Dated : 15-04-2023

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Test Series HMC-8(HP & HR), HMC-9(19-25), HMC-15(01)

MM : 720

Test - 04

Time : 3 hrs. 20 min.

PHYSICS : SHM, WAVES, GRAVITATION
CHEMISTRY : THERMODYNAMICS, HYDROGEN, CHEMISTRY IN ACTION, GASEOUS STATE, EXTRACTION
ZOOLOGY : BODY FLUIDS & CIRCULATION, ANIMAL KINGODM, EPITHELIAL TISSUE & CT PROPER
BOTANY : PLANT KINGDOM, STRATEGIES FOR ENHANCEMENT IN FOOD FPRODUCTION

PHYSICS : SECTION-A

All questions are compulsory in section A

1. A particle is moving with constant angular velocity along the circumference of a circle. Which of the following statements is true
   (1) The particle so moving executes S.H.M.
   (2) The projection of the particle on any one of the diameters executes uniform motion
   (3) The projection of the particle on any of the diameters executes S.H.M.
   (4) None of the above
2. Equation of a progressive wave is given by $y = a \sin \pi\left(\frac{t}{2} - \frac{x}{4}\right)$, where t is in seconds and x is in metre. Then the distance through which the wave moves in 8 second is
   (1) 2 m (2) 4 m
   (3) 8 m (4) 16 m
3. Which of the following is not a property of gravitational force?
   (1) Central force
   (2) Action reaction pair
   (3) Infinite range
   (4) Dependent on motion of bodies
4. A small body of mass 0.1 kg is executing S.H.M. of amplitude 1m and period 0.2 second. The maximum force acting on it is approximately
   (1) 100 N (2) 1000 N
   (3) 250 N (4) 75 N
5. A medium can carry a longitudinal wave because it has the property of
   (1) Mass (2) Density
   (3) Volume (4) Elasticity
6. For a particle executing simple harmonic motion, the kinetic energy is given by $K_0\cos^2\omega t$. The maximum value of potential energy is
   (1) K_0 (2) zero
   (3) $0.5\ K_0$ (4) $0.75\ K_0$
7. If the radius of earth's orbit is made 1/4, the duration of a year will become
   (1) 8 times (2) 4 times
   (3) 1/8 times (4) 1/4 times
8. Match the proprties of sound in column I with the quantities on which these depend primarily in column II.

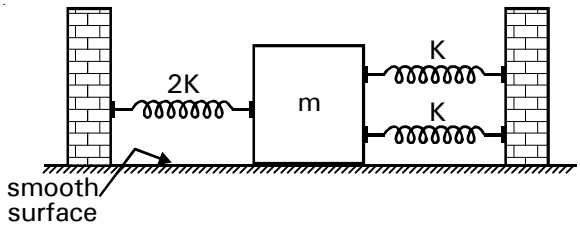
Column I		**Column II**	
a.	Pitch	i.	Waveform
b.	Quality	ii.	Frequency
c.	Loudness	iii.	Intensity

   (1) a-i, b-ii, c-iii (2) a-ii, b-i, c-iii
   (3) a-iii, b-i, c-ii (4) a-ii, b-iii, c-i
9. The value of universal gravitational constant
   (1) depends on system of units
   (2) depends on medium between masses
   (3) both (1) and (2)
   (4) neither (1) nor (2)

10. Intensity of one sound wave is 1000 times that of another sound wave. The difference in their loudness levels is
(1) 1000 dB (2) 3 dB
(3) 30 dB (4) zero

11. For the stationary wave $y = 4\sin\left(\frac{\pi x}{15}\right)\cos(96\pi t)$, distance between a node and next antinode is
(1) 7.5 (2) 15
(3) 22.5 (4) 30

12. At what height above the surface of the earth is the value of acceleration due to gravity same as that at a depth of 5 km?
(1) 10 km (2) 7.5 km
(3) 5 km (4) 2.5 km

13. 

