, 5, 2

117. Pick the correctly spelt word:

A) sequens B) zerosem C) chandelier D) empatetic

118. Fill in the blanks to complete the sentence:

'Mishra has ---- will ---- win.'

A) a, for B) a, to C) the, to D) the, can

119. Pick the part of the sentence that contains an error, or pick 'D' to indicate there is no error in it:

He petitioned the President A) that his father B) be pardoned. C) D) (No error)

120. Fill in the blanks to complete the sentence:

Mohan and Janaki ------ now ready to challenge the visiting team.

A) is B) are C) feel D) feeling

A

22012 **120 MINUTES**

1. The system of linear equations $x + y + z = 0; 2x + y + z = 0; x + y + kz = 0$ has non-trivial solution if:

   A) $k = 1$ B) $k = -1$ C) $k = 2$ D) $k = -2$

2. The rank of the matrix $\begin{bmatrix} 1 & 3 & 4 \\ 2 & 4 & 7 \\ 1 & 1 & 3 \end{bmatrix}$ is:

   A) 1 B) 3 C) 2 D) None of these

3. Which of the following is true for a system $AX = b$ of m linear equations in n variables?

   A) The system is consistent only if $b = 0$

   B) If $m > n$ and $b = 0$, the system has infinite number of solutions

   C) If $rank(A) = m$ and $b = 0$, the system has only trivial solution

   D) If $m = n$ and the system has unique solution, then A is invertible

4. The characteristic polynomial of the matrix $\begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix}$ is:

   A) $\lambda^2 + 6\lambda + 7$ B) $\lambda^2 - 6\lambda + 7$

   C) $\lambda^2 + 6\lambda - 7$ D) $\lambda^2 - 6\lambda - 7$

5. The eigen vector corresponding to the eigen value $\lambda = 1$ for the matrix $A = \begin{bmatrix} 2 & -1 \\ -2 & 3 \end{bmatrix}$ is:

   A) $\binom{1}{1}$ B) $\binom{1}{-2}$ C) $\binom{2}{1}$ D) $\binom{-1}{1}$

6. Which of the following is **not** true?

   A) A matrix A is invertible, then all its eigen values are non zero
   B) If λ is an eigen value of an invertible matrix A, then λ^{-1} is an eigen value of A^{-1}
   C) If a scalar λ is an eigen value of a matrix A, then the matrix $A - \lambda I$ is singular
   D) A matrix A is diagonalizable only if all its eigen values are distinct

7. The quadratic form $q(X)$ that corresponds to the symmetric matrix $A = \begin{pmatrix} 5 & -3 \\ -3 & 7 \end{pmatrix}$ is:

