SOLVED PAPER
AIIMS - 2001

Time : 3½ Hours Max. Marks : 200

PHYSICS

1. Two coherent monochromatic light beams of amplitude 3 and 5 units are superposed. The maximum and minimum possible intensities in the resulting beams are in the ratio
(a) 4 : 2 (b) 16 : 1
(c) 8 : 2 (d) 4 : 2.

2. Two masses are attached to a rod end to end. If torque is applied they rotate with angular acceleration α. If their distances are doubled and same torque is applied, then they move with angular acceleration
(a) 4α (b) α
(c) 3α (d) $\alpha/4$.

3. A particle is revolving in a circle of radius R. If the force acting on it is inversely proportional to R, then the time period is proportional to
(a) R (b) R^2
(c) $1/R$ (d) $1/R^2$.

4. At a place earth's magnetic field, 5×10^5 Wb/m^2 is acting perpendicular to a coil of radius $R = 5$ cm. If $\mu_0/4\pi = 10^{-7}$, then how much current is induced in circular loop?
(a) 0.2 A (b) 0 A
(c) 4 A (d) 40 A.

5. An engine is working. It takes 100 calories of heat from source and leaves 80 calories of heat to sink. If the temperature of source is 127°C, then temperature of sink is
(a) 147°C (b) 47°C
(c) 100°C (d) 47 K.

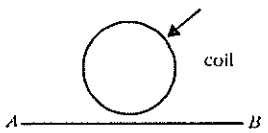
6. Speed in kilometer per hour in S.I. unit is represented as
(a) KMPH (b) Kmhr^{-1}
(c) Kmh^{-1} (d) kilometer/hour.

7. Colour of a star depends upon
(a) luminosity (b) temperature
(c) brightness (d) all of these.

8. Dimension of resistivity is
(a) $ML^2T^{-2}I^{-1}$ (b) $ML^3T^{-3}I^{-2}$
(c) $ML^3T^{-2}I^{-1}$ (d) $ML^2T^{-2}I^{-2}$.

9. If mass of an atom is M moving with speed v, what will be its speed after the emission of an α-particle if speed of α-particle is zero ?
(a) $\frac{Mv}{M+2}$ (b) $\frac{Mv}{M-4}$
(c) $\frac{Mv}{M+4}$ (d) $\frac{M-4}{Mv}$.

10. If electron is moving from A to B in wire AB, then current induced in the coil is



(a) anticlockwise (b) clockwise
(c) arbitrary direction
(d) no current will be induced.

11. A wire of length l carries a steady current. It is bent first to form a circular plane loop of one turn. The magnetic field at the centre of the loop is B. The same length is now bent more sharply to give a double loop of smaller radius. The magnetic field at the centre caused by the same is
(a) B (b) $B/4$
(c) $4B$ (d) $B/2$.

12. A metal rod consumes power P on passing current. If it is cut into two half and joined in parallel, it will consume power
(a) P (b) $2P$
(c) $4P$ (d) $P/4$.

13. A body of mass M moving with velocity V

explodes into two equal parts. If one comes to rest and the other body moves with velocity v, what would be the value of v ?

(a) V (b) $V/\sqrt{2}$

(c) $4V$ (d) $2V$.

14. Which of the following physical quantities do not have same dimensions?

(a) pressure and stress

(b) tension and surface tension

(c) strain and angle (d) energy and work.

15. A solid sphere and a hollow sphere are heated the same temperature. Point out the true statement.

(a) hollow sphere cools more quickly.

(b) both hollow and solid sphere cools equally.

(c) solid sphere cools more quickly.

(d) none of the statement is true.

16. The orbital velocity of an artificial satellite in a circular orbit above the earth's surface at a distance equal to radius of earth is v. For a satellite orbiting at an altitude half of earth's radius, orbital velocity is

(a) $\frac{3}{2}v$ (b) $\sqrt{3/2}\,v$

(c) $2/\sqrt{3}\,v$ (d) $\frac{2}{3}v$.

17. The time period of a simple pendulum is T remaining at rest inside a lift. Find the time period of pendulum when lift starts to move up with an acceleration of $g/4$.

(a) T (b) $T/2$

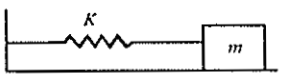
(c) $2T/5$ (d) $2T/\sqrt{5}$.

18. 1 Kcal of heat flowing through a rod of iron. When the rod is cut down to 4 pieces then what will be the heat flowing through each piece having same differential temperature?

(a) 1/2 Kcal (b) 1/4 Kcal

(c) 1 Kcal (d) 1/15 Kcal.

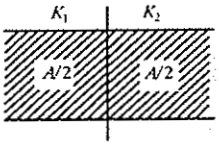
19. From the given figure find the frequency of oscillation of the mass m.



(a) $n=\frac{1}{2\pi}\sqrt{\frac{K}{m}}$ (b) $n=\frac{1}{2\pi}\sqrt{\frac{K^2}{2m}}$

(c) $n=2\pi\sqrt{\frac{m}{2K}}$ (d) $n=\frac{1}{2\pi}\sqrt{\frac{K}{2m}}$.

