SOLVED PAPER
AIIMS - 2013*

Time : 3½ Hours | Max. Marks : 200

PHYSICS

1. For satellite communication which wave is used ?
(a) Space wave (b) Sky wave
(c) Ground wave (d) Microwave

2. In nuclear fission, which of the following quantity is conserved ?
(a) Energy
(b) Mass
(c) Momentum
(d) Both energy and mass.

3. When a slow neutron is captured by a $^{235}_{92}U$ nucleus, a fission energy releasing 200 MeV. If power of nuclear reactor is 100 W then rate of nuclear fission is
(a) $3.6 \times 10^6\ s^{-1}$ (b) $3.1 \times 10^{12}\ s^{-1}$
(c) $1.8 \times 10^4\ s^{-1}$ (d) $4.1 \times 10^6\ s^{-1}$

4. A ball of mass m is tied up with string and rotated along a horizontal circle of radius r. At an instant, its velocity is v, and tension in string is T, the force required for circular motion is
(a) $T - \frac{mv^2}{r}$ (b) $T + \frac{mv^2}{r}$
(c) $\frac{mv^2}{r}$ (d) zero

5. If modulation index is 1/2 and power of carrier wave is 2 W. Then what will be the total power in modulated wave?
(a) 0.5 W (b) 1 W
(c) 0.25 W (d) 2.25 W

6. If velocity of a particle is three times of that of electron and ratio of de Broglie wavelength of particle to that of electron is 1.814×10^{-4}. The particle will be
(a) Neutron (b) Deutron
(c) Alpha (d) Tritium

7. A dipole of dipole moment 'p' is placed in non-uniform electric field along x-axis. Electric field is increasing at the rate of 1 V m^{-1} then the force on dipole is
(a) 0 (b) $2p$
(c) $p/2$ (d) p

8. Dimensional formula of angular momentum is
(a) ML^2T^{-1} (b) $M^2L^2T^{-2}$
(c) ML^2T^{-3} (d) MLT^{-1}

9. Relation between magnetic moment and angular velocity is
(a) $M \propto \omega$ (b) $M \propto \omega^2$
(c) $M \propto \sqrt{\omega}$ (d) None of these

10. In an intrinsic semiconductor band gap is 1.2 eV then ratio of number of charge carriers at 600 K and 300 K is
(a) 10^4 (b) 10^7 (c) 10^5 (d) 10^3

11. Gravitational potential of the body of mass m at a height h from surface of earth of radius R is (Take g = acceleration due to gravity at earth's surface)
(a) $-g(R + h)$ (b) $-g(R - h)$
(c) $g(R + h)$ (d) $g(R - h)$

12. Which of the following is the best method to reduce eddy currents?
(a) Laminating core (b) Using thick wires
(c) Reducing hysteresis loss
(d) None of these

13. In a cyclic process, work done by the system is
(a) zero
(b) more than the heat given to the system
(c) equal to heat given to the system
(d) independent of heat given to system

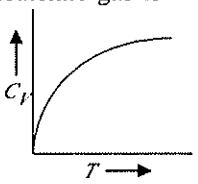
14. In a cylinder their are 60 g Ne and 64 g O_2. If pressure of mixture of gases in cylinder is 30 bar then in this cylinder partial pressure of O_2 is (in bar)
(a) 30 (b) 20 (c) 15 (d) 12

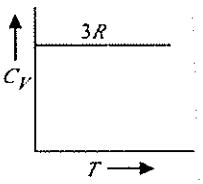
* *Based on memory.* Courtesy : ***Allen Career Institute**, Kota (Rajasthan)*

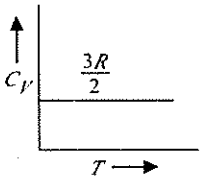
15. A gas mixture contain one mole O_2 gas and one mole He gas. Find the ratio of specific heat at constant pressure to that at constant volume of the gaseous mixture.
(a) 2 (b) 1.5
(c) 2.5 (d) 4

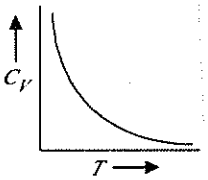
16. One mole of oxygen of volume 1 litre at 4 atm pressure to attains 1 atm pressure by result of isothermal expansion. Find work done by the gas.
(a) ≈ 155 J (b) ≈ 206 J
(c) ≈ 355 J (d) ≈ 552 J

17. Graph of specific heat at constant volume for a monoatomic gas is

(a) 

(b) 

(c) 

(d) 

18. Given that force $(5\hat{i}+7\hat{j}-3\hat{k})$ N acts on a particle at position $(\hat{i}+\hat{j}-\hat{k})$ m. Find torque of this force on the particle about origin.
(a) $4\hat{i}-2\hat{j}+2\hat{k}$ (b) $2\hat{i}-3\hat{j}+4\hat{k}$
(c) $5\hat{i}-2\hat{j}+3\hat{k}$ (d) $6\hat{i}-4\hat{j}+4\hat{k}$

19. Astronomical wavelength increase due to doppler effect known as
(a) Red shift (b) Voilet shift
(c) UV (d) IR shift

20. Long distance communication between two point on earth is achieved by
(a) Space wave communication
(b) Sky wave communication
(c) Satellite wave communication
(d) Line of sight transmission

21. Which of the following is not a state function?
(a) Work-done in adiabatic process.
(b) Work done in isothermal process.
(c) Heat at constant pressure.
(d) Heat at constant volume.

