

## PG/INTEGRATED PG ENTRANCE EXAMINATION, APRIL 2023

## INTEGRATED M.Sc. PHYSICS/INTEGRATED M.Sc. CHEMISTRY

Time : Two Hours

Maximum : 400 Marks

*Each question carries 4 marks.**1 mark will be deducted for each wrong answer.***Section A (Physics)**

1. In the travelling wave equation  $y = a \sin(\omega t - kx)$ , the dimensions  $k$  are :

(A)  $M^0 L^1 T^1$ .

(B)  $M^0 L^{-1} T^0$ .

(C)  $M^0 L^0 T^{-1}$ .

(D)  $M^0 L^1 T^{-1}$ .

2. A body weighs 22.42 g and has a measured volume of 4.7 cc. The possible errors in the measurements of mass and volume are 0.01 g and 0.1 cc. Then the maximum error in the density will be :

(A) 22 %.

(B) 2 %.

(C) 0.2 %.

(D) 0.02 %.

3. A particle moves along a straight line OX. At a time  $t$  (in seconds), the distance  $x$  (in metre) of the particle from O is given by  $x = 40 + 12t - t^3$ . How long would the particle travel before coming to rest ?

(A) 24 m.

(B) 40 m.

(C) 56 m.

(D) 16 m.

**Turn over**

4. A stone tied to the end of a string of 1 m long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolutions in 44 seconds, what is the magnitude and direction of acceleration of the stone ?
- (A)  $\pi^2/4 \text{ ms}^{-2}$  and direction along the radius towards the centre.  
(B)  $\pi^2 \text{ ms}^{-2}$  and direction along the radius away from the centre.  
(C)  $\pi^2 \text{ ms}^{-2}$  and direction along the radius towards the centre.  
(D)  $\pi^2 \text{ ms}^{-2}$  and direction along the tangent to the circle.
5. When forces  $F_1, F_2, F_3$  are acting on a particle of mass  $m$  such that  $F_2$  and  $F_3$  are mutually perpendicular, then the particle remains stationary. If the force  $F_1$  is now removed, then the acceleration of the particle is :
- (A)  $\frac{F_1}{m}$  (B)  $\frac{F_2 F_3}{m F_1}$   
(C)  $\frac{F_2 - F_3}{m}$  (D)  $\frac{F_2}{m}$
6. A body of mass 1 kg begins to move under the action of a time dependent force  $F = (2t i + 3t^2 j) \text{ N}$ , where  $i$  and  $j$  are unit vectors along X and Y axes. What power will be developed by the force at the time ( $t$ ) ?
- (A)  $(2t^2 + 4t^4) \text{ W}$ . (B)  $(2t^3 + 3t^4) \text{ W}$ .  
(C)  $(2t^3 + 3t^5) \text{ W}$ . (D)  $(2t + 3t^3) \text{ W}$ .
7. A wheel has angular acceleration of  $3 \text{ rad/s}^2$  and initial angular speed of  $2 \text{ rad/s}$ . In a time of 2s. It has rotated through an angle (in radian) of :
- (A) 6. (B) 10.  
(C) 12. (D) 4.