20. From the figure find the capacitance of the capacitor?



(a) $C=\frac{\varepsilon_0 A}{d}\left(\frac{K_1+K_2}{2}\right)$

(b) $C=\frac{\varepsilon_0 A}{2d}\left(\frac{K_1K_2}{K_1+K_2}\right)$

(c) $C=\frac{\varepsilon_0 A}{d}\left(\frac{K_1}{K_2}\right)$

(d) $C=\frac{\varepsilon_0 A}{d}\left(\frac{2K_1K_2}{K_1+K_2}\right)$.

21. S.I. unit of velocity is

(a) m/s (b) m sec^{-1}

(c) m hr^{-1} (d) m/hr.

22. Mass of the proton is 1840 times that of electron. It is accelerated through a potential difference of 1 V. Find its kinetic energy.

(a) 6 eV (b) 2 eV

(c) 10 eV (d) 1 eV.

23. Two spheres of same metal have radii a and b. They have been connected to a conducting wire. Find the ratio of the electric field intensity upon them.

(a) a/b (b) b/a

(c) b^2/a (d) b^2/a^2.

24. The work function of a metal is 3.4 eV. If the frequency of incident radiation is increased to twice, then the work function of the metal becomes

(a) 3.4 eV (b) 7.2 eV

(c) 6.8 eV (d) 1.7 eV.

25. If red light is replaced by white light then width of diffraction pattern will

(a) increases (b) decreases

(c) a central white band is obtained

(d) no effect.

26. Maximum energy transfer for an elastic collision will occur if one body is at rest when

(a) $m_1=m_2$ (b) $m_2=\frac{1}{2}m_1$

(c) $m_1>>m_2$ (d) $m_2>>m_1$.

27. Which of the following is path dependent?
(a) U (b) PdV
(c) P (d) V.

28. If fundamental frequency is 50 and next successive frequencies are 150 and 250 then it is
(a) a pipe closed at both end
(b) a pipe closed at one end
(c) an open pipe (d) a stretched pipe.

29. If in a circuit current lags behind EMF by $\pi/2$. Then it is a/an
(a) resistor circuit (b) capacitor
(c) inductor circuit (d) CR circuit.

30. In Planck's oscillator energy is given as

$$E = \frac{h\nu}{\exp\left(\frac{h\upsilon}{Kt} - 1\right)}$$

If $K = 0$, then energy would be
(a) $h\upsilon$ (b) 0
(c) Kt (d) ∞.

31. Temperature of the star is determined by
(a) distance (b) colour
(c) size (d) none of these.

32. If hot water is mixed with cold water
(a) temperature first increases then become constant
(b) temperature first decreases then become constant
(c) increases continuously
(d) first it is uncertain then become constant.

33. For liquid to rise in a capillary tube, the angle of contact should be
(a) acute (b) obtuse
(c) right (d) none of these.

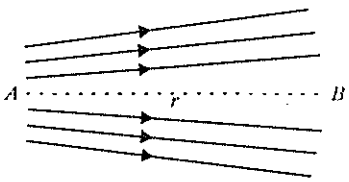
34. Escape velocity of a rocket is 11.2 km/sec. It is released at an angle of 45°. Its escape velocity is
(a) 11.2 m/sec (b) $11.2\sqrt{2}$ km/sec
(c) 11.2 km/sec (d) 22.3 km/sec.

35. X-ray beams are affected by
(a) electric field (b) magnetic field
(c) both (a) and (b) (d) none of these.

36. The heat produced in a long wire is characterised by resistance, current and time through which the current passes. If the errors in measuring these quantities are respectively 1%, 2% and 1%, then total error in calculating the energy produced is
(a) 4% (b) 6%
(c) 4/3% (d) 8%.

37. If a unit positive charge is taken from one point to another over an equipotential surface, then
(a) work is done on the charge
(b) work is done by the charge
(c) work done is constant
(d) no work is done.

38. Figure shows the electric lines of forces emerging from a



charged body. If the electric field at A and B are E_A and E_B respectively and if the displacement between A and B is r, then
(a) $E_A > E_B$ (b) $E_A < E_B$
(c) $E_A = E_B/r$ (d) $E_A = E_B/r^2$.

39. A charge is placed at the centre of cube of side a then flux linked with one of its given faces will be
(a) $\frac{Q}{\varepsilon_0}$ (b) $\frac{Q}{6\varepsilon_0}$
(c) $\frac{Q}{\varepsilon_0 a^2}$ (d) $\frac{Q}{4\pi\varepsilon_0 a^2}$.

40. A small piece of metal wire is dragged across the gap between the pole pieces of a magnet in 0·4 sec. If magnetic flux between the pole pieces is known to be 8×10^{-4} Wb, then induced emf in the wire, is
(a) 4×10^{-3} V (b) 8×10^{-3} V
(c) 2×10^{-3} V (d) 6×10^{-3} V.

41. If the earth is treated as a sphere of radius R and mass M, its angular momentum about the axis of its rotation with period T, is
(a) $\frac{MR^2T}{2\pi}$ (b) $\frac{4\pi MR^2}{5T}$
(c) $\frac{\pi MR^3}{T}$ (d) $\frac{2\pi MR^2}{T}$

42. Antimony and Bismuth are usually used in thermocouple, because
(a) a constant thermo e.m.f. is produced
(b) higher thermo e.m.f. is produced
(c) a negative thermo e.m.f. is produced
(d) lower thermo e.m.f. is produced.