22. In an oscillating system, a restoring force is a must. In an L-C circuit, restoring force is provide by
(a) capacitor (b) inductance
(c) resistance (d) both (a) and (b)

23. Polaroid glass is used in sun glasses because
(a) it reduces the light intensity to half on account of polarisation
(b) it is fashionable
(c) it has good colour
(d) it is cheaper

24. Which of the following statement is incorrect?
(a) Neutron is less stable than proton
(b) Neutron can cause fission in nuclear reactors but proton can not.
(c) A free proton can emit beta particle.
(d) A bound proton can emit beta particle.

25. Electric field at a distance r from infinitely long conducting sheet is proportional to
(a) r^{-1} (b) r^{-2}
(c) $r^{-3/2}$ (d) independent of r

26. Given that the mobility of electrons in Ge is 0.4 $m^2 V^{-1} s^{-1}$ and electronic charge is 1.6×10^{-19}C. The number of donor atom (per m^3) semiconductor of conductivity 500 mho/m is
(a) 8×10^{21} (b) 8×10^{15}
(c) 5×10^{21} (d) 8×10^{16}

27. In a Young's double slit experiment the spacing between the slits is 0.3 mm and the screen is kept at a distance of 1.5 m. The second bright fringe is found 6 mm from the central fringe. The wavelength of the light used in the experiment is
(a) 625 nm (b) 600 nm
(c) 550 nm (d) 500 nm

28. In beta plus decay
(a) antineutrino is produced with electron
(b) neutrino is produced with positron
(c) neutron is produced with electron
(d) none of these

29. A simple pendulum performs simple harmonic motion about $x = 0$ with an amplitude 'a' and time period 'T'. The speed of the pendulum at $x = a/2$ will be
(a) $\frac{\pi a}{T}$ (b) $\frac{3\pi^2 a}{T}$

(c) $\frac{\pi a\sqrt{3}}{T}$ (d) $\frac{\pi a\sqrt{3}}{2T}$

30. A particle is projected from the ground with an initial speed of 'v' at angle θ with horizontal. The average velocity of the particle between its point of projection and height point of trajectory is

(a) $\frac{v}{2}\sqrt{1+2\cos^2\theta}$ (b) $\frac{v}{2}\sqrt{1+\cos^2\theta}$

(c) $\frac{v}{2}\sqrt{1+3\cos^2\theta}$ (d) $v\cos\theta$

31. The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 Å. The refractive index of material will be

(a) 1.50 (b) 3.00 (c) 1.33 (d) 1.40

32. Two solenoids of equal number of turns having their length and the radii in the same ratio 1 : 2. The ratio of their self-inductance will be

(a) 1 : 2 (b) 2 : 1 (c) 1 : 1 (d) 1 : 4

33. A circuit consisting of five resistors each of resistance R, forming a Wheatstone bridge. What is the equivalent resistance of the circuit?

(a) $2R$ (b) R
(c) $2R/3$ (d) $R/2$

34. The circuit as shown in figure,

the equivalent gate is

(a) NOR gate (b) OR gate
(c) AND gate (d) NAND gate

35. An engine has an efficiency of 1/6. When the temperature of sink is reduced by 62°C, its efficiency is doubled. The temperature of source will be

(a) 37° C (b) 62° C
(c) 99° C (d) 124° C

36. If a vector $2\hat{i}+3\hat{j}+8\hat{k}$ is perpendicular to the vector $4\hat{i}-4\hat{j}+\alpha\hat{k}$, then value of α is

(a) –1 (b) $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) 1

37. 1 g of steam is sent into 1 g of ice. At thermal equilibrium, the resultant temperature of mixture is

(a) 270°C (b) 230°C
(c) 100°C (d) 120°C

38. Ratio of longest wavelengths corresponding to Lyman and Balmer series in hydrogen spectrum is

(a) $\frac{7}{29}$ (b) $\frac{9}{31}$ (c) $\frac{5}{27}$ (d) $\frac{3}{23}$

39. The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_p and C_v respectively. If $\gamma = \frac{C_p}{C_v}$ and R is the universal gas constant, then C_v is equal to

(a) $\frac{(\gamma-1)}{R}$ (b) γR

(c) $\frac{1+\gamma}{1-\gamma}$ (d) $\frac{R}{(\gamma-1)}$

40. A body of mass m is taken from the earth's surface to the height equal to twice the radius(R) of the earth. The change in potential energy of body will be

(a) $3mgR$ (b) $\frac{1}{3}mgR$

(c) $2mgR$ (d) $\frac{2}{3}mgR$

Directions : In the following questions (41-60), a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

41. **Assertion** : In a communication system based on amplitude modulation the modulation index is kept < 1.
Reason : It ensures minimum distortion of signal.

42. **Assertion** : If optical density of a substance is more than that of water then the mass density of substance can be less than water.
Reason : Optical density and mass density are not related.

43. **Assertion** : On going away from a point charge or a small electric dipole, electric field decreases at the same rate in both the cases.
Reason : Electric field is inversely proportional to square of distance from the charge or on electric dipole.

44. **Assertion** : If a conductor is given charge then no excess inner charge appears.
Reason : Electric field inside conductor is zero.

45. **Assertion** : Water kept in an open vessel will quickly evaporate on the surface of the moon.
Reason : The temperature at the surface of the moon is much higher than the boiling point of water.

46. **Assertion** : Moment of inertia is always constant.
Reason : Angular moment is conserved that is why moment of inertia is constant.

47. **Assertion** : Magnetic lines forms closed loops in nature.
Reason : Mono-magnetic pole does not exist in nature.

48. **Assertion** : Gaussian surface is considered carefully.
Reason : The point where electric field to be calculated should be with in the surface.