8. Two satellites A and B go round on a planet P in circular orbits having radii  $4R$  and  $R$  respectively. If the speed of satellite A is  $3V$ , the speed of satellite B will be :
- (A)  $12V$ . (B)  $6V$ .  
(C)  $4V/3$ . (D)  $3V/2$ .
9. A copper wire and a steel wire of the same diameter and length are connected end to end and a force is applied which stretches their combined length by 1 cm. Then the two wires will have :
- (A) The same stress and strain.  
(B) The same stress but different strains.  
(C) The same strain but different stresses.  
(D) Different stresses and strains.
10. A liquid drop of surface tension  $\sigma$  and diameter  $D$  breaks up into 125 small droplets of identical size. The total change in surface energy is :
- (A)  $\pi D^2 \sigma$ . (B)  $2\pi D^2 \sigma$ .  
(C)  $4\pi D^2 \sigma$ . (D)  $5\pi D^2 \sigma$ .
11. The molecules of a given mass of a gas have r.m.s velocity of 200 m/s at  $27^\circ\text{C}$  and  $1.0 \times 10^5 \text{ N/m}^2$  pressure. When the temperature and pressure of the gas are respectively,  $127^\circ\text{C}$  and  $0.05 \times 10^5 \text{ N/m}^2$ , the r.m.s velocity of its molecule in m/s is :
- (A)  $\frac{400}{\sqrt{3}}$ . (B)  $\frac{100\sqrt{2}}{3}$ .  
(C)  $\frac{100}{\sqrt{3}}$ . (D)  $\frac{100}{\sqrt{2}}$ .
12. A Carnot engine working between 300 K and 600 K has a work output of 800 joule per cycle. The amount of heat energy supplied from the source to the engine in each cycle is :
- (A) 800 joule. (B) 1600 joule.  
(C) 3200 joule. (D) 6400 joule.

Turn over

13. The total KE of all the molecules of Helium having a volume  $V$  exerting a pressure  $P$  is 1500 J. The total KE in joule of all the molecules of  $N_2$  having the same volume  $V$  and exerting a pressure  $2P$  is :
- (A) 3000. (B) 4000.  
(C) 5000. (D) 6000.
14. The motion of a particle varies with time according to the relation  $X = A [\sin \omega t + \cos \omega t]$ . Then :
- (A) The motion is oscillatory but not S.H.M.  
(B) The motion is S.H.M with amplitude  $2A$ .  
(C) The motion is S.H.M with amplitude  $A$ .  
(D) The motion is S.H.M with amplitude  $\sqrt{2}A$ .
15. The second overtone of an N open organ pipe has the same frequency as the first overtone of a closed pipe  $L$  meter long. The length of the open pipe will be :
- (A)  $L$ . (B)  $2L$ .  
(C)  $L/2$ . (D)  $4L$ .
16. Two point charges  $q$  and  $-5q$  are placed at some distance apart. If the electric field at the location of  $q$  is  $E$ , then the electric field at the location of the other charge is :
- (A)  $-E$ . (B)  $-\frac{E}{5}$ .  
(C)  $-\sqrt{E}$ . (D)  $\frac{E}{5}$ .
17. A point charge  $q$  is placed at one corner of a cube of edge  $a$ . The flux through each cube face is :
- (A)  $\frac{q}{\epsilon_0}$ . (B)  $\frac{q}{16\epsilon_0}$ .  
(C)  $\frac{q}{24\epsilon_0}$ . (D)  $\frac{q}{48\epsilon_0}$ .

18. In to how many equal parts is it necessary to cut a  $64 \Omega$  resistor so as to obtain a resistance of  $1 \Omega$  by connecting these parts in parallel :
- (A) 8. (B) 16.  
(C) 32. (D) 64.
19. A particle of charge  $q$  and mass  $m$  moves in a circular orbit of radius  $r$  with angular speed  $\omega$ . The ratio of the magnitude of its magnetic moment to that of its angular momentum depends on
- (A)  $\omega$  and  $q$ . (B)  $\omega$ ,  $m$  and  $q$ .  
(C)  $m$  and  $q$ . (D)  $\omega$  and  $m$ .
20. Points A and B are situated along the extended axis of a 2 cm long bar magnet at distances  $x$  cm and  $2x$  cm respectively from the pole nearer to the points. The ratio of magnetic fields at A and B will be :
- (A) 2. (B)  $\sqrt{2}$ .  
(C) 4. (D) 8.
21. A player carrying 3 m long iron rod runs towards east with a speed of 30 km/hr. Horizontal component of earth's magnetic field is  $4 \times 10^{-5} \text{ wbm}^{-2}$ . If he is running with the rod in horizontal and vertical positions, the potential difference induced between the two ends of the rod in two cases will be :
- (A) Zero in vertical position and  $10^{-3} \text{ V}$  in horizontal position.  
(B)  $10^{-3} \text{ V}$  in vertical position and zero in horizontal position.  
(C) Zero in both cases.  
(D)  $10^{-3} \text{ V}$  in both cases.
22. In an electrical circuit, resistor, inductor, capacitor and an A.C. voltage source are all connected in series. When the inductor is removed from the circuit, the phase difference between the voltage and current in the circuit is  $\frac{\pi}{3}$ . If instead the capacitor is removed, the phase difference is again  $\frac{\pi}{3}$ . The power factor of the circuit is :
- (A)  $\frac{1}{2}$ . (B)  $\frac{1}{\sqrt{2}}$ .  
(C) 1. (D)  $\frac{\sqrt{3}}{2}$ .