A) $5x^2 - 3xy + 7y^2$ B) $5x^2 - 6xy - 7y^2$

C) $5x^2 - 6xy + 7y^2$ D) $5x^2 + 6xy + 7y^2$

8. The eigen values of the matrix $A = \begin{pmatrix} 2 & 3 \\ x & y \end{pmatrix}$ are 4 and 8 then,

A) $x = 4; y = 10$ B) $x = 5; y = 8$

C) $x = -3; y = 9$ D) $x = -4; y = 10$

9. The limit of the function $f(x, y) = \frac{xy}{x^2+y^2}$ as $(x, y) \to (0, 0)$ along the line $y = x$ is:

A) 0 B) $\frac{1}{2}$ C) $\frac{-1}{2}$ D) 1

10. Consider the function $f(x, y) = \frac{x^3y^2}{1-xy}$. Then which of the following is true?

A) $f(x, y)$ is continuous every where

B) $f(x, y)$ is continuous only at $(0, 0)$

C) $f(x, y)$ is nowhere continuous

D) None of these

11. If $f(x, y) = x^2 y^3 + x^4y$, then $\frac{\partial^2 f}{\partial x^2}$ is:

A) $2y^3 + 12x^2y$ B) $6x^2y$

C) $2xy^3 + 4x^2y$ D) $6xy^2 + 4x^3$

12. Suppose $z = x^2y; x = t^2; y = t^3$. The value of $\frac{dz}{dt}$ at $t = 1$ is :

A) 6 B) 7 C) -6 D) 1

13. The relative maxima of $f(x, y) = 4xy - x^4 - y^4$ occurs at:

A) $(0, 0)$ B) $(-1, 1)$ C) $(1, 1)$ D) No points

14. The value of integral $\int_0^1 \int_{-3}^2 y^2 \, x dx dy$ is:

A) $\frac{5}{6}$ B) $\frac{-1}{2}$ C) $\frac{-5}{6}$ D) $\frac{1}{2}$

15. The value of integral $\int_0^2 \int_{\frac{y}{2}}^1 e^{x^2} dxdy$ is:

A) e B) $e+1$ C) e^2+1 D) $e-1$

16. The area of the region enclosed by the curve $r = \sin 3\theta$ is:

A) $\frac{\pi}{4}$ B) $\frac{\pi}{6}$ C) $\frac{\pi}{2}$ D) $\frac{\pi}{3}$

17. The series $\sum_{n=1}^{\infty} \frac{n+2}{n^p}$ converges only for:

A) $p \geq 2$ B) $p < 2$ C) $p > 2$ D) $p \leq 2$

18. If $\sum_{n=1}^{\infty} \frac{n!}{n^n} x^n$ is a series of positive terms, then the series:

A) converges for all x B) converges if $0 \leq x < e$

C) diverges if $0 \leq x < e$ D) diverges if $0 \leq x < 3$

19. The series $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} +$ ... converges to:

A) $\ln 2$ B) $\ln e$ C) $\ln 3$ D) $2\ln 2$

20. The series $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + \cdots$ to ∞ converges to:

A) $e^3 - e$ B) $e^2 - e$ C) $\frac{e^3-e}{2}$ D) $\frac{e^2-e}{2}$

21. The power series expansion of $\frac{1}{(1+x)(2+x)(3-2x)}$ valid in the domain:

A) $|x| < 1$ B) $|x| > 1$ C) $|x| > 2$ D) $|x| < 2$

22. The coefficient of $(x-1)^{15}$ in the Taylor series expansion of $\frac{1}{x}$ about $x = 1$ is:

A) $-\frac{1}{2^{15}}$ B) $\frac{1}{2^{15}}$ C) $\frac{1}{2^{16}}$ D) $-\frac{1}{2^{16}}$

23. The constant term in the fourier series expansion of $x - x^2$ in $-\pi < x < \pi$ is:

A) $\frac{2}{3}\pi^2$ B) $-\frac{2}{3}\pi^2$ C) $\frac{1}{3}\pi^2$ D) $-\frac{1}{3}\pi^2$

24. If $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$

has a Fourier series expansion, then $f(0)$ is:

A) $-\frac{\pi}{2}$ B) $\frac{\pi}{2}$ C) $-\pi$ D) 0

25. Suppose a particle moves along the curve $\vec{r} = (t^2 - t)\hat{\imath} + (t^2 + t)\hat{\jmath} + t\hat{k}$ where t denotes the time. The magnitude of the acceleration at $t = 1$ is:

A) 2 B) 3 C) $\sqrt{11}$ D) $2\sqrt{2}$

26. The unit tangent vector at (1, 2, 3) on the curve $\vec{r} = t^2\hat{\imath} + (t^2 + 1)\hat{\jmath} + (t^3 + 2)\hat{k}$ is parallel to the vector:

A) $\hat{\imath} + \hat{\jmath} + 3\hat{k}$ B) $\hat{\imath} + \hat{\jmath} + \hat{k}$

C) $2\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$ D) $2\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$

27. The directional derivative of $f(x, y, z) = \frac{x}{y+z}$ at the point $(1, 1, 1)$ in the direction of negative y-axis is:

A) $-\frac{1}{2}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $-\frac{1}{4}$

28. If $\vec{b}$ is a constant vector and $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$, then $curl\ (\vec{r}\ \mathrm{x}\ \vec{b})$ is:

A) $2\vec{b}$ B) $-2\vec{b}$ C) $\vec{b}$ D) 0

29. If $\vec{a} = 5\hat{\imath} - y\hat{\jmath} + \hat{k}$ and $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ then, div $(\vec{a}\ \mathrm{x}\ \vec{r}\ )$ is:

A) 0 B) $\vec{a}$ C) $5\vec{a}$ D) $2\vec{a}$

30. If F is a vector field and ϕ a scalar function then which of the following is true?

A) curl $(\phi F) = \phi$ curl $F + F$ x $\nabla\phi$

B) curl $(\phi F) = \phi$ curl $F + \nabla\phi$ x F

C) div (curl F) $= F$

D) div $(\phi F) = \phi$ div F

31. Suppose $f(x, y, z) = xe^y + ze^x$. The maximum value of the directional derivative at $(0, 0, 1)$ is:

A) $\sqrt{3}$ B) 1 C) 0 D) $\sqrt{5}$

32. A particle is moving along the curve $x = e^{-2t}, y = 3\cos 2t,\ z = 3\sin 2t$ where t is the time. The magnitude of the initial velocity is:

A) $2\sqrt{3}$ B) $2\sqrt{5}$ C) $2\sqrt{10}$ D) 0

33. Which of the following is a solution of the differential equation

$\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$?