43. A constant pressure air thermometer gave a reading of 47·5 units of volume when immersed in ice-cold water, and 67 units in a boiling liquid. The boiling point of the liquid, is
(a) 125°C (b) 100°C
(c) 135°C (d) 112°C.

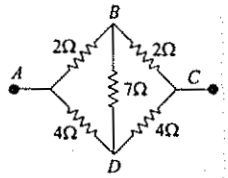
44. Two particles are seen to collide and move jointly together after the collision. During such a collision, for the total system,
(a) both the mechanical energy and the linear momentum are conserved
(b) linear momentum is conserved but not the mechanical energy
(c) neither the mechanical energy nor the linear momentum is conserved
(d) mechanical energy is conserved but not the linear momentum.

45. A body weighed 250 N on the surface assuming the earth to be a sphere of uniform mass density, how much would it weigh half way down to the centre of the earth?
(a) 195 N (b) 240 N
(c) 125 N (d) 210 N.

46. For an enclosure maintained at 1000 K, the maximum radiation occurs at wavelength λ_m. If the temperature is raised to 2000 K, the peak will shift to
(a) $\frac{5}{2}\lambda_m$ (b) $\frac{1}{2}\lambda_m$
(c) $\frac{7}{2}\lambda_m$ (d) $\frac{3}{2}\lambda_m$.

47. A certain radioactive element has a half-life of 20 years. If we have a block with 10 g of the element in it, after how many years will there be just 2·5 g of the element in the block?
(a) 80 years (b) 40 years
(c) 100 years (d) 60 years.

48. What is the dimensional formula for the gravitational constant ?
(a) $[M^{-1}L^3T^{-2}]$ (b) $[M^{-1}L^3T^{-1}]$
(c) $[M^{-2}L^3T^{-2}]$ (d) $[M^{-2}L^{-1}T^3]$.

49. The equivalent resistance between A and C of the given circuit, is


(a) 8 Ω
(b) $\frac{32}{12}\Omega$
(c) $\frac{4}{3}\Omega$ (d) $\frac{8}{3}\Omega$.

50. A source of frequency 240 Hz is moving towards an observer with a velocity of 20 m/s. The observer is now moving towards the source with a velocity of 20 m/s. Apparent frequency heard by observer, if velocity of sound is 340 m/s, is
(a) 268 Hz (b) 270 Hz
(c) 360 Hz (d) 240 Hz.

Directions for Questions 51-60 : In each of the following questions, a statement of Assertion (A) is given and a corresponding statement of Reason (R) is given just below it. Of the statements, mark the correct answer as -
(a) If both A and and R are true and R is the correct explanation of A.
(b) If both A and R are true but R is not the correct explanation of A.
(c) If A is true but R is false.
(d) If A is false but R is true.

51. *Assertion* (A) : Centripetal force does no work.
Reason (R) : Force and displacement are perpendicular to each other.

52. *Assertion* (A) : Skiers uses air glasses.
Reason (R) : Light reflected by snow is partially polarised.

53. *Assertion* (A) : LASER is used to measure distant object as moon.
Reason (R) : They are highly coherent source of light.

54. *Assertion* (A) : Work done in uniform circular motion is zero.
Reason (R) : Force is always directed along displacement.

55. *Assertion* (A) : At pole value of acceleration due to gravity (g) is greater than that of equator.
Reason (R) : Earth rotates on its axis in addition to revolving round the sun.

56. *Assertion* (A) : During reverse biasing a diode doesn't conduct current.
Reason (R) : It narrows the depletion layer.

57. *Assertion* (A) : On increasing the frequency of light larger number of photoelectrons are emitted.
Reason (R) : The number of electrons emitted depends on the intensity of incident light.

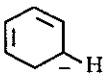
58. *Assertion* (A) : Soldiers are asked to break steps while crossing the bridge.
Reason (R) : The frequency of thick marching may be equal to the natural frequency of bridge and may lead to resonance which can break the bridge.

59. *Assertion* (A) : The time period of revolution of a satellite around a planet is directly proportional to the radius of the orbit of the satellite.
Reason (R) : Artificial satellite do not follow Kepler's laws of planatary motion.

60. *Assertion*: Electric appliances with metallic body *e.g.*, heaters, presses etc., have three pin connections, whereas an electric bulb has a two pin connection.
Reason: Three pin connections reduce heating of connecting cables.

CHEMISTRY

61. Which of the following is aromatic?

(a)  (b) 

(c)  (d) 

62. Which of the following is most stable carbocation?

(a) CH_3^+ (b) $CH_3\overset{+}{C}H_2CH_2$

(c) $CH_3\overset{+}{C}H_2CH_3$ (d) $CH_3-\underset{CH_3}{\overset{+}{C}H}-CH_3$

63. Hybridisation in CH_3, $\overset{+}{C}H_3$ and $\overset{-}{C}H_3$ are respectively

(a) sp^2, sp^2, sp^3 (b) sp^2, sp^3, sp^3
(c) sp^3, sp^3, sp^2 (d) sp^3, sp^2, sp^2.

