

SOLVED PAPER

AIIMS - 2000

Time : 3½ Hours

Max. Marks : 200

PHYSICS

1. A body is allowed to slide down a frictionless track freely under gravity. The track ends in a semicircular shaped part of diameter D . What should be the height (minimum) from which the body must fall so that it completes the circle.
 - (a) $\frac{4}{5}D$ (b) $\frac{5}{4}D$
 - (c) D (d) $2D$.
2. What is the dimensional formula of gravitational constant G ?
 - (a) $M^{-1}L^3T^{-2}$ (b) $M^{-2}L^3T^{-2}$
 - (c) $M^{-1}L^2T^{-2}$ (d) $M^{-1}L^3T^{-1}$.
3. A body of mass 5 kg has momentum of 10 kg m/s. When a force of 0.2 N is applied on it for 10 seconds, what is the change in its kinetic energy?
 - (a) 1.1 J (b) 2.2 J
 - (c) 3.3 J (d) 4.4 J.
4. Knowing that mass of Moon is $\frac{M}{81}$ where M is the mass of Earth, find the distance of the point where gravitational field due to Earth and Moon cancel each other, from the Moon. Given that distance between Earth and Moon is $60R$, where R is the radius of Earth.
 - (a) $2R$ (b) $4R$
 - (c) $6R$ (d) $8R$.
5. A satellite is in an orbit around the Earth; if its kinetic energy is doubled, then
 - (a) it will fall on the Earth
 - (b) it will rotate with a greater speed
 - (c) it will maintain its path
 - (d) it will escape out of Earth's gravitational field.
6. For an electron in the second orbit of hydrogen, what is the moment of momentum as per the Bohr's model?
 - (a) $2\pi h$ (b) πh
 - (c) $\frac{h}{\pi}$ (d) $\frac{2h}{\pi}$.
7. Half life of a substance is 20 minutes. What is the time between 33% decay and 67% decay?
 - (a) 40 minutes (b) 20 minutes
 - (c) 30 minutes (d) 25 minutes.
8. When a ray of light enters a glass slab, then
 - (a) its frequency and velocity changes
 - (b) only frequency changes
 - (c) its frequency and wavelength changes
 - (d) its frequency does not change.
9. Match the elements of table I and table II.

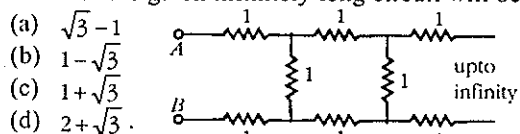
Table I	Table II
1. Myopia	(i) Bifocal lens
2. Hypermetropia	(ii) Cylindrical lens
3. Presbyopia	(iii) Concave lens
4. Astigmatism	(iv) Convex lens

 - (a) 1 - iii, 2 - iv, 3 - i, 4 - ii
 - (b) 1 - iv, 2 - iii, 3 - i, 4 - ii
 - (c) 1 - i, 2 - ii, 3 - iii, 4 - iv
 - (d) 1 - ii, 2 - iv, 3 - i, 4 - iii.
10. A doctor advices a patient to use spectacles with a convex lens of focal length 40 cms in contact with a concave lens of focal length 25 cms. What is the power of the resultant combination?
 - (a) 1.5 D (b) -1.5 D
 - (c) 6.5 D (d) -6.5 D.
11. Turn ratio in a step-up transformer is 1 : 2. If a Leclanche cell of 1.5 V is connected across the input, what is the voltage across the output?
 - (a) 1.5 V (b) 0.0 V
 - (c) 3 V (d) 0.75 V.
12. The Sun emits a light with maximum wavelength 510 nm while another star x emits a light with

- maximum wavelength of 350 nm. What is the ratio of surface temperature of the Sun and the star X?
- (a) 1.45 (b) 0.68
(c) 0.46 (d) 2.1.
13. Surface temperature of star A and B are 727°C and 327°C respectively. What is the ratio $H_A : H_B$ for the heat radiated per second by the two stars?
- (a) 5 : 3 (b) 25 : 9
(c) 625 : 81 (d) 125 : 27.
14. Ratio of intensities of two waves is 9 : 1. If these two are superimposed, what is the ratio of maximum and minimum intensities?
- (a) 9 : 1 (b) 3 : 1
(c) 4 : 1 (d) 5 : 3.
15. Which of the following is true?
- (a) Momentum is conserved in all collisions but kinetic energy is conserved only in inelastic collisions.
(b) Neither momentum nor kinetic energy is conserved in inelastic collisions.
(c) Momentum is conserved in all collisions but not kinetic energy.
(d) Both momentum and kinetic energy are conserved in all collisions.
16. Two resistance filaments of same length are connected first in series and then in parallel. Find the ratio of power dissipated in both cases assuming that equal current flows in the main circuit.
- (a) 1 : 4 (b) 4 : 1
(c) 1 : 2 (d) 2 : 1.
17. Given a number of capacitors labelled as $8\ \mu\text{F}$, 250 V. Find the minimum number of capacitors needed to get an arrangement equivalent to $16\ \mu\text{F}$, 1000 V.
- (a) 4 (b) 16
(c) 32 (d) 64.
18. A rod of length 1.4 m and negligible mass has two masses of 0.3 kg and 0.7 kg tied to its two ends. Find the location of the point on this rod where the rotational energy is minimum when the rod is rotated about that point.
- (a) 0.98 m from 0.3 kg (b) 0.98 m from 0.7 kg
(c) 0.7 m from 0.3 kg (d) 0.7 m from 0.7 kg.
19. What accounts for the flow of charge carriers in forward and reverse biasing of silicon p - n diode?
- (a) drift in forward bias and diffusion in reverse bias
(b) drift in reverse bias and diffusion in forward bias
(c) drift in both reverse and forward bias
(d) diffusion in both forward and reverse bias.
20. A 60 W incandescent lamp operates at 120 V. The number of electrons passing through the filament per second will be
- (a) 1.61×10^{12} (b) 3.12×10^{18}
(c) 7.21×10^{12} (d) 12.40×10^{13} .
21. Given a current carrying wire of non uniform cross section. Which of the following is constant throughout the length of the wire?
- (a) current, electric field and drift speed
(b) drift speed only
(c) current and drift speed
(d) current only.
22. An insulated charged sphere of radius 5 cms has a potential of 10 V at the surface. What is the potential at centre?
- (a) 10 V (b) zero
(c) same as that at 5 cms from the surface
(d) same as that at 25 cms from the surface.
23. A body is projected from the ground with some angle to the horizontal. What happens to the angular momentum about the initial position in this motion?
- (a) decreases (b) increases
(c) remains same
(d) first increases and then decreases.
24. What should be the amount of current through the ring of radius 5 cms so that field in the centre is with earth's magnetic field of $7 \times 10^{-9}\ \text{Wb/m}^2$ is
- (a) 0.5 A (b) 0.28 A
(c) 2.8 A (d) none.
25. Which of the following statements is not correct about the magnetic field?
- (a) magnetic lines of force don't cut each other
(b) inside the magnet the lines go from north to