Time period of oscillation of the above arrangement is

(1) $2\pi\sqrt{\frac{m}{4k}}$ (2) $2\pi\sqrt{\frac{m}{k}}$

(3) $2\pi\sqrt{\frac{2m}{5k}}$ (4) $2\pi\sqrt{\frac{2m}{3k}}$

14. Which of the following statements is correct with respect to a geostationary satellite
(1) It moves in a plane containing the Greenwich meridian
(2) It moves in a plane perpendicular to the celestial equatorial plane
(3) Its height above the earth's surface is about six times the radius of the earth
(4) none of these

15. Beats are produced by two waves $y_1 = a \sin 2000\pi t$, and $y_2 = a \sin 2008\pi t$. The number of beats heard per second is
(1) zero (2) one
(3) four (4) eight

16. A person determines the time period of a simple pendulum in a stationary lift as T. If the lift is accelerated at g/4 in the downward direction, the time period of the pendulum will be

(1) $\frac{T}{3}$ (2) $2\frac{T}{\sqrt{3}}$

(3) $\sqrt{\frac{2}{3}}T$ (4) $\frac{T}{\sqrt{3}}$

17. A source of sound producing a frequency 600 Hz is moving with a speed 36 km/h towards an observer which is moving away with a speed 72 km/h. If speed of sound is 340 m/s, apparent frequency heard by the observer is
(1) 581 hertz (2) 562 hertz
(3) 634 hertz (4) 574 hertz

18. A tuning fork of unknown frequency gives 4 beats per second with a tuning fork of frequency 310 hertz. It gives the same number of beats when it is filed. The unknown frequency is
(1) 306 Hz (2) 300 Hz
(3) 314 Hz (4) 310 Hz

19. Kepler's second law regarding constancy of aerial velocity of a planet is a consequence of the law of conservation of
(1) energy
(2) angular momentum
(3) linear momentum
(4) none of these

20. The equation of SHM of a particle is $a + 4\pi^2 x = 0$ where 'a' is instantaneous linear acceleration at displacement 'x'. The frequency of motion is
(1) 1 Hz (2) 4π Hz
(3) 1/4 Hz (4) 4 Hz

21. Speed with which earth have to rotate on its axis so that a person on equator weigh $\frac{1}{4}^{th}$ as much as the present, is

(1) $\sqrt{\frac{3g}{4R}}$ rad/s (2) $\sqrt{\frac{g}{2R}}$ rad/s

(3) $\sqrt{\frac{g}{R}}$ rad/s (4) $\sqrt{\frac{2g}{R}}$ rad/s

22. Three similar wires of fundamental frequencies n_1, n_2 and n_3 under same tension are joined to make one long wire. Fundamental frequency of new wire under same tension will be

(1) $n = n_1 + n_2 + n_3$

(2) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$

(3) $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$

(4) $\frac{1}{n^2} = \frac{1}{n_1^2} + \frac{1}{n_2^2} + \frac{1}{n_3^2}$

23. If intensity of sound is increased by a factor of four, then the pressure amplitude in the sound wave is increased by

(1) 50% (2) 100%
(3) 300% (4) 200%

24. The ratio of kinetic energy required to be given to a satellite to escape earth's gravitational field to kinetic energy required to be given so that the satellite moves in a circular orbit just above earth atmosphere is

(1) one (2) two
(3) half (4) infinite

25. **Assertion** : The acceleration and velocity of a body in SHM, both change direction after time T/2 where T is time period.
Reason : The acceleration and velocity of a body in SHM change direction simultaneously.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

26. In an experiment for determination of velocity of sound by resonance tube method using a tuning fork of 256 Hz, first resonance was observed at 30.7 cm and second was obtained of 93.2 cm. Measured velocity of sound is

(1) 160 m/s (2) 320 m/s
(3) 340 m/s (4) 300 m/s

27. A satellite of mass 'm' moving around the earth of mass M_E in a circular orbit of radius R has angular momentum L. The rate of the area swept by the line joining the centre of the earth and satellite is

(1) L/2m (2) L/m
(3) 2 L/m (4) 2 L/M_E

28. In a stationary wave, all particles are

(1) At rest at the same time twice in every period of oscillation
(2) At rest at the same time only once in every period of oscillation
(3) Never at rest at the same time
(4) Never at rest at all

29. A horizontal platform with an object placed on it is executing S.H.M. in the vertical direction. The amplitude of oscillation is 20 cm. What must be approximately the least period of these oscillations, so that the object is not detached from the platform?