A) e^{2x} B) e^{-2x} C) e^{x} D) All the above

34. The particular integral of the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{5x}$

A) $\frac{e^{5x}}{4}$ B) $\frac{e^{2x}}{12}$ C) $\frac{e^{5x}}{8}$ D) $\frac{e^{5x}}{12}$

35. The general solution of the differential equation $x^2\ \frac{d^2y}{dx^2} - 4x\ \frac{dy}{dx} + 6y = 0$ is:

A) $c_1e^{2x} + c_2e^{3x}$ B) $c_1e^{2x} + c_2x^3$

C) $c_1x^2 + c_2x^3$ D) $(c_1 + c_2)\log x$

36. Which of the following differential equation is linear?

A) $y\ \frac{d^2y}{dx^2} + \frac{dy}{dx} = 2x$

B) $x^2\ \frac{d^2y}{dx^2} + x\ \frac{dy}{dx} = e^x$

C) $2\ \frac{d^2y}{dx^2} - 4\left(\frac{dy}{dx}\right)^2 + 6y = 0$

D) None of these

37. The solution of the initial value problem $\frac{d^2y}{dx^2} + 4y = 0$, given that $y(0) = 1$ and $y'(0) = 0$ is:

A) $sin\ 2x$ B) $cos\ 2x$

C) $sin\ 2x - \cos 2x$ D) $sin\ 2x + \cos 2x$

38. Laplace transform of t^3e^{3t} is:

A) $\frac{3}{(s-3)^3}$ B) $\frac{6}{(s-3)^3}$ C) $\frac{6}{(s-3)^4}$ D) $\frac{3}{(s-3)^4}$

39. The inverse Laplace transform of $\frac{1}{(s-2)^2+4}$ is:

A) $e^{2t}\sin 2t$ B) $\frac{e^{2t}\sin 2t}{2}$

C) $e^{2t}\cos 2t$ D) $\frac{e^{2t}\cos 2t}{4}$

40. The Fourier transform of $e^{-\frac{x^2}{2}}$ is:

A) $e^{-\frac{\omega^2}{2}}$ B) $\frac{1}{2}e^{-\frac{\omega^2}{2}}$ C) $\frac{\pi}{2}$ D) $\sqrt{\pi}$

41. The angles between two forces to make their resultant a minimum and maximum respectively are:

A) 0° and 90° B) 90° and 180° C) 180° and 90° D) 180° and 0°

42. A man pulls a box of mass 10 kg with a force of 69 N and its acceleration in the direction of force is 2 m/s^2. What is the value of the coefficient of friction?

A) 0.3 B) 0.4 C) 0.5 D) 0.6

43. The condition of equilibrium for coplanar system of forces is:

A) Algebraic sum of horizontal component of forces should be zero
B) Algebraic sum of vertical component of forces should be zero
C) Algebraic sum of moments of all forces about any point should be zero
D) All of the above

44. Change in momentum of an object is equal to:

A) Internal energy B) Impulse
C) Entropy D) Enthalpy

45. D'Alembert's principle is used for:

A) Reducing the problem of kinetics to equivalent static problem
B) Determining stability of floating bodies
C) Designing safe structures
D) None of the above

46. What is the rotational analogue of force?

A) Angular momentum B) Angular acceleration
C) Torque D) Moment of inertia

47. Consider a mass –spring system. When this system is given an initial displacement, it oscillates with frequency f_1. System is brought to rest and then it is given a different displacement and let f_2 be the frequency of oscillation. Then frequencies

A) $f_1 = f_2$ B) $f_1 > f_2$ C) $f_1 < f_2$ D) None of these

48. Which of the following motions is not simple harmonic?

A) Vertical oscillations of a spring
B) Motion of a simple pendulum
C) Motion of planet around the sun
D) Oscillation of liquid in a U tube

49. Which type of damping stops the oscillation in the shortest time?

A) Under damping B) Over damping
C) Light damping D) Critical damping

50. In a forced harmonic oscillator, the amplitude is 0.01 mm at very low driving frequency and increases to a maximum of 6 mm at a driving frequency of 200 Hz. What is the Q-factor of the system?