64. In the following reaction order, B is

$$CH_3CH_2-COOH \xrightarrow{P/Br_2} A \xrightarrow[H^+]{\text{alc. KOH}} B$$

(a) $CH_2=CH-COOH$
(b) $CH_2-\underset{Br}{CH}-COOH$ (c) CH_3CH_2COBr
(d) CH_3CH_2OH.

65. Which of the following arrangement is possible?

	n	l	m	s
(a)	5	2	2	$+\frac{1}{2}$
(b)	2	2	0	$-\frac{1}{2}$
(c)	3	−2	1	$+\frac{1}{2}$
(d)	0	0	1	$+\frac{1}{2}$.

66. Strongest acid among the following is
(a) acetic acid (b) FCH_2COOH
(c) $F_2CHCOOH$ (d) F_3CCOOH.

67. Which of the following is strongest Bronsted base?
(a) ClO^- (b) ClO_2^-
(c) ClO_3^- (d) ClO_4^-.

68. Which of the following has highest hydration energy?
(a) $MgCl_2$ (b) $CaCl_2$
(c) $BaCl_2$ (d) $SrCl_2$.

69. In which of the following $p\pi$ - $d\pi$ bonding is possible?
(a) CO_3^{2-} (b) PO_4^{3-}
(c) NO_3^- (d) NO_2^-.

70. Which of the following is always feasible?
(a) $\Delta H = T\Delta S$
(b) ΔH (+ve), $T\Delta S$ (–ve) and $\Delta H > T\Delta S$
(c) ΔH (–ve), $T\Delta S$ (+ve) and $\Delta H < T\Delta S$
(d) ΔH (–ve), $T\Delta S$ (–ve) and $\Delta H > T\Delta S$.

71. Given that $C + O_2 \rightarrow CO_2$; $\Delta H° = -a$ kJ.
$2CO + O_2 \rightarrow 2CO_2$; $\Delta H° = -b$ kJ
The heat of formation of CO is

(a) $b - 2a$ (b) $\frac{2a-b}{2}$

(c) $\frac{b-2a}{2}$ (d) $2a - b$.

72. Which of the following hydrogen halide is most

basic?
(a) HF (b) HCl
(c) HBr (d) HI.

73. Which of the following is soluble in water?
(a) Be (b) Sr
(c) Mg (d) Ba.

74. When the temperature of reactions will increase then the effect on pH value will
(a) increase (b) decrease
(c) first increases then decreases
(d) remains same.

75. Hardest compound of boron is
(a) magnesium boride
(b) aluminium boride
(c) boron nitride (d) boron carbide.

76. Which of the following has highest second ionization energy?
(a) Ni (b) V
(c) Cr (d) Mn.

77. Smallest intermolecular distance is found in
(a) O_2 (b) O_2^{+2}
(c) O_2^- (d) O_2^{-2}.

78. The *p*H of aqueous solution of ammonium formate is
(pK_a of HCOOH = 3.8 and pK_b of NH_3 = 4.8)
(a) 7 (b) 6.0
(c) 6.5 (d) 8.9.

79. Which azide is explosive?
(a) $Ba(N_3)_2$ (b) NaN_3
(c) KN_3 (d) Mg_3N_2.

80. dsp^2 hybridisation is found in
(a) $[NiCl_4]^{2-}$ (b) $[COCl_4]^{2-}$
(c) $[CuCl_4]^{3-}$ (d) $[CuCl_4]^{2-}$.

81. Which of the following order of basic strength is correct?
(a) $NH_3 < NH_2OH < HN_3 < NH_2–NH_2$
(b) $NH_2OH < HN_3 < NH_2–NH_2 < NH_3$
(c) $HN_3 < NH_3 < NH_2OH < NH_2–NH_2$
(d) $HN_3 < NH_2OH < NH_2–NH_2 < NH_3$.

82. A packet of colloidal system is taken in which colloidal particles are still. Two electrodes are taken in system and voltage is applied so that liquid medium moves under the influence of electric field. This phenomenon is called
(a) dorn effect (b) electroosmosis
(c) electrophoresis (d) electrodialysis.

83. Which one forms KHX_2 type compound?
(a) HF (b) HCl
(c) HI (d) HBr.

84. Rate determining step in nitration of benzene is
(a) formation of NO_2^+
(b) formation of carbocation
(c) replacement of H atom
(d) none of these.

85. Which of the following is stable (inert) to fire?
(a) CCl_4 (b) C_2H_5OH
(c) CH_4 (d) C_4H_{10}.

86. The pH value of decinormal solution of NH_4OH which is 20% ionised is
(a) 12.95 (b) 12.30
(c) 14.70 (d) 13.30.

87. The composition of carnalite is
(a) $KCl·MgCl_2·6H_2O$ (b) $Na_2Al_2O_3$
(c) Fe_3O_4 (d) Na_3AlF_6.

88. A spoon to be electroplated with gold should be
(a) cathode (b) anode
(c) electrolyte (d) none of these.

89. Which of the following option w.r.t. increasing bond order is correct ?
(a) $NO < C_2 < O_2^- < He^+$
(b) $C_2 < NO < He^+ < O_2^-$
(c) $He^+ < O_2^- < NO < C_2$
(d) $He^+ < O_2^- < C_2 < NO$.