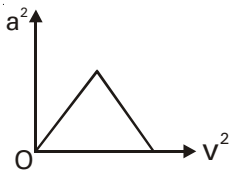
(1) 1.2 s (2) 1.1 s
(3) 1.0 s (4) 0.9 s

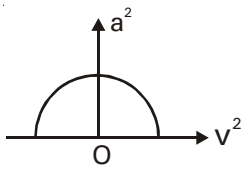
30. A particle of mass 2kg is kept at the center of a spherical shell of mass 100kg and radius 4m. Work done to take the particle away from the sphere to infinity is
(1) 1.334×10^{-9} J
(2) 3.33×10^{-9}J
(3) 6.67×10^{-9} J
(4) 5×10^{-9}J

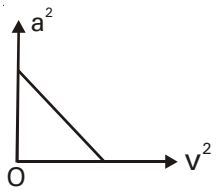
31. A solid cube floats in water half immersed and has small vertical oscillations of time period $\frac{\pi}{5}$ s. Its mass is
(1) 4 kg (2) 2 kg
(3) 1 kg (4) 0.5 kg

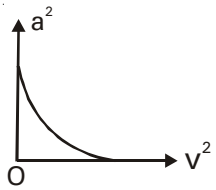
32. The escape velocity from earth is v_e. A body is projected with velocity $2v_e$ with what constant velocity will it move in the inter planetary space
(1) v_e (2) $3\ v_e$
(3) $\sqrt{3}\ v_e$ (4) $\sqrt{5}\ v_e$

33. A particle is in linear SHM. If the acceleration and the corresponding velocity of this particle are 'a' and 'v' respectively; then the graph relating to these quantities is

(1) 

(2) 

(3) 

(4) 

34. If the length of the simple pendulum is increased by 125%, then what is the change in time period of pendulum
(1) 25% (2) 33.3%
(3) 50% (4) 66.7%

35. The orbital velocity of satellite close to earth is 'v'. For a satellite orbiting at an altitude of half the earth's radius, the orbital velocity is
(1) $\frac{3}{2}v$ (2) $\sqrt{\frac{3}{2}}v$
(3) $\sqrt{\frac{2}{3}}v$ (4) $\frac{2}{3}v$

PHYSICS : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

36. At two different instants, displacement of a particle doing SHM is same. Then, at these two instants,
a. velocity must be same
b. acceleration must be same
c. kinetic energy must be same
d. potential energy must be same
(1) a, b & c (2) b, c & d
(3) a, c & d (4) a, b, c & d

37. An open pipe has a fundamental frequency f. If it is immersed in water upto half its original length, 3th overtone of the new pipe is
(1) 11f (2) 10f
(3) 5f (4) 7f

38. Two planets of radii in the ratio 1 : 4 are made from the material of density in the ratio 9 : 1. Then their ratio of acceleration due to gravity $g_1 : g_2$ at the surface of two planets will be
(1) 1.5 (2) 2.25
(3) 0.44 (4) 0.67

39. Assertion : We can put an artificial satellite into an orbit in such a way that it always remains over New Delhi.
Reason : A geostationary satellite remains over the same place on earth.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

40. Two masses m_1 and m_2 are suspended together by a massless spring of constant k. When the masses are in equilibrium, m_1 is removed without disturbing the system. Then the angular frequency of oscillation of m_2 is

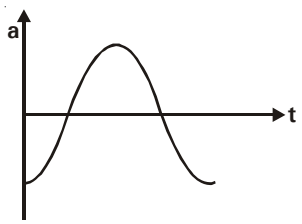
(1) $\sqrt{\frac{k}{m_1}}$ (2) $\sqrt{\frac{k}{m_2}}$