A) 60 B) 600 C) 120 D) 1200

51. A wave has a wavelength of 10 m and a time period of 0.02 s. What is the speed of the wave?

A) 50 m/s B) 0.2 m/s C) 20 m/s D) 500 m/s

52. Which of the following phenomenon is shown by transverse waves only?

A) Interference B) Diffraction
C) Polarization D) Reflection

53. Interference in a thin film is due to:

A) Division of wavefront B) Division of amplitude
C) Addition of amplitude D) Addition of wavefront

54. What is the minimum thickness of a thin film of refractive index 1.25 which will appear dark in reflected light when light of wavelength 500 nm is incident normally on it?

A) 400 nm B) 625 nm C) 200 nm D) 1250 nm

55. To obtain a good diffraction pattern the size of the obstacle must be:

A) Much greater than the wavelength of light used
B) Much smaller than the wavelength of light used
C) Comparable to the wavelength of light used
D) None of the above

56. In Fresnel diffraction the incident wavefront is:
A) Hyperbolic B) Linear C) Plane D) Spherical

57. The concept of wave nature of material particles was proposed by:
A) Werner Heisenberg B) Erwin Schrodinger
C) Albert Einstein D) Louis de Broglie

58. An electron, a proton, a hydrogen atom and a uranium nucleus all have the same wavelength. The one having most energy is
A) electron B) proton
C) hydrogen atom D) uranium nucleus

59. Find the ratio of wavelengths of two particles of mass m and 2m moving with a speed of 1×10^7 m/s and 2×10^7 m/s
A) 3:1 B) 1:4 C) 2:3 D) 4:1

60. As per Uncertainty principle, the relation between relative momentum and relative position is:
A) Independent B) Equal
C) Directly proportional D) Inversely proportional

61. Which one of the following is an example of a one dimensional nanostructure?
A) Nanoparticles B) Nanorods
C) Nano layers D) None of the above

62. Which ratio decides the efficiency of nanosubstances?
A) Weight / volume B) Surface area / volume
C) Volume / weight D) Pressure / volume

63. Sound waves with frequencies above 20 KHz are called
A) Audible waves B) Infrasonic waves
C) Ultrasonic waves D) Supersonic waves

64. What is the intensity level of sound in dB scale for normal conversation?
($I = 10^{-6}$ W/m^2)
A) 30 dB B) 60 dB C) 90 dB D) 120 dB

65. The persistence of sound after the source has ceased to produce it is known as:
A) Echo B) Reverberation
C) Noise D) Loudness

66. When an alternating voltage is applied along an axis, of certain crystals like quartz, mechanical vibrations are produced along a perpendicular axis. This phenomenon is:

A) Piezoelectric effect
B) Magnetostriction effect
C) Inverse Piezoelectric effect
D) Inverse Magnetostriction effect

67. An ultrasonic wave of frequency 0.1 MHz sent towards the seabed returns after 0.6 s. Calculate the depth of the sea. Velocity of sound in sea water is 1800 m/s.

A) 270 m
B) 540 m
C) 1080 m
D) 400 m

68. Which one of the following lasers employs optical pumping?

A) Ruby laser
B) Helium Neon laser
C) Semiconductor laser
D) Dye laser

69. Which information of light from the object is recorded in a hologram?

A) Phase
B) Intensity
C) Both A and B
D) Neither A nor B

70. A step-index fibre has a core of refractive index 1.5 and the cladding has a refractive index difference of 0.015. What is the refractive index of the cladding?

A) 1.515 B) 1.485 C) 1.47 D) 1.53

71. A cell reaction is feasible if the emf of the cell is:

A) Negative
B) Positive
C) Zero
D) Both positive and negative

72. KCl is used in a salt bridge because:

A) KCl forms a good jelly with agar-agar
B) KCl is a strong electrolyte
C) KCl is ionic
D) K^+ and Cl^- ions have almost the same mobility

73. What is the pH of a solution in a hydrogen electrode half cell that is coupled with a saturated calomel electrode at 25°C if the emf of the combined cell is 0.5525 V?

A) 4 B) 5.25 C) 9.5 D) 13.25

74. Which among the following is TRUE regarding electrochemical corrosion?

A) Corrosion is uniform and occurs throughout the surface
B) It is a fast process
C) It occurs in dry condition
D) It occurs only on homogeneous metal surfaces.