Turn over

23. Out of the following options, which one can be used to produce a propagating electromagnetic wave :
- (A) A stationary charge.
  - (B) A moving chargeless particle.
  - (C) An accelerating charge.
  - (D) A charge moving at constant velocity.
24. In a concave mirror an object is placed at a distance  $x$  from the focus and the image is formed at a distance  $y$  from the focus. The focal length of the mirror is :
- (A)  $xy$ .
  - (B)  $\sqrt{xy}$ .
  - (C)  $\sqrt{\frac{x}{y}}$ .
  - (D)  $\sqrt{\frac{y}{x}}$ .
25. In a Young's double slit experiment, the spacing between two slits is 0.1 mm. If the screen is kept at a distance of one metre from the slits and the wave length of light is 5000 Å, the fringe width is :
- (A) 1 cm.
  - (B) 1.5 cm.
  - (C) 0.5 cm.
  - (D) 2 cm.
26. The retarding potential necessary to stop the emission of photoelectrons, when a target material of work function 1.24eV is irradiated with light of wave length  $4.36 \times 10^{-7}$  m is :
- (A) 6.4 V.
  - (B) 3.2 V.
  - (C) 4.8 V.
  - (D) 1.6 V.
27. If the kinetic energy of a particle is increased to 16 times its previous value, the percentage change in the de-Broglie wavelength of the particle is :
- (A) 25.
  - (B) 75.
  - (C) 60.
  - (D) 50.
28. The initial activity of a certain radioactive isotope was measured as 16000 counts per minute. If its activity after twelve hours was 2100 counts per minute, the approximate value of half life in hours is :
- (A) 9.
  - (B) 6.
  - (C) 4.
  - (D) 2.

29. Which of the following transitions gives photons of maximum energy :
- (A)  $n = 1$  to  $n = 2$ . (B)  $n = 2$  to  $n = 1$ .  
(C)  $n = 2$  to  $n = 6$ . (D)  $n = 6$  to  $n = 2$ .
30. A  $p$ - $n$  photodiode is fabricated from a semiconductor of band gap 2.5 eV. Which of the following signals of wavelength can be detected using this photodiode :
- (A) 4000 Å. (B) 6000 Å.  
(C) 4000 nm. (D) 6000 nm.

### Section B (Chemistry)

31. Under similar conditions of pressure and temperature, 40 ml of slightly moist hydrogen chloride gas is mixed with 20 ml of ammonia gas, the final volume of gas at the same temperature and pressure will be :
- (A) 100 ml. (B) 20 ml.  
(C) 40 ml. (D) 60 ml.
32. The ionization enthalpy of hydrogen atom is  $1.312 \times 10^6 \text{ J mol}^{-1}$ . The energy required to excite the electron in the atom from  $n = 1$  to  $n = 2$  is :
- (A)  $9.84 \times 10^2 \text{ J mol}^{-1}$ . (B)  $9.84 \times 10^3 \text{ J mol}^{-1}$ .  
(C)  $9.84 \times 10^4 \text{ J mol}^{-1}$ . (D)  $9.84 \times 10^5 \text{ J mol}^{-1}$ .
33. As we proceed from Li to F in period 2, the electro negativity :
- (A) Increase regularly. (B) Decrease regularly.  
(C) Shows no variation. (D) Increase irregularly.
34. An atom of an element A has three electrons in its outermost orbit and that of B has six electrons in its outermost orbit. The formula of the compound between these two will be :
- (A)  $A_2B$ . (B)  $A_3B_2$ .  
(C)  $A_2B_3$ . (D)  $A_3B_6$ .
35. At constant temperature the product of pressure and volume of a given amount of a gas is constant. This is called \_\_\_\_\_.
- (A) Boyle's law. (B) Charles' law.  
(C) Gay-Lussac law. (D) Avogadro law.