49. **Assertion** : $^{60}_{27}Co$ is a source of gamma radiation.
Reason : Gamma emission is due to nuclear decay.

50. **Assertion** : When light ray is incident at polarising angle on glass, refracted light is partially polarised.
Reason : The intensity of light decreases in polarisation.

51. **Assertion** : A laser beam of 0·2 W power can drill holes through a metal sheet, whereas a 1000 W torch-light cannot.
Reason : The frequency of laser light is much higher than that of torch light.

52. **Assertion** : Electromagnetic radiations exert pressure.
Reason : Electromagnetic-waves carry both momentum and energy.

53. **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.

54. **Assertion** : Total current entering a circuit is equal to leaving the circuit by Kirchhoff's law.
Reason : It is based on conservation of energy.

55. **Assertion** : The sun rises some time before the actual sun-rise.
Reason : Because of the refraction through the different layers of atmosphere.

56. **Assertion** : Centre of mass of a system does not move under the action of internal forces.
Reason : Internal forces are non conservative forces.

57. **Assertion** : Total energy is negative for a bound system.
Reason : Potential energy of a bound system is negative and more than kinetic energy.

58. **Assertion** : A undamped spring-mass system is simplest free vibration system.
Reason : It has three degrees of freedom.

59. **Assertion** : Magnetic field is useful in producing parallel beam of charged particle.
Reason : Magnetic field inhibits the motion of charged particle moving across it.

60. **Assertion** : Resolving power of a telescope depends only on wavelength.
Reason : This is proportional to square of wavelength.

CHEMISTRY

61. The plot of a concentration of the reactant versus time for a reaction is a straight line with a negative slope. The reaction follows a
(a) first order rate equation
(b) zero order rate equation
(c) second order reaction
(d) third order rate equation

62. Which of the following element has lowest melting point?
(a) Cr (b) Fe
(c) Ni (d) Cu

63. Maximum number of unpaired electrons are present in
(a) Gd^{3+} (b) Yb^{2+}
(c) Tb^{2+} (d) Pm^{3+}

64. The first ionisation enthalpy of Na, Mg and Si are 496, 737, 776 kJ/mol respectively. What will be the first ionisation enthalpy potential of Al in kJ/mol?
(a) > 766 kJ/mol
(b) > 496 and < 737 kJ
(c) > 737 and < 766 kJ/mol
(d) > 496 kJ/mol

65. When calomel is treated with ammonium hydroxide, a black substance is formed. The black substance is
(a) Hg + HgO (b) $HgO.HgCl_2$
(c) $H_2N - Hg - Cl + Hg$
(d) $Hg(NH_2)_2 + HgO$

66. Total number of antibonding electrons present in O_2 will be
(a) 6 (b) 8
(c) 4 (d) 2

67. In BF_3, the B – F bond length is 1.30 Å, when BF_3 is allowed to be treated with Me_3N, it forms an adduct, $Me_3N \rightarrow BF_3$, the bond length of B — F in the adduct is
(a) greater than 1.30 Å
(b) smaller than 1.30 Å
(c) equal to 1.30 Å
(d) none of these.

68. Oxidation state of iron in haemoglobin is
(a) 0 (b) +2
(c) –2 (d) +3

69. Which of the following statement is not true for hydrolysis of XeF_6?
(a) $XeOF_4$ is formed. (b) XeO_2F_2 is formed.
(c) It is a redox reaction.
(d) XeO_3 is formed.

70. Which of the following is most basic?
(a) $Al(OH)_3$ (b) $Cr(OH)_3$
(c) $La(OH)_3$ (d) $Fe(OH)_3$

71. Bleaching powder does not contain
(a) $CaCl_2$ (b) $Ca(OH)_2$
(c) $Ca(OCl)_2$ (d) $Ca(ClO_3)_2$

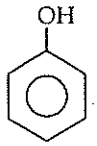
72. Which of the following metal ion forms unstable complex with CN^-?
(a) Ag(I) (b) Zn(II)
(c) Cu(II) (d) Cr(II)

73. Which of the following ion does not exist?
(a) $[CuI_4]^{2-}$ (b) VO_4^{3-}
(c) WO_4^{2-} (d) CrO_4^{2-}

74. $K_2Cr_2O_7$ in acidic medium converts into
(a) Cr^{2+} (b) Cr^{3+}
(c) Cr^{4+} (d) Cr^{5+}

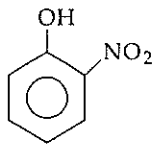
75. Which of the following is not a green house gas?
(a) Hydrogen (b) Carbon dioxide
(c) Methane
(d) Nitrous oxide or N_2O

76.



$\xrightarrow{\text{dil. } HNO_3}$ *A* (Major product)

A is

(a)


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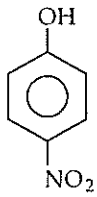

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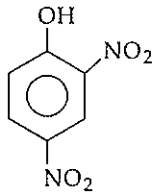

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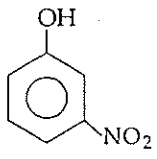
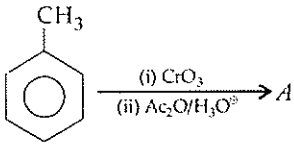


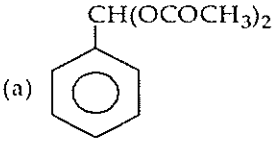
77. Which of the following is a non-reducing sugar?
(a) Sucrose (b) Maltose
(c) Lactose (d) Mannose

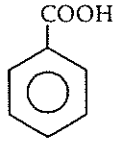
78. Arrange the following compounds in increasing order of reactivity towards nucleophilic addition reaction.