- south pole of the magnet
 (c) the magnetic lines form a closed loop
 (d) tangents to the magnetic lines give the direction of the magnetic field.
26. Let E_a be the electric field due to a dipole in its axial plane distant l and let E_q be the field in the equatorial plane distant l' . The relation between E_a and E_q is
 (a) $E_a = E_q$ (b) $E_a = 2 E_q$
 (c) $E_q = 2 E_a$ (d) $E_a = 3 E_q$.
27. Particle nature and wave nature of electromagnetic waves and electrons can be shown by
 (a) electron has small mass, deflected by the metal sheet
 (b) X-ray is diffracted, reflected by thick metal sheet
 (c) light is refracted and diffracted
 (d) light is polarised and refracted.
28. A light of intensity I_0 passes through a material of thickness d . The resultant intensity is
 (a) $I = I_0 e^{-d\lambda}$ (b) $I = I_0 (1 - e^{-d\lambda})$
 (c) $I = I_0 e^{-d/\lambda}$ (d) $I = I_0 (1 - e^{-d/\lambda})$.
 (λ being the wavelength of light)
29. A light wave moves from air to glass with frequency ν and wavelength λ . Then
 (a) ν changes
 (b) ν does not change, λ change.
 (c) λ does not change
 (d) ν and λ changes.
30. A man waves his arms while walking. This is
 (a) to keep constant velocity
 (b) to ease the tension
 (c) to increase the velocity
 (d) to balance the effect of earth's gravity.
31. A transverse stationary wave passes through a string with the equation $y = 10 \sin \pi(0.02x - 2.00t)$ where x is in meters and t in seconds. The maximum velocity of the particles in wave motion is
 (a) 63 (b) 78
 (c) 100 (d) 121.
32. Seven capacitors each of capacitance 2 mF are to be connected to obtain a capacitance of 10/11 mF. Which of the following combination is possible?
 (a) 5 in parallel, 2 in series
 (b) 4 in parallel, 3 in series
 (c) 3 in parallel, 4 in series
 (d) 2 in parallel, 5 in series.
33. In a series LCR circuit the voltage across resistance, capacitance and inductance is 10 V each. If the capacitance is short circuited, the voltage across the inductance will be
 (a) $\frac{10}{\sqrt{2}}$ V (b) 10 V
 (c) $10\sqrt{2}$ V (d) 20 V.
34. Eddy currents are produced when
 (a) a metal is kept in varying magnetic field
 (b) a metal is kept in the steady magnetic field
 (c) a circular coil is placed in a magnetic field
 (d) through a circular coil current is passed.
35. A moving coil galvanometer has a resistance of 900 Ω . In order to send only 10% of the main current through this galvanometer, the resistance of the required shunt is
 (a) 0.9 Ω (b) 100 Ω
 (c) 405 Ω (d) 90 Ω .
36. Force between two identical bar magnets whose centres are r metre apart is 4.8 N when their axes are in the same line. If separation is increased to $2r$, the force between them is reduced to
 (a) 2.4 N (b) 0.6 N
 (c) 1.2 N (d) 0.3 N.
37. Which of the following statements is true?
 (a) The presence of a large magnetic flux through a coil maintains a current in the coil if the circuit is continuous.
 (b) A coil of a metal wire kept stationary in a non-uniform magnetic field has an emf induced in it.
 (c) A charged particle enters a region of uniform magnetic field at an angle of 85° to the magnetic lines of force; the path of the particle is a circle.
 (d) There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it.

38. The resistance between the terminal points A and B of the given infinitely long circuit will be



- (a) $\sqrt{3} - 1$
 (b) $1 - \sqrt{3}$
 (c) $1 + \sqrt{3}$
 (d) $2 + \sqrt{3}$
39. Potential energy of equal +ve charge $1 \mu\text{C}$ held 1 m apart in air is
- (a) 1 J (b) $9 \times 10^{-3} \text{ eV}$
 (c) zero (d) $9 \times 10^{-3} \text{ J}$

40. In a Neon discharge tube $2.9 \times 10^{18} \text{ Ne}^+$ ions move to the right each second, while 1.2×10^{18} electrons move to the left per second, electron charge is $1.6 \times 10^{-19} \text{ C}$. The current in the discharge tube is

- (a) 1 A towards right
 (b) 0.66 A towards right
 (c) 0.66 A towards left
 (d) zero.