Turn over

36. The enthalpy change in a reaction does not depend upon \_\_\_\_\_.
- (A) The nature of the reactants and products.
  - (B) Different intermediate steps in the reaction.
  - (C) The state of reactions and products.
  - (D) Initial and final enthalpy of the reaction.
37. Ostwald's dilution law is applicable to :
- (A) Strong electrolytes only.
  - (B) Non-electrolytes.
  - (C) Strong and weak electrolytes.
  - (D) Weak electrolyte only.
38. Which among the following is the strongest oxidizing agent ?
- (A)  $O_3$ .
  - (B)  $KMnO_4$ .
  - (C)  $K_2Cr_2O_7$ .
  - (D)  $H_2O_2$ .
39. Water gas is a mixture of \_\_\_\_\_.
- (A) CO and  $H_2O$ .
  - (B)  $CO_2$  and  $H_2$ .
  - (C) CO and  $H_2$ .
  - (D)  $CO_2$  and  $H_2O$ .
40. The chemical formula of 'Slaked lime' is \_\_\_\_\_.
- (A) CaO.
  - (B)  $CaSO_4$ .
  - (C)  $CaCO_3$ .
  - (D)  $Ca(OH)_2$ .
41. Carborundum is obtained when silica is heated at high temperature with
- (A) Carbon monoxide.
  - (B) Carbon.
  - (C) Carbon dioxide.
  - (D) Calcium carbonate.
42. During Lassaigne's test, if sulphur and nitrogen are present in an organic compound, the products obtained are :
- (A)  $Na_2SO_4$  and NaCN.
  - (B) NaCN and NaCNO.
  - (C)  $Na_2S$  and NaCN.
  - (D)  $Na_2S$  and NaCNO.
43. Benzene reacts with  $CH_3Cl$  in the presence of anhydrous  $AlCl_3$  to form :
- (A) Benzyl chloride.
  - (B) Xylene.
  - (C) Chlorobenzene.
  - (D) Toluene.

44. The coldest region of the atmosphere :
- (A) Mesosphere. (B) Stratosphere.  
(C) Thermosphere. (D) Troposphere.
45. The total number of Bravais lattices in the crystal structures is \_\_\_\_\_.
- (A) 14. (B) 10.  
(C) 6. (D) 4.
46. The boiling point of an azeotropic mixture of water and ethanol is less than that of water and ethanol. The mixture shows :
- (A) No deviation from Raoult's Law.  
(B) Positive deviation from Raoult's Law.  
(C) Negative deviation from Raoult's Law.  
(D) Two boiling points.
47. To deposit one equivalent weight of silver at cathode, the charge required will be :
- (A)  $9.65 \times 10^2$  C. (B)  $9.65 \times 10^3$  C.  
(C)  $9.65 \times 10^4$  C. (D)  $9.65 \times 10^5$  C.
48. When the temperature rises, the peak of the curve in the Maxwell-Boltzmann distribution graph
- (A) Shifts forward and upward. (B) Shifts forward and downward.  
(C) Shifts backward and upward. (D) Shifts backward and downward.
49. An emulsifier is a substance which :
- (A) Stabilizes the emulsion.  
(B) Coagulates the emulsion.  
(C) Retards the dispersion of liquid in liquid.  
(D) Causes homogenesis of emulsion.
50. Malachite is an ore of \_\_\_\_\_.
- (A) Silver. (B) Iron.  
(C) Zinc. (D) Copper.
51. \_\_\_\_\_ is obtained on heating ammonium nitrate at  $250^\circ\text{C}$ .
- (A) Nitric oxide. (B) Nitrous oxide.  
(C) Nitrogen dioxide. (D) Dinitrogen tetroxide.