75. How many peaks *(other than the TMS peak)* are observed in the NMR spectrum of isopropyl chloride?

A) 4 B) 3 C) 2 D) 1

76. Which among the following is IR inactive?
A) CO_2 B) H_2O C) HCl D) N_2

77. Solvatochromism refers to the ability of a compound to change colour due to a change in:
A) Molecular weight of the compound
B) Polarity of the solvent
C) Viscosity of the solvent
D) Wavelength of incident radiation

78. The UV-vis spectra of acetone shows two bands one at 187 nm and the other at 273 nm. These can be assigned to ---- and ---- respectively.
A) $\pi-\pi^*$ & $n-\pi^*$ B) $\pi-\pi^*$ & $n-\sigma^*$
C) $n-\pi^*$ & $\pi-\pi^*$ D) $n-\sigma^*$ & $\pi-\pi^*$

79. In a DTA plot, ΔT is placed on the y-axis and ---- on the x-axis.
A) Mass B) Length
C) Time D) None of these

80. The solvent with the highest eluting power among the following is:
A) Methanol B) Hexane
C) Dichloromethane D) Acetone

81. Which among the following is FALSE regarding SEM?
A) It has a higher depth of field when compared to TEM
B) It employs scattered electrons in image capturing
C) Specimens are mounted on very thin copper grids
D) Requires vacuum for its operation

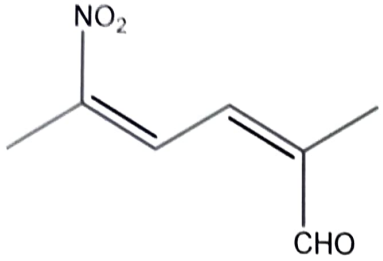
82. The term 'Russian Doll model' is associated with the structure of:
A) multi-walled carbon nanotubes
B) single-walled carbon nanotubes
C) fullerenes
D) nano gold

83. Identify the metamers from among the following with formula $C_4H_{10}O$?
A) ethoxyethane B) 2-methoxy propane
C) 1-methoxy propane D) All the above

84. Which among the following is a polyamide?
A) Rayon B) Orlon C) Nylon D) Dacron

85. How many gauche forms does the diequatorial form *trans*– 1,2– dimethylcyclohexane possess?
A) 1 B) 2 C) 3 D) 4

86. The IUPAC name of the compound given below is (*X, Y*)–5–nitro–2–methylhexa–2,4–dienal. Here X and Y refers to:



A) 2E, 4E B) 2Z, 4Z C) 2Z, 4E D) 2E, 4Z

87. While calculating the calcium carbonate equivalent hardness, the Multiplication Factor is highest for:

A) $Al_2(SO_4)_3$ B) $Ca(HCO_3)_2$ C) $MgCO_3$ D) $MgSO_4$

88. The TRUE statement regarding Hot Lime Soda process is:

A) Coagulants like alum are to be used
B) Dissolved gases cannot be removed at all in this method
C) The process is slow when compared to cold lime soda process
D) Water with residual hardness of ~ 30ppm can be obtained by this process

89. Clarkes degree refers to the number of parts of calcium carbonate equivalents in ------ parts of water.

A) 70,000 B) 10^5 C) 10^6 D) 10^9

90. The process of wet steam formation in boilers is called:

A) Caustic embrittlement B) Foaming
C) Priming D) Sludging

91. Which of the following is an exit controlled loop?

A) while loop B) for loop
C) do-while loop D) Nested loop

92. Find the output of the following code?

```
#include<stdio.h>
main()
{
int x=4;
constint y=6;
y++;
printf("%d",y);
}
```

A) 6 B) 7
C) 5 D) Compilation error

93. Consider the following statements and choose the correct option?
1. strcmp is an inbuilt string function
2. strcmp can return only 0 and 1
3. strcmp supports both case sensitive and case insensitive checking

A) 1, 2 and 3 B) 1 and 3 only
C) 1 only D) 1 and 2 only

94. Variables that are both alive and active throughout the entire C programme are part of ------ storage class type.
A) Automatic B) Register C) Static D) External

95. Which of the following statements is **not** true about functions in C?
A) Functions enable code reuse
B) Functions after execution returns multiple values.
C) Every programme must contain at least one function
D) Functions are capable of hiding information

96. The function in which both called function and calling function is same are called?
A) User defined functions B) Recursive function
C) Standard library function D) None of the above

97. Arguments that are given as input by user before running a program are called?
A) Function arguments B) Formal arguments
C) Command-Line arguments D) Parameterized arguments

98. Choose the correct statement about call by value in C?
A) Call by value does not use pointers.
B) Call by Value copies the variable value in multiple memory locations
C) Call by value protects original variables from changes in called functions
D) All of the above

99. Which of the following statement is **not** true about gets() function in C?
A) gets() read input from the standard input.
B) gets() read the input until it encounters newline.
C) gets() do array bound testing.
D) gets() has a return type.