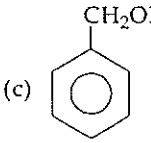
(I) $C_6H_5COCH_3$ (II) $CH_3CO-C_2H_5$
(III) C_6H_5CHO (IV) $Cl-CH_2-CHO$
(a) IV > III > II > I (b) IV > II > III > I
(c) I > II > III > IV (c) III > IV > II > I

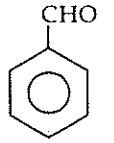
79. 

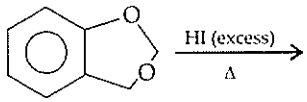
A; Product A is

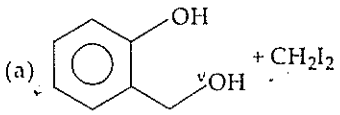
(a) 

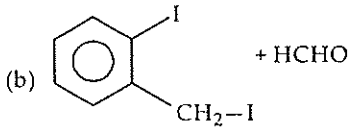
(b) 

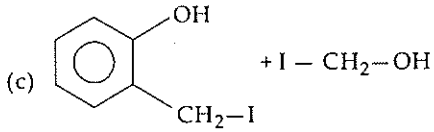
(c) 

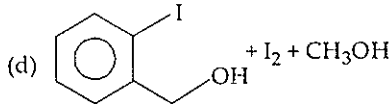
(d) 

80. 

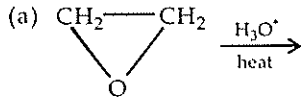
(a) 

(b) 

(c) 

(d) 

81. Which of the following reaction will not produce ethylene glycol?

(a) 

(b) $ClCH_2CH_2Cl \xrightarrow[\text{heat}]{OH^-}$

(c) $HO-CH_2-CH_2-OCH_3 \xrightarrow[\text{heat}]{OH^-}$

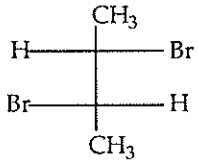
(d) $CH_2=CH_2 \xrightarrow[KMnO_4]{\text{alkaline}}$

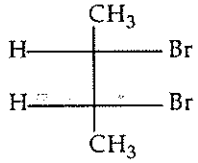
82. Salicylic acid can be easily prepared by reaction between
(a) phenol and CO_2
(b) benzoic acid and H_2O_2
(c) benzene diazonium chloride and CO_2
(d) phenol and formic acid.

83. Reaction of aniline with HNO_2 followed by treatment of dilute acid gives
(a) C_6H_5NHOH (b) C_6H_5OH
(c) $C_6H_5NHNH_2$ (d) C_6H_6

84. Which of the following will give carbylamine test?
(a) CH_3NH_2 (b) CH_3NHCH_3
(c) $CH_3N(CH_3)CH_3$ (d) CH_3CONH_2

85. When *trans*-2-butene is reacted with Br_2 then product formed is

(a) 

(b) 

(c) Meso compounds (d) both (b) and (c)

86. Which of the following does not give nitroalkane?

(a) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\underset{|}{\overset{|}{N}}}}-CH_3 \xrightarrow{KMnO_4}$

(b) $C_2H_5I \xrightarrow{\text{alc. } AgNO_2}$

(c) $CH_3-CH_3 \xrightarrow{\text{Fuming } HNO_3}$

(d) Both (a) and (b)

87. A compound containing two –OH groups attached with one carbon atom is unstable but which one of the following is stable?

(a) $CH_3CH(OH)_2$ (b) $CH_3-\underset{\displaystyle OH}{\overset{\displaystyle OH}{\underset{|}{\overset{|}{C}}}}-OH$

(c) $Cl_3CH(OH)_2$ (d) None of these.

88. Which of the following is true for an ideal solution?
(a) $\Delta H_{(mix)} = 0$ (b) $\Delta S_{(mix)} = 0$
(c) $\Delta G_{(mix)} = 0$ (d) None of these

89. Boiling point of benzene is 353.23 K. When 1.8 g of non-volatile solute is dissolved in 90 g of benzene. Then boiling point is raised to 354.11 K. Given K_b (benzene) = 2.53 kg mol^{-1}. The molecular mass of non-volatile substance is
(a) 58 g mol^{-1} (b) 120 g mol^{-1}
(c) 116 g mol^{-1} (d) 60 g mol^{-1}

90. In a solid, atom M occupies *ccp* lattice and 1/3rd of tetrahedral voids are occupied by atom N. Find the formula of solid formed by M and N.
(a) M_3N_2 (b) M_2N_3
(c) M_4N_3 (d) M_3N_4

91. Hair cream is
(a) gel (b) emulsion
(c) solid sol (d) sol.

92. A particle is moving 3 times faster than the speed of electron. If the ratio of wavelength of particle and electron is 1.8×10^{-4}, then particle is
(a) Neutron (b) α-particle
(c) Deuteron (d) Tritium

93. Electrode potential of hydrogen electrode is 18 mV, then [H$^+$] is
(a) 0.2 (b) 1
(c) 2 (d) 5

94. What will be the solubility product of AX_3?
(a) $27S^4$ (b) $4S^3$
(c) $36S^4$ (d) $9S^3$

95. Which thermodynamic parameter is not a state function?
(a) q at constant pressure
(b) q at constant volume
(c) W at adiabatic
(d) W at isothermal

96. According to Hardy schulze law, the flocculating power of an ion increases with
(a) decreases in size
(b) increase in size
(c) decrease in charge
(d) increase in charge.