41. The earth's magnetic induction at a certain point is $7 \times 10^{-5} \text{ Wb/m}^2$. This is to be annulled by the magnetic induction at the centre of a circular conducting loop of radius 5 cm. The required current in the loop is

- (a) 0.56 A (b) 5.6 A
 (c) 0.28 A (d) 2.8 A.

42. The self-induced e.m.f. in closing a d.c. current circuit is e_c , in breaking it is e_b and the e.m.f. of the source is e_0 , then

- (a) $e_c > e_0 > e_b$ (b) $e_c < e_0 < e_b$
 (c) $e_c < e_b < e_0$ (d) $e_c = e_b < e_0$

43. Electric potential V at any point x, y, z in space is given by $V = 6z^2$. The value of the electric field at the point $(2, -1, 3)$ is

- (a) 24 (b) -12
 (c) -36 (d) 12.

44. The increase in internal energy of a system is equal to the work done on the system. Which process does the system undergo?

- (a) isochoric (b) adiabatic
 (c) isobaric (d) isothermal.

45. A flask containing air at 27°C is corked up at atmospheric pressure. The cork can be forced out by a pressure of 2.5 atmosphere. To what

temperature the flask should be heated to do that?

- (a) 150 K (b) 300 K
 (c) 600 K (d) 750 K.

46. A body of mass 20.00 g has volume 5.0 cm^3 . The maximum possible error in the measurement of mass and volume respectively are 0.01 and 0.1 cm^3 . The percentage error in the density will be nearest to

- (a) 1% (b) 2%
 (c) 11% (d) 25%.

47. A good photographic print is obtained by an exposure of 2 seconds at a distance of 1 m from the lamp. How much time will be required to get equally good result at a distance 2 m from the same lamp?

- (a) 1 second (b) 2 second
 (c) 4 second (d) 8 second.

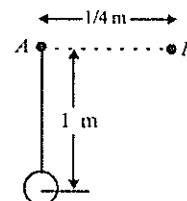
48. Two spheres of equal mass collide with the collision being absolutely elastic but not central. Then the angle between the velocities (θ) must be

- (a) $\theta = 180^\circ$ (b) $\theta \leq 180^\circ$
 (c) $90^\circ \leq \theta \leq 180^\circ$ (d) $\theta = 90^\circ$.

49. A column of mercury of length $h = 10 \text{ cm}$ is contained in the middle of a narrow horizontal tube of length 1 m closed at ends. The air in both halves of the tube is under a pressure of $P_0 = 76 \text{ cm}$ of mercury. The tube is now slowly made vertical. The distance moved by mercury will be

- (a) 4.5 cm (b) 3.0 cm
 (c) 2.5 cm (d) 1.2 cm.

50. A simple pendulum has a bob suspended by an inextensible thread of length 1 metre from a point A of suspension. At the extreme position of oscillation, the thread is suddenly caught by a peg at a point B distant $(1/4) \text{ m}$ from A and the bob begins to oscillate in the new condition. The change in frequency of oscillation of the pendulum is approximately given by ($g = 10 \text{ m/s}^2$).



- (a) $\frac{\sqrt{10}}{2}$ hertz (b) $\frac{1}{4\sqrt{10}}$ hertz
 (c) $\frac{\sqrt{10}}{3}$ hertz (d) $\frac{1}{\sqrt{10}}$ hertz.

Directions : The following questions consists of two statements, one labelled as Assertion (A) and the other labelled as Reason (R). You are to examine these two statements carefully and decide if the Assertion A and the Reason R are individually true and if so, whether the Reason is a correct explanation of the Assertion. Select your answers to these items using the codes given below:

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false but R is true.
51. **Assertion:** Density of all the nuclei is same.
Reason: Radius of nucleus is directly proportional to the cube root of mass number.
52. **Assertion:** Danger signals are made of red colour.
Reason: Velocity of red light is maximum and thus more visibility in dark.
53. **Assertion:** Current and time both have direction as well as magnitude but still are not considered vector.
Reason: They do not follow laws of vector addition.
54. **Assertion:** If polar ice melts, days will be longer.
Reason: Moment of inertia increases and thus angular velocity decreases.
55. **Assertion:** Endoscopy involves use of optical fibres to study internal organs
Reason: Optical fibres are based on phenomena of total internal reflection.
56. **Assertion:** Cyclotron does not accelerate electrons.
Reason: Mass of electrons is very small.
57. **Assertion:** Good conductors of heat are also good conductors of electricity and vice versa.
Reason: Mainly electrons are responsible for these conductions.
58. **Assertion:** Air at some distance above the fire is hotter than the same distance below it.
Reason: Air surrounding the fire carries heat

upwards.

59. **Assertion:** If a convex lens is kept in water its convergent power decreases.
Reason: Focal length of convex lens in water increases.
60. **Assertion:** If current is flowing through a machine of iron eddy currents are produced.
Reason: Change in magnetic flux through an area causes eddy currents.