90. A solid *AB* has NaCl type structure. The radius of A^+ is 100 pm. What is the radius of B^-?
(a) 190.47 (b) 540.13
(c) 525 (d) 78.12.

91. Correct equation of Freundrich isotherm is
(a) $\log\left(\frac{x}{m}\right) = \log K + \frac{1}{n}\log C$
(b) $\log\left(\frac{m}{x}\right) = \log K + \frac{1}{n}\log C$

(c) $\log\left(\frac{x}{m}\right) = \log C + \frac{1}{K}\log C$

(d) $\log\left(\frac{x}{m}\right) = \log C + \frac{1}{n}\log K$.

92. Crystalline solids have
(a) short range order (b) long range order
(c) anisotropic distribution
(d) no order.

93. How many electrons are delivered at the cathode during electrolysis by a current of 1 A in 60 seconds
(a) 3.74×10^{20} (b) 6.0×10^{23}
(c) 7.48×10^{21} (d) 6.0×10^{20}.

94. In which of the following reaction $K_p > K_c$?
(a) $PCl_3 + Cl_2 \rightarrow PCl_5$ (b) $H_2 + I_2 \rightarrow 2HI$
(c) $2SO_3 \rightarrow O_2 + 2\ SO_2$
(d) $N_2 + 3H_2 \rightarrow 2NH_3$.

95. The IUPAC name of the compound having the formula CCl_3CH_2CHO is
(a) 2, 2, 2-trichloropropanal
(b) 1, 1, 1-trichloropropanal
(c) 3, 3, 3-trichloropropanal
(d) 1, 2, 1-dichloromethanal.

96. Which of the following molecule or ions is a bidentate ligand ?
(a) $C_2O_4^{2-}$ (b) Br_2^+
(c) CH_3NH_2 (d) $CH_3\text{-}C \equiv N$.

97. The number of electrons required to deposit 1 gm equivalent aluminium (atomic wt. = 27) from a solution of aluminium chloride will be
(a) 3 (b) 1
(c) 4 (d) 2.

98. Which of the following is a characteristic of a reversible reaction ?
(a) it never proceeds to completion
(b) it can be influenced by a catalyst
(c) it proceeds only in forward direction
(d) number of moles of reactants and products are equal.

99. How many litres of ammonia gas at S.T.P. would be needed to prepare 100 ml of 2·5 M ammonium hydroxide solution ?
(a) 5·6 lit (b) 0·056 lit
(c) 11·2 lit (d) 0·56 lit.

100. The equilibrium constant of a reaction is 300. If the volume of a reaction flask is trippled, the equilibrium constant will be
(a) 300 (b) 100
(c) 600 (d) 150.

101. Which of the following is the correct sequence of atomic weights of the given elements ?
(a) Ni > Co > Fe (b) Fe > Co > Ni
(c) Co > Fe > Ni (d) Co > Ni > Fe.

102. The aqueous solution of which of the following salt will have the lowest pH ?
(a) $NaClO_3$ (b) NaClO
(c) $NaClO_4$ (d) $NaClO_2$.

103. Which of the following alkanes is optically active?
(a) 3-methyl hexane (b) propane
(c) 2, 3, 4-trimethyl pentane
(d) 2-methyl butane.

104. A solution with pH = 2 is more acidic than one with a pH = 6, by a factor
(a) 4000 (b) 5000
(c) 8000 (d) 10 000

105. Vapour pressure of benzene at 30°C is 121.8 mm. When 15 g of a non-volatile solute is dissolved in 250 g of benzene, its vapour pressure is decreased to 120.2 mm. The molecular weight of the solute is
(a) 35.67 g (b) 356.7 g
(c) 432.8 g (d) 502.7 g

106. The BCl_3 is a planar molecule where as NCl_3 is pyramidal, because
(a) B–Cl bond is more polar than N–Cl bond
(b) N–Cl bond is more covalent than B–Cl bond
(c) nitrogen atom is smaller than boron atoms
(d) BCl_3 has no lone pair but NCl_3 has a lone pair of electrons

107. Which of the following compound is not coloured?
(a) $Na_2[CuCl_4]$ (b) $Na_2[CdCl_4]$
(c) $K_4[Fe(CN)_6]$ (d) $K_3[Fe(CN)_6]$

108. If 0.189 g of a chlorine containing organic compound gave 0.287 g of silver chloride, then the percentage of chlorine in the organic compound is

(a) 35.47 (b) 35.57
(c) 37.57 (d) 45.37

109. Which of the following statements is not true about alcohols?
(a) lower alochols have fiery taste and strong smell
(b) as molecular mass increases the boiling point increases
(c) lower alcohols are water insoluble and their solubility increases with molecular weight
(d) lower alcohols are water soluble and their solubility decreases with molecular weight

110. The electronic configuration $1s^2\ 2s^2\ 2p^5\ 3s^1$ shows
(a) ground state of fluorine atom
(b) excited state of fluorine atom
(c) excited state of neon atom
(d) excited state of ion O_2^-

Directions for Questions 111-120 : In each of the following questions, a statement of *Assertion (A)* is given and a corresponding statement of *Reason (R)* is given just below it. Of the statements, mark the correct answer as -
(a) If both A and and R are true and R is the correct explanation of A.
(b) If both A and R are true but R is not the correct explanation of A.
(c) If A is true but R is false.
(d) If A is false but R is true.