97. Strength of H_2O_2 is 15.18 g L^{-1}, then it is equal to
(a) 1 volume (b) 10 volume
(c) 5 volume (d) 7 volume

98. Energy of activation of forward reaction for an endothermic process is 50 kJ. If enthalpy change for forward reaction is 20 kJ then enthalpy change for backward reaction will be
(a) 30 kJ (b) 20 kJ
(c) 70 kJ (d) 50 kJ

99. What is the role of aniline or cresol when added in a froth floatation process?
(a) Stabilizer (b) Depressant
(c) Wetting agent (d) All of these.

100. Non-stick cookwares generally have a coating of a polymer, whose monomer is
(a) $CH_2 = CH_2$ (b) $CH_2 = CHCN$
(c) $CH_2 = CHCl$ (d) $CF_2 = CF_2$

Directions : In the following questions (101-120), a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as :
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

101. Assertion : Bond dissociation energy is $F_2 > Cl_2$.
Reason : Cl_2 has more electronic repulsion than F_2.

102. Assertion : Bond lengths of P—Cl bonds in gaseous PCl_5 and solid PCl_5 are not equal.
Reason : Because in solid state two PCl_5 molecules are associated.

103. Assertion : EDTA forms complex with divalent metals of 3*d*-series in the ratio of 1:1
Reason : EDTA has 4 —COOH groups.

104. Assertion : In a mixture of Cd(II) and Cu(II), Cd^{2+} gets precipitated in presence of KCN by H_2S.
Reason : The stability constant of $[Cu(CN)_4]^{3-}$ is greater than $[Cd(CN)_4]^{2-}$.

105. Assertion : Aq. solution of $CoCl_2$ is pink in colour. It turns blue in presence of conc. HCl.
Reason : It is due to the formation of $[CoCl_4]^{2-}$.

106. Assertion : Acetamide on reaction with KOH and bromine gives acetic acid.
Reason : Bromine catalyses hydrolysis of acetamide.

107. Assertion : Mixture of benzaldehyde and acetaldehyde in hot alkaline medium gives cinnamaldehyde.
Reason : Benzaldehyde is strong electrophile than acetaldehyde.

108. Assertion : *cis*-3-chloroprop-2-enoic acid is less stable than its *trans*-form.
Reason : Dipole moment of *cis*-form is greater than *trans*-form.

109. Assertion : Aryl sulphonic acid gives phenol on reacting with NaOH at high temperature.
Reason : This reaction is electrophilic substitution reaction.

110. Assertion : All enzymes are made up of proteins and all proteins have three dimensional structures.
Reason : Secondary structures of protein are sequence of amino acids.

111. Assertion : The presence of a large number of Schottky defects in NaCl lowers its density.
Reason : In NaCl, there are approximately 10^6 Schottky pairs per cm^3 at room temperature.

112. Assertion : For an isolated system, q is zero.
Reason : In an isolated system, change in U and V is zero.

113. Assertion : At critical point the densities of substance in gaseous and liquid states are same.
Reason : Critical temperature is the temperature at which the real gas exhibit ideal behaviour for considerable range of pressure.

114. Assertion : Entropy of system increases for a spontaneous reaction.
Reason : Enthalpy of reaction always decreases for spontaneous reaction.

115. Assertion : Catalyst changes Gibbs free energy of system.
Reason : Catalyst changes pre-exponential factor of a chemical reaction.

116. Assertion : A process is called adiabatic if the system does not exchange heat with the surroundings.
Reason : It does not not involve increase or decrease in temperature of the system.

117. Assertion : Number of radial and angular nodes for 3p-orbital are 1, 1 respectively.
Reason : Number of radial and angular nodes depends only on principal quantum number.

118. Assertion : Cu is stronger reducing agent than H_2.
Reason : E° of Cu^{2+}/Cu is negative.

119. Assertion : Magnesium is extracted by the electrolysis of fused mixture of $MgCl_2$, NaCl and $CaCl_2$.
Reason : Calcium chloride acts as a reducing agent.

120. Assertion : Phosphoric acid has no reducing properties.
Reason : Phosphoric acid does not contain P—H bonds.

BIOLOGY

121. Stinging capsules (nematocysts) are found in
(a) wasp and honeybee
(b) scorpion and cobra
(c) sea pen and sea fan
(d) cactus and Venus flytrap.

122. Which of the following is a cloning vector?
(a) DNA of *Salmonella typhimurium*
(b) *Ti* plasmid
(c) Amp^r and Tet^r loci
(d) *Ori* minus pBR322

123. India is one of the twelve megadiversity countries with ____ of genetic resources of the world.
(a) 12.1% (b) 18.1% (c) 38.1% (d) 8.1%

124. Which of the following is not an invasive species?
(a) *Parthenium hysterophorus*
(b) *Nelumbo* (lotus)
(c) *Lantana camara* (d) *Eichhornia crassipes*

125. Intercalated discs are characteristic of muscles found in
(a) heart (b) thigh
(c) urinary bladder (d) stomach.

126. In which of the following sets of organisms, does the external fertilization occur?
(a) Echinodermata and mosses
(b) Hemichordata and ferns
(c) Amphibians and algae
(d) Reptiles and gymnosperms

127. Starting from the maximum, arrange the following male reproductive accessory organs in the correct order, based on the amount of secretion poured into urethra.
(i) Prostrate gland
(ii) Seminal vesicle
(iii) Bulbourethral gland
(a) (i) > (ii) > (iii) (b) (iii) > (ii) > (i)
(c) (ii) > (iii) > (i) (d) (ii) > (i) > (iii)

128. Which of the following contraceptive devices make uterus unsuitable for implantation?
(a) Progestasert (b) CuT
(c) Lippe's loop (d) Multiload

129. In Miller's experiment, he used a mixture of CH_4, NH_3, H_2 and water vapour in a closed flask to mimic early earth conditions. What was the temperature at which this flask was kept?
(a) 800°C (b) 1200°C (c) 200°C (d) 400°C

130. Sexual stage (gametocytes) of *Plasmodium* occurs in
(a) Salivary glands of mosquito
(b) Human RBC
(c) Intestine of mosquito
(d) Human liver

131. Occurrence of triploid (3n) primary endosperm nucleus is a characteristic feature of
(a) Algae (b) Gymnosperms
(c) Angiosperms (d) Bryophytes.