CHEMISTRY

61. Oxidation state of sulphur in S_8 , H_2S and S_2F_2 is
 (a) 0, -2, -1 (b) 0, +2, -1
 (c) 1, -2, +1 (d) 0, -2, +1.
62. Which of the following is paramagnetic?
 (a) NO_2 (b) N_2O
 (c) N_2O_3 (d) N_2O_5 .
63. $CuSO_4$ dissolves in NH_3 due to the formation of
 (a) $Cu(OH)_2$ (b) $Cu[(NH_3)_4]SO_4$
 (c) $Cu[(NH_3)_4(OH)_2]$ (d) CuO .
64. 12 g of an alkaline earth metal gives 14.8 gm of its nitride. Atomic weight of the metal is
 (a) 12 (b) 20
 (c) 40 (d) 14.8.
65. Which of the following has a tendency for covalent compound formation?
 (a) Na (b) Mg
 (c) Ca (d) Ba.
66. A gas z is bubbled through a solution containing x^- and y^- . If the reduction potential are in the order $x > y > z$, then
 (a) y will oxidise z and not x
 (b) y will oxidise x and not z
 (c) y will oxidise both x and z
 (d) y will reduce both x and z.
67. A molecule contains atoms x and y so that x occurs at the corners of the cube while y at the face centre. The formula of the molecule can be
 (a) xy_3 (b) x_3y
 (c) xy_2 (d) x_2y .
68. Which of the following is true about ClO_2 ?

- (a) it is paramagnetic
(b) it dimerises in liquid phase
(c) it is an linear molecule
(d) it is very reactive.
69. The formula of microcosmic salt and the product obtained by heating it is
(a) $\text{Na}(\text{NH}_4)\text{PO}_4$; NaPO_3
(b) $\text{Na}(\text{NH}_4)_2\text{HPO}_4$; NaPO_3
(c) $\text{Na}(\text{NH}_4)\text{HPO}_4$; NaPO_4
(d) $\text{Na}(\text{NH}_4)\text{HPO}_4$; NaPO_3 .
70. CO_2 is liberated on adding sodium carbonate to a carboxylic acid. The carbon of CO_2 comes from
(a) carboxylic group (b) carbonate
(c) alkyl group (d) methyl.
71. Which is not hydrolysed:
(a) PCl_3 (b) NCl_3
(c) AsCl_3 (d) SnCl_3 .
72. In dichromate dimer
(a) 4 Cr – O bonds are equal
(b) 6 Cr – O bonds are equal
(c) all Cr – O bonds are equal
(d) all Cr – O bonds are unequal.
73. Which of the following don't act as Lewis acid?
(a) BF_3 (b) SnCl_4
(c) CCl_4 (d) SF_3 .
74. The percentage of CH_4 in coal gas is
(a) 10-15% (b) 25-35%
(c) 2-5% (d) 35-50%.
75. The enthalpy change for the following reaction $\text{NaOH}_{(\text{aq})} + \text{HCl}_{(\text{aq})} \rightarrow \text{NaCl}_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$ is -57 kJ . Predict the value of the enthalpy change in the following reaction.
 $\text{Ba}(\text{OH})_2 + \text{H}_2\text{SO}_{4(\text{aq})} \rightarrow \text{BaSO}_{4(\text{s})} + 2\text{H}_2\text{O}_{(\text{l})}$
(a) -57 kJ (b) -76 kJ
(c) -114 kJ (d) -228 kJ .
76. Which of the following 0.1 M solution will show maximum boiling point?
(a) sodium chloride (b) copper chloride
(c) magnesium sulphate
(d) chromium sulphate.
77. In the formation of $[\text{Ni}(\text{CN})_4]^{2-}$, the type of hybridisation involved is
(a) sp^2 (b) sp^3d
(c) dsp^2 (d) sp^3d .
78. The unit in which the solubility product of barium phosphate is expressed as
(a) $\text{mol}^2 \text{ dm}^{-6}$ (b) $\text{mol}^3 \text{ dm}^{-9}$
(c) $\text{mol}^4 \text{ dm}^{-12}$ (d) $\text{mol}^5 \text{ dm}^{-15}$.
79. Helium atom is two times heavier than a hydrogen molecule. At 298 K, the average kinetic energy of the helium atom is
(a) two times that of a hydrogen molecule
(b) same as that of a hydrogen molecule
(c) four times that of a hydrogen molecule
(d) half that of a hydrogen molecule.
80. The boiling point of CCl_4 is higher than that of CHCl_3 because
(a) CHCl_3 forms hydrogen bonds
(b) CCl_4 is highly soluble in water
(c) CCl_4 has strong van der Waal's forces of attraction than CHCl_3
(d) CCl_4 is more ionic than CHCl_3 .
81. Salicylic acid is prepared from phenol by
(a) Reimer - Tiemann reaction
(b) Kolbe's synthesis
(c) Gattermann's reaction
(d) None of the above.
82. The salient feature of the theory of absolute reaction rates is the
(a) formation of activated complex
(b) collision of the reactant molecules
(c) matching potential energy of the reactant molecules
(d) decrease of entropy of the reactant molecules.
83. Portland cement contains the following amount of CaO
(a) 5-15% (b) 20-35%
(c) 50-60% (d) 70-80%.
84. In dichromate dimer
(a) 4 Cr – O bonds are equal
(b) 6 Cr – O bonds are equal
(c) all Cr – O bonds are equal
(d) all Cr – O bonds are unequal.
85. Acetamide and ethylamine can be distinguished by reacting with

- (a) dilute HCl and heat
(b) NaOH solution and heat
(c) acidified KMnO_4 (d) Br_2 water.
86. A vessel of one litre capacity containing 1 mole of SO_3 is heated till a state of equilibrium is attained.