100. Find the odd one among the following?
A) Assembler B) Web browser
C) Compiler D) Debugger

101. Choose the correct statement about the given ternary operator condition? expression 1: expression 2
A) If both expressions are true condition will be checked.
B) If condition is false expression 1 will be evaluated else expression 2.
C) If condition is true expression 1 will be evaluated else expression 2.
D) Both expressions will be evaluated irrespective of condition.

102. What is the return type of pow() function in C?
A) float B) char C) double D) integer

103. Find the output of the following code?

```
#include <stdio.h>
#include<string.h>
void find()
{
char f[50];
char h[] = "Bye";
printf("%s", h);
strcpy(f, h);
printf("%s", f);
}
void main() {
find();
}
```

A) eyB Bye
B) Bye
C) ByeBye
D) Compilation Error

104. Which of the following is **not** a reserved keyword in C?
A) auto B) switch C) main D) default

105. Find the correct hierarchy of arithmetic operators in C?
A) * / + - B) + - * / C) * + - / D) - * + /

Read the passage and choose the most appropriate answer from the options provided for questions 106 -110.

An English scientist known as the world's first human cyborg has died at 64.

Dr. Peter Scott-Morgan made headlines in 2020 as the subject of the documentary "Peter: The Human Cyborg."

The film followed the ground-breaking scientist's journey as he refused to accept his terminal diagnosis and worked to become fully robotic to extend his life after he was diagnosed with motor neuron disease — the same condition that afflicted Stephen Hawking.

Scott-Morgan, who had a Ph.D. in robotics, developed an incredibly life-like avatar to smile and express his emotions as his face muscles failed, had a voice box fitted with his own recorded speech, used eye-tracking technology to operate computers and used a wheelchair that allowed him to stand and lie flat.

He also used a catheter and colostomy bag to use the toilet and had his larynx removed so saliva did not flood his lungs.

106. The word 'cyborg' derives from the expression:
A) scientific bridge B) cyclizedbridge
C) cybernetic organism D) sanctified organism

107. The word 'avatar' is of ------- origin.
A) Latin B) Greek C) Sanskrit D) Egyptian

108. A 'terminal diagnosis' relates to illnesses that:
A) are related to any kind of travel
B) are predominantly contracted at airport terminals
C) are active for a short term, subside, and then recur
D) lead to death

109. Motor neuron disease can affect:
A) any robot B) any human
C) human cyborgs only D) human scientists only

110. The phrase 'to use the toilet' in the context of this passage is a/an:
A) exaggeration B) euphemism
C) emergency D) exigency

Fill in the blanks, choosing the most appropriate of the options provided for questions 111 -115.

111. They offered her -------- money.
A) all B) any C) some D) most

112. He promised me that the job------- be done.
A) will B) shall C) would D) should

113. Have you seen the girl--------the green dress?
A) in B) on C) of D) with

114. The gold was --------in the kitchen cupboard.
A) hiding B) hidden C) hid D) hide

115. Let's all work very hard, ---------?
A) will we B) shall we C) will you D) shall you

Answer the following, choosing the most appropriate of the options given for questions 116-120.

116. 'To go the extra mile' means:
A) to travel alone at the end of a journey
B) to eat to excess at the end of a meal
C) to be cheerful and pleasant
D) to exceed expectations

117. Indicate the part of the sentence below that contains an error, or point out if there is no error in it:

Our professor (P) proved that (Q) Pythagoras was wrong. (R)

A) P B) Q C) R D) No error

118. He was sitting by himself in an obscure corner of ---------- college library.

A) a B) the
C) an D) No article required

119. Where is the ICU, -------?

A) please B) please me C) please say D) please tell

120. 'I returned back home yesterday.' Which of the following words in this sentence is redundant?

A) returned B) back C) home D) yesterday

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