132. From the following groups, select the one which has only secondary metabolites?
(a) Arbrin, cellulose, arginine, tyrosine
(b) Glycine, gums, serine, diterpenes
(c) Carotenoids, phenylalanine, curcumin, rubber
(d) Conclavin-A, morphine, codeine, vinblastin

133. In a diploid cell, at which stage of cell cycle, the amount of DNA is doubled?
(a) G_1 and G_2 phase (b) G_0 phase
(c) S, G_2 and M phase (d) S phase

134. Sporopollenin is a constituent of pollen exine. It can be degraded by the action of
(a) enzymes (b) high temperature
(c) strong acids
(d) cannot be degraded.

135. The pollen grains of rice and wheat lose their viability in ___ minutes of their release.
(a) 30 (b) 10 (c) 60 (d) 90

136. After double fertilization, a mature ovule has
(a) 1 diploid and 1 haploid cell
(b) 1 diploid and 1 triploid cell
(c) 2 haploid and 1 triploid cell
(d) 1 haploid and 1 triploid cell.

137. Genetically modified (GM) crops can be produced by
(a) recombinant DNA technology
(b) somatic hybridization
(c) cross breeding (d) micropropagation.

138. Which of the following is a palindromic sequence?
(a) 5′ - CGTATG - 3′ (b) 5′ - CGAATG - 3′
3′ - GCATAC - 5′ 3′ - CGAATG - 5′
(c) 5′ - GAATTC - 3′ (d) 5′ - GACTAC - 3′
3′ - CTTAAG - 5′ 3′ - TACGAC - 5′

139. C_3 plants have better productivity because
(a) C_4 plants absorb more light
(b) C_4 plants absorb more CO_2
(c) C_4 plants does not carry photorespiration
(d) C_4 plants have more amount of RuBisCO.

140. Match the source gland with its respective hormone and function and select the correct option.

	Source gland	Hormone	Function
(a)	Anterior pitutary	Oxytocin	Contraction of uterine muscles
(b)	Anterior pitutary	Vasopressin	Induces reabsorption of water in nephron
(c)	Thymus	Thymosin	Proliferation of T-lymphocytes
(d)	α-cells of islets of Langerhans	Glucagon	Uptake of glucose into the cell.

141. Which of the following microbes is correctly paired with its function?
(a) *Aspergillus niger* – Production of lactic acid
(b) *Trichoderma polysporum* – Lowers blood cholesterol
(c) *Saccharomyces cerevisiae* – Production of citric acid
(d) Methanogenic bacteria – Gobar gas formation

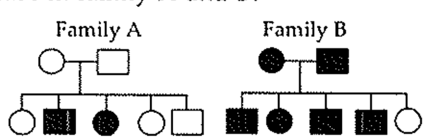
142. Match Column - I with Column - II and select the correct option from the codes given below.

	Column - I		Column - II
A.	Chlorophyta	(i)	*Equisetum*
B.	Lycopsida	(ii)	*Chara*
C.	Phaeophyta	(iii)	*Selaginella*
D.	Sphenopsida	(iv)	*Ectocarpus*

(a) A - (ii), B - (iii), C - (iv), D - (i)
(b) A - (iv), B - (i), C - (ii), D - (iii)
(c) A - (ii), B - (iii), C - (i), D - (iv)
(d) A - (iv), B - (i), C - (iii), D - (ii)

143. Which of the following gastric secretions is correctly matched with its source?
(a) Pepsin – Chief cells
(b) Chymotrypsin – Parietal cells
(c) HCl – Goblet cells
(d) Mucus – Oxyntic cells

144. Which of the following is true for a recessive disease in family A and B?

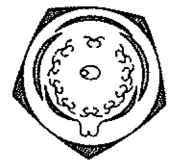


(a) In family A, both the parents are homozygous recessive.
(b) In family B, both the parents are homozygous dominant.
(c) In family B, both the parents are heterozygous recessive.
(d) In family A, both the parents are heterozygous recessive.

145. Which of the following is true for excretion in humans?
(a) Glucose and amino acids are reabsorbed in PCT by simple diffusion.
(b) DCT is impermeable to water.
(c) On an average, 25-30 gm of urea is excreted out per day.
(d) Maximum reabsorption occurs in the loop of Henle.

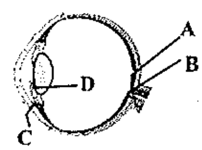
146. Which of the following is not true for inbreeding?
(a) It causes inbreeding depression after a few generations.
(b) It always increases the productivity.
(c) It is used to produce a pure line.
(d) It leads to homozygosity.