$$2\text{SO}_3(g) \rightleftharpoons 2\text{SO}_2(g) + \text{O}_2(g)$$
 At equilibrium, 0.6 moles of SO_2 had formed. The value of equilibrium constant is
 (a) 0.18 (b) 0.36
 (c) 0.45 (d) 0.68.
87. Gasoline is a mixture of hydrocarbons containing
 (a) C_3 to C_5 carbon atoms
 (b) C_7 to C_9 carbon atoms
 (c) C_{12} to C_{16} carbon atoms
 (d) C_{14} to C_{18} carbon atoms.
88. Identify the product in the reaction.
- $$\text{C}_6\text{H}_6 \xrightarrow[\text{Reflux}]{\text{HNO}_3/\text{H}_2\text{SO}_4} \text{intermediate compound} \xrightarrow{\text{Sn/HCl}} \text{product.}$$
- (a) $\text{C}_2\text{H}_5\text{NO}_2$ (b) $\text{C}_6\text{H}_4(\text{NO}_2)_2$
 (c) $\text{C}_6\text{H}_4 \begin{smallmatrix} \text{NO}_2 \\ \text{NH}_2 \end{smallmatrix}$ (d) $\text{C}_6\text{H}_4 \begin{smallmatrix} \text{NH}_2 \\ \text{NH}_2 \end{smallmatrix}$
89. Tempering steel is a process of heating
 (a) steel in contact with carbon and quenching it
 (b) steel in the presence of ammonia and quenching it
 (c) the hardened steel to a temperature below redness and cooling it slowly
 (d) steel to bright redness and quenching it.
90. Which of the following ions in aqueous solution is the best conductor of electricity?
 (a) Li^+ (b) Na^+
 (c) Mg^{2+} (d) Cs^+ .
91. If the r.m.s. speed of a gas molecule at 27°C is $100\sqrt{2} \text{ ms}^{-1}$ the r.m.s. speed at 327°C would be
 (a) 100 ms^{-1} (b) 200 ms^{-1}
 (c) 300 ms^{-1} (d) 400 ms^{-1} .
92. Sodium thiosulphate is used in photography to
 (a) reduce AgBr grains to metallic Ag
 (b) dissolve out Ag produced by reduction
 (c) remove unaffected AgBr in the photographic film or plate
 (d) none of these.
93. Nitrogen and oxygen exist as diatomic but their congeners are P_4 and S_8 respectively. This is due to
 (a) phosphorus and sulphur are solids
 (b) phosphorus and sulphur polymerise as soon as they are formed
 (c) phosphorus and sulphur catenate due to the existence of d -orbitals and form strainless structures
 (d) none of these.
94. The IUPAC name of $\text{CH} \equiv \text{C} - \text{CH} = \text{CH} - \text{CH}_3$ is
 (a) pent-1-yn-3-ene (b) pent-3, ene-1, yne
 (c) pent-2-ene-4 yne (d) 3-ene-pent-1 yne.
95. The AsF_5 molecule is trigonal pyramidal. The hybrid orbitals used by the As atoms for bonding are
 (a) $d_{x^2-y^2}, d_{z^2}, s, p_x, p_y$
 (b) d_{xy}, s, p_x, p_y, p_z
 (c) $s, p_x, p_y, p_z, d_{z^2}$
 (d) $d_{x^2-y^2}, s, p_x, p_y, p_z$.
96. Which one of the following is the correct order of the size of iodine species?
 (a) $\text{I} > \text{I}^- > \text{I}^+$ (b) $\text{I} > \text{I}^+ > \text{I}^-$
 (c) $\text{I}^+ > \text{I}^- > \text{I}$ (d) $\text{I}^- > \text{I} > \text{I}^+$.
97. Philosopher's wool when heated with BaO at 1100°C gives a compound. Identify the compound.
 (a) BaZnO_2 (b) $\text{Ba} + \text{ZnO}_2$
 (c) BaCdO_2 (d) $\text{BaO}_2 + \text{Zn}$.
98. The pH value of 0.1 M NaOH solution is (when there is a given reaction $[\text{H}^+][\text{OH}^-] = 10^{-14}$)
 (a) 13 (b) 12
 (c) 11 (d) 2.
99. Which of the following have nonlinear structure?
 (a) $\text{Ag}(\text{NH}_3)_2^+$ (b) HgCl_2
 (c) SnCl_2 (d) BeCl_2 .
100. Identify the transition element:
 (a) $1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^2$
 (b) $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^{10}, 4s^2 4p^1$
 (c) $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^{10}, 4s^2 4p^6$
 (d) $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^2, 4s^2$.
101. The edge length of face centred unit cube cell is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is
 (a) 288 pm (b) 398 pm
 (c) 144 pm (d) 618 pm.

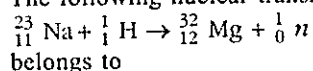
102. A certain aqueous solution of FeCl_3 [formula mass = 162] has a density of 1.1 g/mL and contains 20.0% FeCl_3 . Molar concentration of this solution is

- (a) 0.028 (b) 0.163
(c) 1.357 (d) 1.47.

103. The combustion enthalpies of carbon, hydrogen and methane are $-395.5 \text{ kJ mol}^{-1}$, $-284.8 \text{ kJ mol}^{-1}$ and $-890.4 \text{ kJ mol}^{-1}$ respectively at 25°C . The value of standard formation enthalpies of methane at that temperature is

- (a) $890.4 \text{ kJ mol}^{-1}$ (b) $-298.8 \text{ kJ mol}^{-1}$
(c) $-74.7 \text{ kJ mol}^{-1}$ (d) $-107.7 \text{ kJ mol}^{-1}$.