(3) $\sqrt{\frac{k}{m_1+m_2}}$ (4) $\sqrt{\frac{k}{m_1m_2}}$

41. In one metre long open pipe, what is the harmonic of resonance obtained with a tuning fork of frequency 480 Hz? ($v_{sound} = 320$ m/s)
(1) First (2) Second
(3) Third (4) Fourth

42. Two identical solid copper spheres of radius R are placed in contact with each other. The gravitational attracton between them is proportional to
(1) R^2 (2) R^{-2}
(3) R^4 (4) R^{-4}

43. The acceleration-time curve for a particle executing S.H.M. is as shown in the figure. The equation of its motion is



(1) $x = a \sin \omega t$ (2) $x = a \cos \omega t$

(3) $x = a \sin\left(\omega t + \frac{\pi}{4}\right)$ (4) $x = a \cos\left(\omega t + \frac{\pi}{4}\right)$

44. The amplitude of two sound waves of same frequency are in ratio 3 : 2. The ratio of their energy densities is
(1) 2 : 3 (2) 9 : 4
(3) 3 : 2 (4) 4 : 9

45. The wavelength of sound produced by a stationary source is 120 cm. If the source is moving with relative velocity of 60 m/s towards the observer, then the wavelength of the sound wave reaching to observer will be nearly (velocity of sound = 330 m/s)
(1) 98 cm (2) 140 cm
(3) 120 cm (4) 144 cm

46. The maximum height attained by a rocket of mass M, launched vertically from the surface of the earth of radius 'R' with an initial speed V, is [g = acceleration due to gravity on the surface of earth]

(1) $\frac{R}{\left(\frac{2gR}{V^2}+1\right)}$ (2) $\frac{R}{\left(\frac{2gR}{V^2}-1\right)}$

(3) R (4) $\frac{V^2}{2g}$

47. In forced oscillation, in one complete cycle, work done by
(1) external force is positive
(2) restoring force is positive
(3) damping force is positive
(4) damping force is zero

48. If pressure is increased by 1 atmosphere and temperature is increased by 1°C, then velocity of sound in air will
(1) increases by 16 m/s
(2) increase by 0.61 m/s
(3) decrease by 0.61 m/s
(4) remain constant

49. An artificial satellite moving in circular orbit around earth has total mechanical energy E_0. Its potential energy is
(1) $-E_0$ (2) $1.5\,E_0$
(3) $2\,E_0$ (4) E_0

50. A string of 7 m length has a mass of 0.035 kg. If tension in the string is 60.5 N, then speed of a wave on the string is
(1) 77 m/s (2) 102 m/s
(3) 110 m/s (4) 165 m/s

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. A system absorbs 1800 J of heat from the surroundings and does a work of 1620 J. Change in internal energy during process is
(1) $+180$ J (2) $+3420$ J
(3) -180 J (4) -3420 J

52. If a process is both endothermic and spontaneous then
(1) $\Delta S > 0$ (2) $\Delta S < 0$
(3) $\Delta H < 0$ (4) $\Delta H = T\Delta S$

53. The correct order of magnitude of root mean square velocity of the following molecules at the same temperature is
(1) $H_2 > O_2 > CO_2 > SO_2$
(2) $CO_2 > SO_2 > O_2 > H_2$
(3) $SO_2 > CO_2 > O_2 > H_2$
(4) $H_2 > CO_2 > SO_2 > O_2$

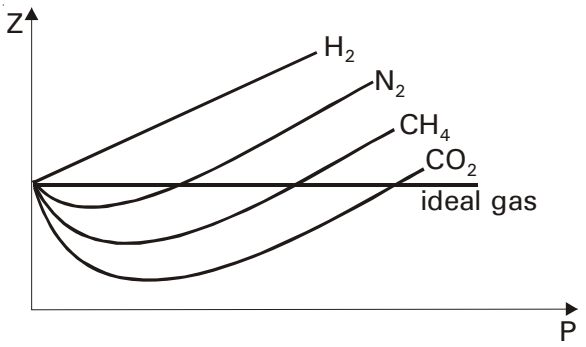
54. The temperature at which gas is supposed to have zero volume is
(1) 273°C (2) 300K
(3) zero K (4) 100 K