Turn over

52. The higher catalytic activity of the transition metals is due to the :
- (A) High enthalpy of atomisation. (B) Paramagnetic behaviour.  
(C) Variable oxidation states. (D) Colour of hydrate ions.
53. Mohr's salt is :
- (A)  $\text{Fe}_2(\text{SO}_4)_3(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ .  
(B)  $\text{Fe}_2(\text{SO}_4)_3(\text{NH}_4)_2\text{SO}_4 \cdot 24\text{H}_2\text{O}$ .  
(C)  $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 24\text{H}_2\text{O}$ .  
(D)  $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ .
54. The synthesis of alkyl fluorides is best accomplished by :
- (A) Swarts reaction. (B) Sandmeyer's reaction.  
(C) Free radical fluorination. (D) Finkelstein reaction.
55. The alcohol which does not react with Lucas reagent is
- (A) Isobutyl alcohol. (B) n-butanol.  
(C) Tert-butyl alcohol. (D) Sec-butyl alcohol.
56. The reaction of ethyl formate with an excess of  $\text{CH}_3\text{MgI}$  followed by hydrolysis gives :
- (A) Ethyl alcohol. (B) Propyl alcohol.  
(C) n-propyl alcohol. (D) Isopropyl alcohol.
57. Secondary amines could be prepared by :
- (A) Hoffmann bromamide reaction. (B) Reduction of nitriles.  
(C) Reduction of isonitriles. (D) Reduction of amides.
58. The presence and absence of hydroxyl group on which carbon atom of sugar differentiates RNA and DNA ?
- (A) 1<sup>st</sup>. (B) 2<sup>nd</sup>.  
(C) 3<sup>rd</sup>. (D) 4<sup>th</sup>.
59. Low density polythene is prepared by :
- (A) Free radical polymerization. (B) Ziegler - Natta polymerization.  
(C) Cationic polymerization. (D) Anionic polymerization.

60. Narcotic analgesic is ?

- (A) Aspirin. (B) Paracetamol.  
(C) Codeine. (D) Cimetidine.

**Section C (Mathematics)**

61. The relation  $S$  defined on the set of all real numbers by " $(x, y) \in S$  if and only if  $1 + xy > 0$ " is :

- (A) Reflexive and transitive.  
(B) Reflexive and symmetric but not transitive.  
(C) Reflexive but not symmetric and transitive.  
(D) Transitive but not symmetric.

62. Let  $f(x) = x^2$  and  $g(x) = 3^x$  be functions on the set of all real numbers. Then the solution set of

$(f \circ g)(x) = (g \circ f)(x)$  is :

- (A) The set of all real numbers. (B)  $\{0, 3\}$ .  
(C)  $\{0, 2\}$ . (D)  $\{1, 2\}$ .

63. Let  $z = x + iy$  be a complex number where  $x$  and  $y$  are integers. Then the area of the triangle whose vertices are the roots of the equation  $\bar{z}z^3 + z\bar{z}^3 = 350$  is :

- (A) 36. (B) 48.  
(C) 40. (D) 60.

64. The sum of first  $n$  terms of the series  $1 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \dots$  is :

- (A)  $\frac{n(n+1)}{2}$ . (B)  $\frac{(n+1)(n+2)}{2}$ .  
(C)  $\frac{n}{n+1}$ . (D)  $\frac{-n(n+1)}{2}$ .

65. The sum of all two digit numbers which when divisible by 4 produce unity as remainder is :

- (A) 1201. (B) 1212.  
(C) 1210. (D) 1012.