104. The following nuclear transmutation



belongs to

- (a) (n, L) type (b) (p, n) type
(c) (L, n) type (d) (d, p) type.

105. Baking soda or baking powder is

- (a) washing soda (b) caustic soda
(c) soda ash
(d) sodium bicarbonate.

106. NaOH is prepared by the electrolysis of

- (a) aqueous solution of sodium chloride with platinum electrode
(b) sodium chloride solution with graphite anode and iron cathode
(c) sodium carbonate with platinum electrodes
(d) sodium carbonate with nickel electrodes.

107. The process associated with sodium carbonate manufacture is known as process.

- (a) Chamber (b) Haber
(c) Le-Blanc (d) Castner.

108. Identify the correct statement:

- (a) Elemental sodium can be prepared and isolated by electrolysis of an aqueous solution of sodium chloride.
(b) Elemental sodium is a strong oxidising agent.
(c) Elemental sodium is insoluble in ammonia.
(d) Elemental sodium is easily oxidised.

109. An ore of potassium is

- (a) carnallite (b) cryolite
(c) bauxite (d) dolomite.

110. Which has lowest thermal stability?

- (a) Li_2CO_3 (b) Na_2CO_3
(c) K_2CO_3 (d) Rb_2CO_3 .

Directions : The following questions consists of two statements, one labelled as Assertion (A) and the other labelled as Reason (R). You are to examine these two statements carefully and decide if the Assertion A and the Reason R are individually true and if so, whether the Reason is a correct explanation of the Assertion. Select your answers to these items using the codes given below:

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(d) A is false but R is true.

111. **Assertion:** Formic acid reduces mercuric chloride to mercurous chloride on heating, while acetic acid does not.

Reason: Formic acid is stronger than acetic acid.

112. **Assertion:** Bond order can have positive, negative or fractional value.

Reason: Bond order depends upon the bonding and antibonding orbital electrons.

113. **Assertion:** H_3PO_3 is dibasic acid.

Reason: Two hydrogen atoms are directly attached to the P.

114. **Assertion:** Heat of neutralization for both HNO_3 and HCl with NaOH is 53.7 kJ/mole .

Reason: NaOH is a strong electrolyte/base.

115. **Assertion:** Pb^{4+} can be reduced easily to Pb^{2+} .

Reason: Pb^{2+} is paramagnetic.

116. **Assertion:** Maleic acid shows geometrical isomerism.

Reason: It has $-\text{C}=\text{C}-$ bond.

117. **Assertion:** 0.1 M solution of glucose has same increment in the freezing point than 0.1 M solution of urea.

Reason: K_f for both has same value.

118. **Assertion:** When an atom in group 1A of the periodic table undergoes radioactive decay by emitting a positron, the resulting element belongs to zero group.

Reason: When an atom emits a positron, its atomic number increases by one unit.

119. *Assertion:* Alkenes and cycloalkanes series of hydrocarbons have same general formula.

Reason: Either insertion of a double bond or formation of a ring reduce the number of hydrogen atoms of corresponding alkane by 2.

120. *Assertion:* The carbon atoms of the benzene ring may be numbered for identification of substituent groups, just as a continuous chains of carbon atoms are numbered.

Reason: Smallest set of numbers designating the substituents is the preferred set.

BIOLOGY

121. Which of the following organism is found in lymph nodes?
 (a) *Plasmodium* (b) *Wuchereria*
 (c) *Taenia* (d) *Diplococcus*.
122. "Gametes are never hybrid". This is a statement of
 (a) law of dominance
 (b) law of independent assortment
 (c) law of segregation
 (d) law of random fertilisation.
123. Mendel was not able to say anything about recombination and crossing over because
 (a) he did not have a large and strong microscope
 (b) he chose only pure type
 (c) traits he chose, were not linked and present on different chromosomes or were far apart
 (d) traits he chose had no genes.
124. Sprain is due to excessive pulling of
 (a) tendon (b) muscle
 (c) ligament (d) neurons.
125. A man suddenly sees a tiger. His heart beat goes up, blood pressure increases, etc. Which hormone is released at this time in his body.
 (a) parathormone (b) corticoid
 (c) adrenaline (d) thyroxine.
126. A scientist wants to study the viral effects on plants. Which of the following part of the plant should he exclude?
 (a) phloem (b) pith
 (c) cortex (d) shoot apex.
127. A man has enlarged breasts, sparse hair on body and sex compliment as XXY. He then suffers from
 (a) Down's syndrome (b) Klinefelters syndrome
 (c) Edward's syndrome (d) Turner's syndrome.
128. "They have raised cheek bones, oblique eyes and yellowish skin colours". Here they refers to
 (a) Adrenoids (b) Negroids
 (c) Mongoloids (d) Africans.
129. Urea is transported by
 (a) plasma (b) RBC
 (c) blood plasma (d) WBC.
130. In fast swimming fishes, propulsion is due to
 (a) pelvic fin (b) pectoral fin
 (c) dorsal fin (d) caudal fin.
131. While dissecting a rat, when you are pinning the rat in the dissecting tray, which side should face you?
 (a) dorsal (b) ventral
 (c) anterior (d) lateral.
132. The molecule which mainly absorb light energy and convert it to chemical energy in photosynthesis are
 (a) chlorophyll (b) chlorophyll *a*
 (c) chlorophyll *b* (d) xanthophyll.
133. Apical dominance can be overcome by application of
 (a) auxin (b) cytokinin
 (c) florigen (d) gibberellin.
134. Thickening of arteries due to cholesterol deposition is
 (a) arteriosclerosis (b) rheumatic heart
 (c) blood pressure (d) cardiac arrest.
135. Blood vessels in *Pheretima*, which have valves are
 (a) dorsal (b) ventral
 (c) integumentary (d) lateral.
136. Rate of transpiration can be measured by
 (a) Ganong's potometer (b) porometer
 (c) auxanometer (d) respirometer.
137. If we take food rich in lime juice, then
 (a) action of ptyalin on starch is enhanced
 (b) action of ptyalin on starch is reduced
 (c) action of ptyalin on starch is unaffected
 (d) action of ptyalin on starch stops.
138. Why do we move our hands while walking?