55. **Statement-I** : Phenol can act as antiseptic as well as disinfectant.
Statement-II : Chloroxylenol and terpeneol are the main constituents of dettol.
(1) Both statement-I and statement-II are incorrect
(2) Both statement-I and statement-II are correct
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

56. Which of the following has/have $\Delta H_{reaction}$ equal to $\Delta H_{atomisation}$ but not equal to $\Delta H_{sublimation}$?
a. $I_2(s) \rightarrow 2I(g)$
b. $CCl_4(s) \rightarrow C(g) + 4Cl(g)$
c. $CH_4(g) \rightarrow C(g) + 4H(g)$
d. $Na(s) \rightarrow Na(g)$
(1) both a & d (2) a, b & c
(3) c only (4) a, b, c & d

57. Temporary and permanent hardness in water can be removed respectively by the addition of
(1) $Ca(OH)_2$ and Na_2CO_3
(2) CaO and $CaCO_3$
(3) Na_2CO_3 and $CaCl_2$
(4) $NaHCO_3$ and CaO

58. A narrow spectrum antibiotic is active against
(1) gram positive or gram negative bacteria
(2) gram negative bacteria only.
(3) single organism or one disease.
(4) both gram positive and gram negative bacteria

59. 

Compressibility factor $\left[Z = \frac{PV}{nRT}\right]$ is plotted against pressure. What is the correct order of compressibility of the gases shown?

(1) $H_2 < N_2 < CH_4 < CO_2$
(2) $CO_2 < CH_4 < N_2 < H_2$
(3) $H_2 < CH_4 < N_2 < CO_2$
(4) $CH_4 < H_2 < N_2 < CO_2$

60. A gaseous mixture was prepared by taking equal mole of CO and N_2. If the total pressure of the mixture was found 1 atmosphere, the partial pressure of the nitrogen (N_2) in the mixture is :
(1) 1 atm (2) 0.5 atm
(3) 0.8 atm (4) 0.9 atm

61. Which hydrides is electron-precise hydride?
(1) B_2H_6 (2) NH_3
(3) H_2O (4) CH_4

62. $N_2(g) + 2\,O_2(g) \rightarrow 2NO_2 + Xkj$
$2NO(g) + O_2(g) \rightarrow 2NO_2(g) + Y\,kj$
The enthalpy of formation of NO is
(1) $(2X - 2Y)$ (2) $X - Y$
(3) $\frac{1}{2}(Y - X)$ (4) $\frac{1}{2}(X - Y)$

63. The minimum pressure required to compress 500 cm^3 of air at 2 bar to 200 cm^3 at 30°C is
(1) 0.5 bar (2) 5 bar
(3) 2.5 bar (4) 0.8 bar

64. An LPG cylinder contains 15 kg of butane gas at 27°C and 10 atmospheric pressure. It was leaking and its pressure fell down to 8 atmospheric pressure after one day. Gas leaked is
(1) 1 kg (2) 2 kg
(3) 3 kg (4) 4 kg

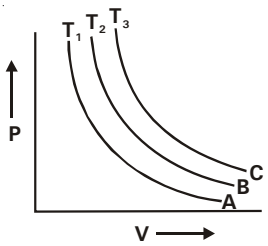
65. Which of the following statement is correct for the reaction?

$CaO(s) + CO_2(g) \rightarrow CaCO_3(s)\ \Delta_rH^o = -178.3KJ/mole$

(1) Δ_rH^o is the enthalpy of formation of $CaCO_3$
(2) Δ_rH^o is the not enthalpy of formation of $CaCO_3$
(3) Δ_rH^o is the enthalpy of combustion of $CaCO_3$
(4) Δ_rH^o is the enthalpy of atomisation of $CaCO_3$

66. "Perhydrol" is the name associated with
(1) H_2O_2 (2) D_2O
(3) H_2O (4) HD

67. The density of a gas at 27°C and 1 atm is d. Pressure remaining constant, at which of the following temperatures will its density become 0.6 d?
(1) 600 K (2) 500 K
(3) 400 K (4) 300 K

68. 