147. Which of the following is the correct floral formula for the floral diagram given below?



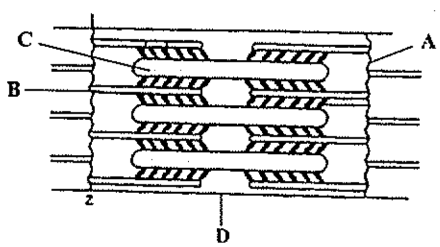
(a) Br ⊕ ⚥ Epi $K_{5\ or\ (5)}\ \widehat{C_5\ A_{(\infty)}}\ \underline{G}_{(2\ \infty)}$
(b) ⊕ ⚥ $K_{(5)}\ \widehat{C_5\ A_{(5)}}\ \underline{G}_{(2)}$
(c) % ⚥ $K_{(5)}C_{1+2+(2)}\ A_{(9)+1}\ \underline{G}_1$
(d) ⊕ ⚥ $\widehat{P_{3+3\ or\ (3+3)}A_{3+3}}\ \underline{G}_{(3)}$

148. Which of the following is true for the function of labelled parts in the diagram below?



(a) **A** - Blind spot – Image is formed here
(b) **B** - Fovea – No visual activity is present
(c) **C** - Cornea – Helps to hold lens in place
(d) **D** - Iris – Visible coloured portion of eye

149. Which of the following is true for the labelled parts in the figure below?



(a) **A** - Z-line – located at centre of I - band
(b) **B** - Thin filament – occurs in A-band only
(c) **C** - Thick filament – confined to I-band
(d) **D** - H-zone – located at centre of M-line

150. Which of the following is correctly matched without exception in regard to plant classification?
(a) Family – Poaceae - ae
(b) Division – Pteridophyta - phyta
(c) Class – Bryopsida - sida
(d) Genus – *Solanum* - um

151. What is the oxidation state of iron in haemoglobin?
(a) Fe^{-} (b) Fe^{2+}
(c) Fe^{3+} (d) Fe^{4+}

152. In the given table, some organisms are classified into categories. However, there is one exception. Select the option with correctly mentioned exceptional organism.

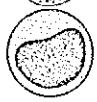
	Organisms	Category	Exception
(a)	*Penicillium, Aspergillus, Mucor*	Fungi	Mucor
(b)	Cacti, Venus flytrap	Plants	Cacti
(c)	*Ascaris, Neresis, Wuchereria*	Aschelminthes	*Neresis*
(d)	Scorpion, Prawn, *Anopheles*	Arthropoda	Prawn

153. Select the correct pair amongst the following.
(a) Spring wood – light colour, high density
(b) Spring wood – dark colour, low density
(c) Autumn wood – light colour, high density
(d) Autumn wood – dark colour, high density.

154. Which of the following organelles contain DNA?
(i) Mitochondria (ii) Chloroplasts (iii) Golgi bodies (iv) Ribosomes
(a) (i) and (ii)
(b) (ii) and (iii)
(c) (i) only
(d) (iv) only.

155. Carbon dioxide (CO_2) diffuses into blood from tissue site and passes to alveolar site in the form of
(a) bicarbonate; 70%
(b) bicarbonate; 20 – 25%
(c) carbaminohaemoglobin; 60 – 70%
(d) carbaminohaemoglobin; 7%.

156. Select the option having all the correct characteristics.

	Structure	Percentage of WBCs	Function
(a)		0.3 – 0.5	Phagocytic
(b)		0.5 – 1.0	Secrete histamine and serotonin
(c)		30 – 40	Defence against parasites
(d)		30 – 40	Allergic reactions

157. Chromatin is made up of:
(a) DNA and protein
(b) DNA and histone
(c) DNA, RNA, protein
(d) RNA, histone and oil bodies.

158. A large quantity of urban sewage is drained to nearby village river. Which among the given conditions would happen after mixing of sewage into the river?
(i) Biochemical oxygen demand (BOD) of receiving water body increases.
(ii) Dissolved oxygen of receiving water body decreases.
(iii) It will not cause mortality among fishes and other aquatic creatures.
(iv) It will lead to nutrient enrichment of receiving water body.
(a) (i), (ii) and (iii) (b) (i), (ii) and (iv)
(c) (ii) and (iii) (d) (iii) and (iv).

159. Which of the following plant growth regulators (PGRs) promotes root initiation, flowering and induced parthenocarpy?
(a) Gibberellin (b) Auxin
(c) Cytokinin (d) Ethylene.

160. Which of the following is a secondary pollutant?
(a) Carbon dioxide
(b) Nitrogen oxides
(c) Peroxyacyl nitrates
(d) All of these.

Directions : In the following questions (161-180), a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

161. Assertion : A mutual exchange of sperms occurs between two earthworms during mating.
Reason : Mature sperms and egg cells and nutritive fluid are deposited in cocoons produced by gland cells of clitellum.

162. Assertion : On plotting the length of the root against time, a linear curve is obtained.
Reason : An elongating root exemplifies arithmetic growth.

163. Assertion : Small intestine is the principal organ for absorption of nutrients.
Reason : Absorption of water, simple sugars and alcohol etc. takes place in small intestine.

164. Assertion : On touching radial artery in our wrist, we feel pulse waves.
Reason : The heart beats originate from the sinoatrial node (SA node) on the right atrium.

165. Assertion : In a regular medical examination of a small population, a 35 years old lady was found to have higher levels of oestrogens, progesterone in her blood.
Reason : The lady is 12 weeks pregnant.

166. Assertion : While working on *Staphylococci*, Alexander Fleming observed that *Penicillium notatum* inhibits the growth of the bacteria.
Reason : This inhibiting chemical was commercially extracted and its full potential was established by Alexander Fleming.

167. Assertion : *Saccharomyces cerevisiae* produces acetic acid.
Reason : *Trichoderma polysporum* produces blood cholestrol lowering agent.