- (a) to relieve our tension
(b) to walk faster
(c) to maintain equilibrium against force of gravity
(d) to increase blood circulation.
139. Transverse section of a plant is stained with safranin and fast green. What is the colour of the phloem?
(a) red (b) green
(c) pink (d) orange.
140. Gene which suppresses other gene's activity but does not lie on the same locus is called as
(a) epistatic (b) supplementary
(c) hypostatic (d) codominant.
141. Resolving limit of our eye is
(a) 1' (b) 1''
(c) 1/60' (d) 1/60''.
142. Root cap is formed by
(a) dermatogen (b) calyptragen
(c) vascular cambium (d) wound cambium.
143. Amniocentesis is
(a) digestion of amino acid
(b) conversion of glucose to amino acids
(c) taking out of cells near the foetus
(d) killing of child before birth.
144. Malignant tertian malaria is caused by
(a) *Plasmodium vivax* (b) *P. ovale*
(c) *P. falciparum* (d) *P. malariae*.
145. A bacterial cell divides once every minute and it takes 1 hour to fill a cup. How much time will it take to fill half the cup?
(a) 30 minutes (b) 60 minutes
(c) 29 minutes (d) 59 minutes.
146. In 1929, a scientist discovered an antibiotic which was found very effective. The name of the scientist and the antibiotic, respectively are
(a) Alexander Fleming, Penicillin
(b) Alexander Fleming, Streptomycin
(c) Alexander, Penicillin
(d) None of the above.
147. Albinism and phenylketonuria are disorders due to
(a) recessive autosomal genes
(b) dominant autosomal genes
(c) recessive sex genes
(d) dominant sex genes.
148. A man has a wound. Normally a bleeding wound develops a clot and flow of blood stops. If this does not happen to the man, then he probably suffers from
(a) AIDS (b) tetanus
(c) haemophilia (d) malaria.
149. Which of the following is the best way to determine paternity?
(a) protein analysis
(b) chromosome counting
(c) DNA finger printing
(d) gene counting.
150. Coiling of a tendril around a support is an example of
(a) photonasty (b) thigmonasty
(c) nyctinasty (d) hydronasty.
151. You met a person who has bulging/protruding eyes, tachycardia and higher body temperature. He suffered from
(a) hyperthyroidism (b) acromegaly
(c) diabetes (d) cretinism.
152. One of the possible early sources of energy were/
was
(a) CO₂ (b) chlorophyll
(c) green plants
(d) UV rays and lightening.
153. The limiting factor in nitrification of soil is
(a) soil nature (pH) (b) light
(c) temperature (d) air.
154. Colchicine inhibits
(a) prophase (b) anaphase
(c) interphase (d) spindle formation.
155. Blood pressure is measured by
(a) sphygmomanometer (b) stethoscope
(c) electrocardiogram (d) phonocardiogram.
156. The most important source of energy on earth is
(a) ATP molecules (b) chlorophyll
(c) xanthophyll (d) carotenoids.
157. Sexual reproduction in which DNA of bacteria is transferred to another by the help of bacteriophage is
(a) transformation (b) transduction
(c) transcription (d) conjugation.
158. A person is suffering from impaired nervous

- system and madness after prolonged consumption of polluted water. Which metal is responsible?
- (a) Hg (b) Ca
(c) Mn (d) Pb.
159. Body temperature of cold blooded animals
- (a) is constant
(b) fluctuates with surrounding temperature
(c) becomes very low at times
(d) is very cold.
160. Plants can be cultivated in soil less medium where all required nutrients are supplied from the outside in water solution, this method comes under
- (a) water culture (b) hydroponics
(c) hybrid culture (d) critical culture media.
161. A part of brain of frog is removed which helps it to respire and locomote. The removed part of brain is
- (a) medulla oblongata (b) diencephalon
(c) cerebellum (d) cerebral hemisphere.
162. Which enzyme digests peptides releasing amino acid one by one?
- (a) pepsin (b) trypsin
(c) peptidases (d) aminopeptidase.
163. Cyanobacteria helps farmers by
- (a) reducing the alkanity of the soil
(b) reducing the acidity of the soil
(c) neutralising the alkanity of the soil
(d) water logging.
164. A person having parkinson's disease shows defective action of which neurotransmitter in brain
- (a) dopamine (b) serotonin
(c) noradrenaline (d) eukalphia.
165. Most of the plants cultivated in agriculture are actually belonging to the succession level
- (a) early 1° succession (b) late 1° succession
(c) early 2° succession (d) late 2° succession.
166. A plant has a butterfly shaped flower with one standard two wing like and two keel petals. The plant belongs to the family
- (a) papilionaceae (b) compositae
(c) malvaceae (d) rubiaceae.
167. The part of cauliflower that we eat is
- (a) stem (b) leaf
(c) flower (d) inflorescence.
168. The vacuoles are surrounded by a thin membrane called
- (a) plasmodesmata (b) hydathodes
(c) tonoplast (d) both (b) and (c).
169. Pneumolaxis and inhibitory centres are associated with
- (a) breathing (b) respiration
(c) digestion (d) sleeping.
170. The conidiophores of *Penicillium* are
- (a) uninucleate and colourless
(b) uninucleate and pigmented
(c) binucleate and pigmented
(d) binucleate and pigmented.
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171. **Assertion:** Hearing aids help the hearing impaired to hear.
Reason: They make sound travel through skull bones.
172. **Assertion:** Cyanobacteria are photosynthetic, blue green algae with all the prokaryotic structures.
Reason: They are green due to presence of chloroplasts.
173. **Assertion:** Plants also have hormones called as phytohormones.
Reason: They increase the rate of reactions and thus always accelerate growth and other related changes.
174. **Assertion:** Leguminous plants are best preferred for rotation of crops.
Reason: They have root nodules which have nitrogen fixing bacterium *Clostridium*.
175. **Assertion:** Cancer is contagious and cells can spread from one person to other.
Reason: Cancerous cells are highly dedifferentiated cells.