Three isothermal plots (P versus V) A,B and C are plotted at three temperatures T_1, T_2 and T_3 respectively.

The correct order of temperature will be

(1) $T_1 < T_2 < T_3$ (2) $T_1 = T_2 = T_3$

(3) $T_1 > T_2 > T_3$ (4) $T_1 > T_2 < T_3$

69. Among the following which ore is concentrated by froth floatation process?

(1) Cassiterite (2) Bauxite

(3) Zincite (4) Cinnabar

70. The enthalpy and entropy change for the reaction: Br_2 (l) + Cl_2 (g) $\rightarrow$ 2BrCl(g)

are 30kJ mol^{-1} and 105 JK^{-1} mol^{-1} respectively. The temperature at which the reaction will be in equilibrium is:

(1) 285.7 K (2) 273 K

(3) 450 K (3) 300 K

71. **Assertion** : Copper is electrolytically refined using impure copper as anode and pure copper strip as cathode.

Reason : Impurities in the copper, deposit as anode mud.

(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Assertion is false

72. Which of the following mixture of gases at room temperature does not follow Dalton's law of partial pressures?

(1) NO_2 and O_2 (2) NH_3 and HCl

(3) CO and CO_2 (4) SO_2 and O_2

73. The heat of neutralization of CH_3COOH, HCOOH, HCN and H_2S are –13.2, –13.4, –2.9 & –3.8 k cal per equivalent respectively. The order of acidic strength is

(1) $HCOOH < CH_3COOH < HCN < H_2S$

(2) $HCN < H_2S < HCOOH < CH_2COOH$

(3) $HCN < H_2S < CH_3COOH < HCOOH$

(4) $HCOOH < CH_3COOH < H_2S < HCN$

74. The volume of oxygen liberated at NTP from 10 ml of 20V H_2O_2.

(1) 350 ml (2) 300 ml

(3) 20 ml (4) 200 ml

75. Match the items of Column I with the items of Column II

Column I	**Column II**
a. Coloured bands	p. Zone refining
b. Purification of Ni	q. Fractional distillation
c. Purification of Ge & Si	r. Mond Process
d. Purification of mercury	s. Chromatography
	t. Liquation

(1) a-r, b-s, c-t, d-q (2) a-s, b-r, c-p, d-q

(3) a-p, b-q, c-t, d-r (4) a-q, b-s, c-t, d-r

76. A two litre flask contains 0.2 moles of N_2 gas at 300K. the pressure moist gas in the flask is 3 atm. If this moist gas is shifted to one litre flask. Then the pressure exerted on the new flask is

(1) 4.92 atm (2) 5.46 atm

(3) 6 atm (4) 3.87 atm

77. Choose the incorrect statement
(1) More is value of 'a', more is ease of liquification of gas and lesser is critical temperature
(2) 'a' depends on nature of gas
(3) 'a' is independent of temperature and pressure
(4) value of 'a' is greater for NH_3 than N_2

78. Cyanide process of leaching is used for which of the following metals?
(1) Al (2) Cu
(3) Ag (4) Na

79. An imaginary reaction $A \rightarrow 2B$ assumed to take place in three steps

$A \rightarrow C;\ \Delta H = q_1$

$C \rightarrow D;\ \Delta H = q_2$

$\frac{1}{2} D \rightarrow B;\ \Delta H = q_3$

enthalpy change for the reaction is
(1) $q_1 - q_1 + 2q_3$ (2) $q_1 + q_2 - 2q_3$
(3) $q_1 + q_2 + 2q_3$ (4) $q_1 + 2q_2 - 2q_3$