**Turn over**

66. The number of ways in which 6 distinct toys can be distributed among 4 children is :
- (A)  $4^6$ . (B)  $6^4$ .  
(C)  $6C_4$ . (D) 24.
67. For any positive integer  $n$ ,  $nC_0 + nC_1 + nC_2 + \dots + nC_n$  is equal to :
- (A) 2. (B)  $n + 1$ .  
(C)  $n^2$ . (D)  $2^n$ .
68. A die is rolled thrice, the probability of getting a larger number each time than previous number is :
- (A)  $\frac{15}{54}$ . (B)  $\frac{5}{54}$ .  
(C)  $\frac{15}{216}$ . (D)  $\frac{5}{216}$ .
69.  $\lim_{x \rightarrow 0} \frac{\log(3+x) - \log(3-x)}{2x}$  equals :
- (A)  $\frac{2}{3}$ . (B)  $\frac{1}{3}$ .  
(C) 1 (D)  $\frac{1}{2}$ .
70. The function  $f(x) = x^2 - 2x$  is increasing in the interval :
- (A)  $(-2, -1)$ . (B)  $(-2, 0)$ .  
(C)  $(0, 1)$ . (D)  $(1, 2)$ .
71. The differential co-efficient of  $e^{\sin^{-1} x}$  with respect to  $\sin^{-1} x$  is :
- (A)  $x \sin^{-1} x$ . (B)  $\sin^{-1} x$ .  
(C)  $e^{\sin^{-1} x}$ . (D)  $e^{\cos^{-1} x}$ .
72.  $\int \frac{dx}{\sqrt{2x-x^2}}$  is equal to :
- (A)  $\sin^{-1}(x-1) + c$ . (B)  $\sin^{-1}(1-x) + c$ .  
(C)  $\tan^{-1}(1+x) + c$ . (D)  $\sin^{-1}(1+x) + c$ .

73. The value of  $\int_{-1}^x |t| dt$  is:

(A)  $\frac{1+x^2}{2}$ .

(B)  $\frac{1-x^2}{2}$ .

(C)  $1+x^2$ .

(D)  $1-x^2$ .

74. The solution of the differential equation  $x \frac{dy}{dx} = x + 2y$  is:

(A)  $x + y = c$ .

(B)  $x^2 + y = c$ .

(C)  $x^2 + y^2 = cy$ .

(D)  $x + y = cx^2$ .

75. If  $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$  then  $A^{-1}$  is equal to:

(A)  $\begin{bmatrix} \frac{1}{b} & & \\ 0 & \frac{1}{a} & 0 \\ 0 & 0 & \frac{1}{c} \end{bmatrix}$ .

(B)  $\begin{bmatrix} \frac{1}{a} & & \\ 0 & \frac{1}{b} & 0 \\ 0 & 0 & \frac{1}{c} \end{bmatrix}$ .

(C)  $\begin{bmatrix} \frac{1}{c} & & \\ 0 & \frac{1}{a} & 0 \\ 0 & 0 & \frac{1}{b} \end{bmatrix}$ .

(D)  $\begin{bmatrix} \frac{1}{b} & & \\ 0 & \frac{1}{c} & 0 \\ 0 & 0 & \frac{1}{a} \end{bmatrix}$ .

76. For what value of  $a$ , the points with position vectors  $i - j + k$ ,  $i - 2j - k$  and  $3i + aj + 5k$  are coplanar?

(A) 7.

(B) 12.

(C) -6.

(D) 8.

77. The directrix of the parabola  $x^2 - 4x - 3y + 10 = 0$  is:

(A)  $4y = 5$ .

(B)  $4y = -5$ .

(C)  $4y = -7$ .

(D)  $4y = 7$ .

Turn over

78. If A and D are independent events so that  $P(A \cup B) = 0.9$  and  $P(B) = 0.2$ , then  $P(A)$  is equal to :

(A)  $\frac{3}{7}$ .

(B)  $\frac{4}{7}$ .

(C)  $\frac{5}{7}$ .

(D)  $\frac{7}{12}$ .

79. The area of the region bounded by the curve  $y = x^3$  and the lines  $y = 8$  and  $x = 0$ , is

(A) 12.