111. *Assertion (A)* : Relative strength of acids can be known by knowing the value of dissociation constant.
Reason (R) : It gives the value of H^+ dissolved in solution.

112. *Assertion (A) :* *o*-nitrophenol is more volatile than *p*-nitrophenol.
Reason (R) : Intramolecular hydrogen bonding is present in *o*-nitrophenol while intermolecular H - bonding is in *p*-nitrophenol.

113. *Assertion (A) :* CH_3OCH_3 and C_2H_5OH has comparable molecular weight but boiling point of C_2H_5OH is more than dimethyl ether.
Reason (R) : C_2H_5OH forms intermolecular H-bonding while CH_3OCH_3 forms intramolecular H-bonding.

114. *Assertion (A) :* $CHCl_3$ and CH_3OH are miscible.
Reason (R) : One of them is polar.

115. *Assertion (A) :* In some cases oxygen shows positive oxidation number though it is an electronegative element.
Reason (R) : Fluorine is more electronegative than oxygen.

116. *Assertion (A) :* B_2H_6, Si_2H_6 are said to have similar structure.
Reason (R) : They have same number of σ and π bonds.

117. *Assertion (A) :* Hydrogen nuclei combines to form helium nuclei then energy is released
Reason (R) : Binding energy/nucleon of He is greater than hydrogen.

118. *Assertion (A) :* Water is used as a moderator in nuclear reactor.
Reason (R) : Moderator is a light substance that absorb neutrons.

119. *Assertion*: Ionisation potential of B (atomic no.4) is less than Be (atomic no. 5).
Reason: The first electron released from Be is of *p*-orbital but that from B is of *s*-orbital.

120. *Assertion*: Na_2SO_4 is soluble in water while $BaSO_4$ is not.
Reason: Lattice energy of $BaSO_4$ exceeds its hydration energy.

BIOLOGY

121. If a stimulus, several times greater than the threshold stimulus is provided to a muscle fibre, it will:-
(a) contract with a larger force
(b) contract wih a smaller force
(c) contract with the same force
(d) undergo tetany.

122. During the cell cycle, 2 molecules of DNA are present in a chromosome in the:-
(a) G_1 phase
(b) beginning of S phase
(c) G_2 phase (d) end of M phase.

123. Barr Body is found in the cytoplasm during:-
(a) interphase in cell of female mammal
(b) interphase in cell of male mammal

(c) prophase in cell of female mammal
(d) prophase in cell of male mammal.

124. The respiratory centre in the brain is stimulated by:-
(a) CO_2 concentration in venous blood
(b) O_2 concentration in artery blood
(c) CO_2 concentration in artery blood
(d) O_2 concentration in venous blood.

125. Cocaine is a stimulant, which may cause addiction. It is an alkaloid obtained from:-
(a) *Eucalyptus* (b) *Erythroxylon*
(c) *Rauwolfia* (d) *Papaver*.

126. Some students, during a study, caught, marked and released 80 fishes in a pond. Later 100 fishes were caught at random. Among these 40 were found to be marked. What is the approximate number of fishes in the pond?
(a) 50 (b) 100
(c) 200 (d) 4000.

127. Which of these are considered most essential in the origin of life?
(a) enzymes (b) nucleic acids
(c) carbohydrates (d) proteins.

128. Wooden doors swell up and get stuck during the rainy season. This is due to the phenomenon of:-
(a) imbibition (b) endosmosis
(c) capillarity (d) deplasmolysis.

129. Which of these are most widely used in Genetic Engineering?
(a) plastid (b) plasmid
(c) mitochondria (d) ribosome.

130. Which floral family has (9) + 1 arrangement of anthers in the androecium
(a) malvaceae (b) rutaceae
(c) fabaceae (d) caesalpinaceae.

131. The ratio in a dihybrid test cross between two individuals is given by:-
(a) 2:1 (b) 1:2:1
(c) 3:1 (d) 1:1:1:1.

132. Porous wood contains:-
(a) vessels (b) fibres only
(c) tracheids (d) sieve tubes.

133. A human RBC is placed in 1.5% salt solution. It will:-
(a) swell up (b) shrink
(c) remain unaffected (d) burst.

134. A frog has its brain crushed. But when pinched on the leg, The leg draws away. It is an example of:-
(a) neurotransmitter induced response.
(b) simple reflex (c) conditioned reflex
(d) automated motor response.

135. Which of the following is an egg laying mammal:-
(a) kangaroo (b) *Platypus*
(c) penguin (d) whale.

136. In RNA thiamine is replaced by:-
(a) uracil (b) adenine
(c) thiamine (d) guanine.

137. All veins carries deoxygenated blood except:-
(a) pulmonary veins (b) hepatic vein
(c) hepatic portal vein (d) renal artery.

138. Genetic drift operates only in:-
(a) island population (b) smaller population
(c) larger population
(d) Mendelian population.

139. Which of the following pesticides is an acetylcho linesterase inhibitor?
(a) aldrin (b) BHC
(c) endosulfan (d) malathion.