168. Assertion : Protostele is the simplest stele.
Reason : Protostele is the most advanced type of stele.

169. Assertion : Rice field is an ecosystem for plants and animals.
Reason : Gut of human/animals is an ecosystem for flora and fauna.

170. Assertion : Mitochondria and chloroplasts have their own genome.
Reason : Endoplasmic reticulum and Golgi body are the cell organelles which have their own DNA.

171. Assertion : Now-a-days, the biodiversity is declining with an accelerated rate.
Reason : Exotic species are considered to be a major cause of extinction of species.

172. Assertion : Meiosis II is similar to mitosis.
Reason : Meiosis I cannot occur in haploid cells.

173. Assertion : Periodic abstinence is a natural method where couples abstain from coitus
Reason : Coitus from day 5–10 should be avoided because this is the time of ovulation.

174. Assertion : Corpus callosum connects the two cerebral hemispheres.
Reason : Association areas are responsible for complex functions like intersensory association of memory and communication.

175. Assertion : Only a boy child could be born with a substitution of glutamic acid by valine on 6^{th} codon of beta-chain of haemoglobin.
Reason : The gene for the above mutation is found on Y-chromosome.

176. Assertion : The efficiency of C_4 plant is more than those of C_3 plant.
Reason : C_4 plants are more efficient in picking CO_2.

177. Assertion : Cattles feed on leaves of maize to get nutrition for growth and development.

Reason : A number of symbiotic bacteria are present in rumen of cattle.

178. Assertion : All proteinecous enzymes have a three-dimensional structure.
Reason : The secondary structure of protein is according to amino acid present inside the polypeptides.

179. Assertion : Glutamine contains amide group.
Reason : Isoelectric point of glutamine is 7.

180. Assertion : Duodenum is the main organ of small intestine.
Reason : In duodenum, digestion and absorption mainly occurs.

GENERAL KNOWLEDGE

181. From whom does the Indian government take advice on legal issues?
(a) Chief Justice of Court apex
(b) Solicitor General
(c) Chairman of Planning Commission
(d) Attorney General

182. The Vice President of India is the Chairman of
(a) Lok Sabha (b) Rajya Sabha
(c) Vidhan Sabha
(d) Legislative Assembly

183. Which of the following players won Miami Men's Double tennis – 2012 title?
(a) Daniel Nestor and Radek Stepanek
(b) Radek Stepanek and Leander Paes
(c) Daniel Nestor and Max Mirnyi
(d) Rohan Bopanna and Mahesh Bhupathi

184. Which ancient Indian sage authored 'Yog Sutra'?
(a) Patanjali (b) Kapil Muni
(c) Saatchi dananda (d) Gautam

185. Which Indian Mathematician first time in the world used zero as a number and showed its mathematical operation?
(a) Aryabhatt (b) Ramanuja
(c) Bhaskaracharya (d) Brahmagupta

186. Which Indian freedom fighter was popularly called "Mahamana"?
(a) Bal Gangadhar Tilak
(b) Madan Mohan Malviya
(c) Jawahar lal Nehru
(d) Mahatma Gandhi

187. The book "Big Egos, Small Men" is written by
(a) Mani Shankar Aiyr
(b) Kapil Sibal
(c) Ram Jethmalani (d) Soli Sorabjee

188. Which is the largest buddhist monastery in India?
(a) Rumtek Monastery, Sikkim
(b) Tawang Monastery, Arunachal Pradesh
(c) Thiksey Monastery, Jammu and Kashmir
(d) Ghoom Monastery, West Bengal

189. 'Van Mahotsav' Day is observed on
(a) 1st December (b) 1st July
(c) 23rd February (d) 14th March

190. The famous Kashi Vishwanath temple at Varanasi is dedicated to which Hindu god?
(a) Lord Shiva (b) Lord Vishnu
(c) Lord Brahma (d) Lord Krishna

191. Which Indian State celebrated its 77th foundation day on 1st April, 2013?
(a) Guajrat (b) Odisha
(c) Rajasthan (d) Tamil Nadu

192. According to Mahabharat who constructed the unparalled palace of the Pandavas?
(a) Vishwakarma (b) Krishna
(c) Indra (d) Maya Danava

193. Where was first share market of India established?
(a) Mumbai (b) Kolkata
(c) Delhi (d) Chennai

194. Garampani Sanctuary is located at
(a) Diphu, Assam (b) Junagarh, Gujrat
(c) Kohima, Nagaland
(d) Gangtok, Sikkim

195. Maximum sugarcane production occurs in which country?
(a) India (b) China
(c) Brazil (d) Indonesia

196. Which of the following is not a green house gas?
(a) Carbon dioxide (CO_2)
(b) Nitrous oxide (N_2O)
(c) Methane (CH_4)
(d) Hydrogen (H_2)

197. Which first woman singer got the Bharat Ratna award and is also known as nightingale of carnatic music?

(a) M.S. Subbulaxmi (b) Shubha Mudgal
(c) N. Rajam (d) Vasundhara Devi

198. For seeing objects on the surface of water from submarine, the instrument used is
(a) kaleidoscope (b) periscope
(c) telescope (d) spectroscope

199. Under the tenure of which Prime Minister did Indo-Pak war (1965) take place which ended with Tashkent Treaty?
(a) Lal Bahadur Shastri
(b) Jawaharlal Nehru
(c) Gulzarilal Nanda (d) Morarji Desai

200. A famous writer who travelled to India with Mahmood Ghazni and wrote a book "Tareekh-al-Hind"
(a) Abdul Hai Lakhnawi
(b) Al - Biruni
(c) Riyad-us-Saliheen
(d) Ibn Kathir