(B) 8.

(C) 16.

(D) 24.

80. The equation  $x^2 + y^2 + 4x + 6y + 13 = 0$  represents :

(A) A circle.

(B) A pair of straight lines.

(C) A point.

(D) An ellipse.

#### Section D (Biology)

81. Which of the following animal is a true fish ?

(A) Silver fish.

(B) Hag fish.

(C) Dog fish.

(D) Cuttle fish.

82. Embryological support for evolution was proposed by :

(A) Ernst von Baer.

(B) Hugo de Vries.

(C) Thomas Malthus.

(D) Ernst Heckel.

83. Identify the microbe, which is used for the production of a blood cholesterol lowering bioactive molecule :

(A) *Trichoderma polysporum*.(B) *Aspergillus niger*.(C) *Monascus purpureus*.(D) *Clostridium butylicum*.

84. Promotor and terminator regions of DNA are involved in :

(A) Replication.

(B) Transcription.

(C) Translation.

(D) Transformation.

85. Which of the secondary metabolite is correctly matched ?

(A) Lectin- Codeine.

(B) Toxin- Ricin.

(C) Drug- Abrin.

(D) Terpenoid- Concanavalin A.

86. The minimum quantum requirement for photosynthesis is :
- (A) 2. (B) 6.  
(C) 4. (D) 7.
87. Triple response in pea is induced by :
- (A) Auxin. (B) GA.  
(C) ABA. (D) Ethylene.
88. Siphonogamous fertilization is NOT exclusive in :
- (A) Cycas. (B) Selaginella.  
(C) Solanum. (D) Funaria.
89. Select the Upright pyramid from the following :
- (A) Pyramid of number for a tree ecosystem.  
(B) Pyramid of biomass of pond ecosystem.  
(C) Pyramid of number in a parasitic food chain.  
(D) Pyramid of biomass in grass land ecosystem.
90. Whiptail disease in cauliflower occurs due to the deficiency of
- (A) Mo. (B) Co.  
(C) Mn. (D) Zn.

**Section E (Computer Science)**

91. Which of the following is the latest supercomputer developed in India ?
- (A) PARAM Sanganak. (B) PARAM Pravega.  
(C) PARAM Siddhi-AI. (D) PARAM Shivay.
92. Which of the Object-oriented programming concept allows us to reuse the written code in C++ ?
- (A) Inheritance. (B) Polymorphism.  
(C) Abstraction. (D) Encapsulation.
93. The memory which is introduced in between CPU and main memory of a computer is known as \_\_\_\_\_.
- (A) Virtual Memory. (B) Random Access Memory.  
(C) Read Only Memory. (D) Cache Memory.

**Turn over**

94. The Boolean expression  $Y = AB + BC + AC$  shows the \_\_\_\_\_ operation.
- (A) EX-OR. (B) POS.  
(C) SOP. (D) NOR.
95. Which of the following is the best description for an array ?
- (A) A data structure that shows a hierarchical behaviour.  
(B) Arrays are immutable once initialised.  
(C) Container of objects of similar types.  
(D) Array is not a data structure.
96. What is the base data type of a pointer variable by which the memory would be allocated to it ?
- (A) Int.  
(B) unsigned int.  
(C) Depends upon the type of the variable to which it is pointing.  
(D) None of the above.
97. Variable name in PHP starts with \_\_\_\_\_.
- (A) ! (B) \$  
(C) & (D) #
98. Which of the following is not an example of Database Management Systems ?
- (A) MySQL. (B) PgPISql.  
(C) IBM DB2. (D) Microsoft Edge.
99. Bluetooth is an example of \_\_\_\_\_.
- (A) Wide Area Network. (B) Virtual Private Network.  
(C) Local Area Network. (D) Personal Area Network.
100. Which of the following usually stores all user-related data that is also relevant to GSM mobile systems ?
- (A) SIM. (B) VLR.  
(C) HMR. (D) CMR.