140. The sphere of living matter together with water, air and soil on the surface of earth is called-
(a) atomosphere (b) hydrosphere
(c) lithosphere (d) biosphere.

141. Photorespiration, usually occurs in-
(a) one-cell organelles
(b) two cell organelles
(c) three cell organelles
(d) four cell organelles.

142. Clove is a part of
(a) flower
(b) thalamus of a flower
(c) auxillary bud (d) seed.

143. Velamen is a specialized tissue found in
(a) aerial roots of *Orchids*
(b) succulent leaves
(c) pneumatophores (d) stilt roots.

144. Hydroponics is
(a) cultivation of plants in water
(b) growth of plants towards water

(c) growth of plants away from water
(d) soil-less cultivation of plants.

145. Coconut's Husk fibre coir of commerce is extracted from
(a) epicarp (b) mesocarp
(c) endocarp (d) seed coat.

146. Induction of flowering by low temperature in plants is
(a) cryobiology (b) vernalization
(c) phototropism (d) pruning.

147. Viral diseases have no cure because
(a) viruses have no cell wall
(b) viruses can multiply repeatedly within the host cell
(c) presence of capsid
(d) virus possesses no cytoplasm.

148. Tadpoles can be made to grow in size by:-
(a) injecting thyroxine hormone
(b) feeding the eggs of other frogs
(c) injecting gonadotrophic hormones
(d) providing them with suitable climatic conditions.

149. Sella Turcica is found:-
(a) in bones (b) in joints.
(c) nearby pituitary (d) nearby thyroid.

150. Class Crustacea have following features
(a) cephalothorax, book lungs, chitinous exoskeleton
(b) head and thorax, biramous appendages, book lungs
(c) head and thorax, book lungs, chitinous exoskeleton
(d) cephalothorax, biramous appendages, gills.

151. Chloromycetin is obtained from
(a) *Streptomycetin venezualae*
(b) *Streptomycetin remosus*
(c) *Bacillus subtilis*
(d) *Clostridium botulimin.*

152. Mutualism is found in
(a) hermit crab and sea anemone
(b) butterfly and flower
(c) zoochlorellae and Hydra
(c) *E.coli* and man.

153. In respiration from 180g of glucose which of the following is formed
(a) 264gm CO_2 + 190gm H_2O + 391 Kcal
(b) 264gm CO_2 + 108gm H_2O + 686 Kcal
(c) 390gm CO_2 + 108gm H_2O + 686 Kcal
(d) 390gm CO_2 + 264gm H_2O + 391 Kcal.

154. Extranuclear genes occurs in
(a) plastids - and not inherited
(b) plasmid - and not inherited
(c) mitochondria - and inherited by female
(d) mitochondria - and inherited by male.

155. In plants, water moves from
(a) less negative to more negative gradient
(b) more negative to less negative gradient
(c) same gradients
(d) none of the above.

156. Stomata opens
(a) in day time - for gaseous exchange
(b) in day time - no gaseous exchange
(c) in night time only - for gaseous exchange
(d) in night time only - no gaseous exchange.

157. Identify the correct statement
(a) in amniotes last nerve is spinal accessory
(b) in non-amniotes last nerve is vagus
(c) optic is shortest nerve
(d) olfactory nerves has mixed fibres.

158. Which of the following is wrongly matched?
(a) haemoglobin in mammals - RBC
(b) haemozoin - *Plasmodium* cytoplasm
(c) haemocyanin - prawn
(d) haemoglobin dissolved in blood - *Pheretima*

159. Which of the following is non- pathogenic bacteria of colon?
(a) *Escherichia coli* (b) *Balantidium coli*
(c) *Entamoeba coli*
(d) *Enterobius vermicularis.*

160. During which of the following formation free nuclear division occurs?
(a) flower (b) endosperm
(c) gametes (d) fruit.

161. Some Gram -ve bacteria have peptidoglycan and an extra layer of
(a) lipo-polysaccharide
(b) lipo-protein
(c) protein (d) both (a) and (c).

162. Which of the following is correct about nematocyst?

(a) it can be re-used
(b) its ejection is conditioned reflex
(c) it is ejected on contact and pierce the prey
(d) due to which other *Hydra* doesn't come in contact with it.

163. Which of the following statements about phytochrome is true?
(a) P_r absorbs yellow light and becomes P_{fr}
(b) P_r absorbs red light and becomes P_{fr}
(c) P_{fr} absorbs red light and becomes P_r
(d) P_{fr} absorbs yellow light and becomes P_r.

164. Blackmann's law is related to
(a) respiration (b) transpiration
(c) root pressure (d) photosynthesis.

165. An oocyte is released from the ovary under the influence of LH
(a) after completing meiosis and before polar bodies are released
(b) after completing meiosis I and before release of polar bodies
(c) after completing meiosis
(d) after completing meiosis I and after release of polar bodies.