176. *Assertion:* Fruit juices taste bitter on being kept for some time.

Reason: Microorganisms of the air spoil it quickly.

177. *Assertion:* Amphibians have evolved from fishes.

Reason: Take the example of the fossil *Archaeopteryx*.

178. *Assertion:* Vascular cambium is considered as lateral meristem.

Reason: It gives rise to lateral shoots.

179. *Assertion:* Person with blood group AB can take blood from any other person.

Reason: Blood group incompatibility is due to antigen-antibody reaction. Blood group AB has no antibody and thus the antigen of the other group is not affected.

180. *Assertion:* Snakes exposed to gamma rays become non poisonous.

Reason: Poisonous snakes have poison glands and a pair of poison fangs. They are affected by gamma rays.

GENERAL KNOWLEDGE

181. India's one billionth baby was born on 12, May 2000 in

- (a) Safdurjung Hospital, New Delhi
- (b) Maternity Hospital, Bombay
- (c) Christian Medical College, Vellore
- (d) City Hospital, Chennai.

182. *Abhigyan Shakuntalam* has been written by

- (a) Tulsidas
- (b) Kalidasa
- (c) Valmiki
- (d) Kabir.

183. Who is the chairman of Censor Board of India?

- (a) Shatrughan Sinha
- (b) Mala Sinha
- (c) Asha Parekh
- (d) Rajesh Khanna.

184. In India, whose sign is found on currency note?

- (a) President of India
- (b) Finance Minister
- (c) Prime Minister
- (d) Governor, Reserve Bank.

185. Who won the wimbeldon women's singles 99?

- (a) Stephy Graph
- (b) Lindsay Devenporti
- (c) Martina Hingris
- (d) Martina Navratilova.

186. Gyanpeeth award' 98 was honoured to

- (a) Gireesh Karnad
- (b) Arundhati Roy
- (c) Asha Sharan Devi
- (d) A.B. Vajpayee.

187. Full form of "SAARC"

- (a) South Asian Association for Regional Coordination
- (b) South Asian Association for Regional Cooperation
- (c) South African Agriculture Research Council
- (d) South Asia And Rest Countries.

188. Suez canal joins

- (a) Red sea and Dead sea
- (b) Red sea and Mediteranian sea
- (c) Dead sea and Mediteranian sea
- (d) Pacific and Atlantic sea.

189. Full form of "http"

- (a) hyper text transfer programme
- (b) hyper text transfer protocol
- (c) hyper text transfer protocol
- (d) high tech. testing protocol.

190. First surface to surface missile test fired in India

- (a) Prithvi
- (b) Agni
- (c) Rohini
- (d) Naga.

191. What are bulls in stock market?

- (a) stock brokers
- (b) steady games
- (c) big losses
- (d) big gains.

192. What is fiscal deficit?

- (a) same as budget deficit
- (b) difference between expenditure and revenue earned
- (c) annual debt
- (d) repayed debts and their interests.

193. What is the full form of DOT?

- (a) Direct Observation Treatment
- (b) Distant Observation Treatment

- (c) Domestic Oral Treatment
(d) Duel Oriented Treatment.
194. Which Indian city is known as 'Space City'?
- (a) Hyderabad
(b) Ahmedabad
(c) Bangalore
(d) Thiruvananthapuram
195. Dronacharya Award is given to
- (a) Teachers
(b) Sports coaches
(c) Retired sports persons
(d) National Champion in Archery
196. Who wrote 'Sare Jahan Se Achchha Hindostan Hamara'?
- (a) Ram Prasad Bismil
(b) Iqbal
(c) Rabindra Nath Tagore
(d) Bankim Chandra Chatterjee.
197. Which is the highest gallantry award ?
- (a) Ashoka Chakra
(b) Param Vir Chakra
(c) Mahavir Chakra
(d) None of these.
198. At what temperature do both the Centigrade and Fahrenheit thermometers show the same reading?
- (a) -20° (b) -40°
(c) 42° (d) 0°
199. Dr. C.V. Raman was awarded Nobel Prize in
- (a) Physics (b) Medicine
(c) Chemistry (d) Literature.
200. Greenhouse effect means
- (a) trapping of solar energy due to atmospheric carbon dioxide
(b) pollution in the tropical region
(c) trapping of solar energy due to Nitrogen in atmosphere
(d) planting of green trees.