166. Classical experiment to prove essentiality of CO_2 for photosynthesis was given by
(a) Arnon (b) Von Moll
(c) Calvin *et al* (d) Hill

167. Which of the following statements are correct regarding short day plants (SDPs)?
(a) they are apt to flower in the fall
(b) they are the same as long as long day plants
(c) they do not have a critical photoperiod
(d) all of the above are correct

168. In prokaryotes, genetic recombination can occur during
(a) transduction (b) transformation
(c) conjugation (d) all of these

169. Photosynthetic bacteria do not contain
(a) quantasome (b) PS-I and PS-II
(c) PS-II (d) PS-I

170. Which is Indian dwarf wheat
(a) *T. dicoccum* (b) *T. sphaerococcum*
(c) *T. twigidum* (d) *T. aestivum*

Directions to Q. 171 to Q. 180 : *The following questions consists of an Assertion (A) and reason (R). Select the correct answer from the following.*
(a) if both A and R are true and R is the Correct explantion of A
(b) if both A and R are true and R is not the correct explanation of A
(c) if A is true but R false
(d) A is false but R is true.

171. *Assertion* : Stomata remain open during day.
Reason : Stomata help in exchange of gases.

172. *Assertion* : Among the land animals, the Cheetah can run fastest over the ground.
Reason : The Cheetah uses its powerful forelimbs to push itself forward during running.

173. *Assertion* : Wounds heal slowly due to vitamin C deficiency.
Reason : Vitamin C is essential for collagen formation

174. *Assertion* : A plant girdled upto bast will die.
Reason : Water transportation will cease.

175. *Assertion* : Phenylketonuria is a disease in which excretion of phenylalanine occurs in urine.
Reason : It is due to dietary imbalance.

176. *Assertion* : Salamander, *Sphenodon* are classified as amphibian.
Reason : Their skin is naked, moist and glandular

177. *Assertion* : *Watson* and *Crick* provided experimental proof of semiconservative nature of DNA relication.
Reason : DNA polymerase binds nucleotides in replication.

178. *Assertion* : DNA code does not copied in the synthesis of transfer RNA.
Reason : Transfer RNA move out of the nucleus and after attaching on the ribosomes, form the template.

179. *Assertion* : Monocot stem bear collateral open vascular bundles.
Reason : If cambium is absent such vascular bundles are called closed type.

180. *Assertion* : Plasma membrane is exceedingly thin and not visible as a separate layer.
Reason : It appears merely as a surface layer of cytoplasm.

GENERAL KNOWLEDGE

181. Recent earthquake in Bhuj was measured by which of the following instrument?
(a) sonometer (b) chromatograph
(c) protarograph (d) seismograph.

182. Alzeimer's day is celebrated in which month?
(a) August (b) September
(c) 5th June (d) December.

183. Which of the following enquired 'Tehelka'.com defence dealing case?
(a) retired supreme court judge
(b) high court judge
(c) combined parliament committee
(d) supreme court judge.

184. Who is the chairman of Rajya Sabha of India?
(a) Speaker (b) President
(c) Vice President (d) Governor.

185. Which of the following cricketer batted in matches as - from opener to 9th down?
(a) Sanjay Manjarekar (b) Lala Amarnath
(c) Sunil Gavaskar (d) Vinu Mankad.

186. Next olympic will be held in
(a) Sydney - 2004 (b) London - 2004
(c) New York - 2004 (d) Athens - 2004.

187. Which of the following language is not followed in UN?
(a) Spain (b) Arabic
(c) French (d) German.

188. When was song 'Jana gana mana' adopted as the National Anthem of India?
(a) 14th August 1947 (b) 24th January 1950
(c) 15th August 1947 (d) 26th January 1950

189. Miss Universe recently was held in
(a) Paris (b) New York
(c) London (d) Peurto rico.

190. Highest peak in India is
(a) K_2 (b) Everest
(c) Nanda Devi (d) Kanchanchanga.

191. Which religion is followed by maximum people in the world?
(a) Christianity (b) Buddhism
(c) Islam (d) Hindustani.

192. Leiberhan commision is set out for
(a) Tehelka dispute (b) Jharkhand dispute
(c) Bharatpur arms export
(d) Ayodhya disputes.

193. Head of Army, Air Force and Navy are respectively
(a) General, Air Chief Marshall, Admiral
(b) General, Admiral, Air Chief Marshall
(c) Admiral, Air Chief Marshall, General
(d) Major General, Admiral, Air Chief Marshall.

194. Which of the following is wrong about PIN code?
(a) it consists of six digits.
(b) first digit represent any of six zones.
(c) second and third digit represent sub zones.
(d) last three digits shows specific region.

195. Which of the following is not a function of Reserve Bank of India?
(a) to catch fake currency note
(b) to maintain the value of rupee
(c) to regulate the flow of credit
(d) it has supervisory power over other banks.

196. Present President of USA is
(a) George Bush (b) Bill Clinton
(c) Al gore (d) Tony Blair.

197. Which of the following is not matched?
(a) Badminton - Santosh Trophy
(b) Cricket - Durand Cup
(c) Hockey - Agha Khan Cup
(c) Tennis - Hens Irish Cup.

198. Which of the following official document is related with India?
(a) green paper
(b) white paper (c) yellow book
(d) blue book.

199. 'Adi Granth' was written by
(a) Guru Gobind Singh
(b) Guru Arjun Dev
(c) Guru Teg Bahadur
(d) Guru Nanak Dev.

200. The capital of Lakshadweep, is
(a) Kavaratti (b) Port Blair
(c) Kohima (d) Silvasa.