80. Tritium, a radioactive isotope of hydrogen, emits which of the following particles?
(1) Beta (β^-) (2) Alpha (α)
(3) Gamma (γ) (4) Neutron (n)

81. If 36 ml of H_2O is formed at 298K from its consititutent elements and enthalpy change during the reaction is 400 kcal, then the heat of formation of water is
(1) 400 kcal mol^{-1} (2) 200 kcal mol^{-1}
(3) 100 kcal mol^{-1} (4) $\frac{400}{36}$ kcal mol^{-1}

82. The froth floatation process is based upon
(1) the difference in the specific gravity of ore and gangue particles
(2) the magnetic properties of gangue and ore
(3) preferential wetting of ore particles by oil
(4) preferential wetting of gangue particles by oil

83. 4 gas balloons A,B,C,D of equal volume containing H_2, N_2O, CO, CO_2 were pricked with needle and immersed in a tank containing N_2. Which of them will have same size?
(1) A (2) B
(3) C (4) Both A and D

84. The hydride gap refers to inability of
(1) noble gases to form hydrides
(2) elements of group 7, 8, 9 of d-block to form hydrides
(3) s-electrons of p-block element to participate in bonding
(4) hydrogen to react with saturated hydrocarbons

85. Which of the following is not a tranquilizer?
(1) Barbituric acid (2) Seconal
(3) Equanil (4) Aspirin-

CHEMISTRY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

86. $\Delta^oH_{Neutr.}$ of oxalic acid is $-x$ kJ mol^{-1}; then enthalpy of ionisation of oxalic acid is
(1) $(114.2-x)$kJ mol^{-1} (2) $(57.1-2x)$kJ mol^{-1}
(3) $(2x-114.2)$kJ mol^{-1} (4) $(57.1-x)$kJ mol^{-1}

87. **Assertion** : Real gases behave like ideal gases at high temperature and low pressure.

Reason : Molecular interaction diminishes at high temperature and low pressure.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

88. The salt responsible for permanent hardness of H_2O is

(1) Na_2SO_4 (2) $Mg(HCO_3)_2$

(3) NaCl (4) $MgCl_2$

89. The enthalpy change of which reaction corresponds to ΔH_f^0 for $Na_2CO_3(s)$ at 298K?

(1) $2Na(s) + C(s) + \frac{3}{2}O_2(g) \longrightarrow Na_2CO_3(s)$

(2) $Na_2O(s) + CO_2(g) \longrightarrow Na_2CO_3(s)$

(3) $2Na^+(aq.) + CO_3^{2-}(aq.) \longrightarrow Na_2CO_3(s)$

(4) $2Na^+(aq.) + 2OH^-(aq.) + CO_2(aq.) \longrightarrow Na_2CO_3(s) + H_2O$

90. The correct signs of ΔH and ΔS for $2Cl(g) \rightarrow Cl_2(g)$ are

(1) $-, -$ (2) $+, +$

(3) $-, +$ (4) $+, -$

91. If heat of dissolution of anhydrous $CuSO_4$ and $CuSO_4.5H_2O$ are -15.89 kcal and $+2.80$ kcal respectively, then the heat of hydration of $CuSO_4$ to form $CuSO_4.5H_2O$ is

(1) -13.09 kcal (2) -18.69 kcal

(3) $+13.09$ kcal (4) $+18.69$ kcal

92. Artificial sweetener that is stable under cold conditions and so is added to cold foods only is

(1) sucralose (2) alitame

(3) aspartame (4) saccharine

93. The van der Waal's equation for a real gas is

(1) $\left(P + \frac{a}{V^2}\right)(V - b) = nRT$

(2) $\left(P + \frac{an^2}{V^2}\right)(V - b) = nRT$

(3) $\left(P + \frac{a}{V^2}\right)(V + b) = nRT$

(4) $P = \frac{nRT}{(V - nb)} - \frac{n^2a}{V^2}$

94. The method of zone refining of metals is based on the principle of

(1) greater mobility of pure metal than that of the impurity

(2) higher melting point of the impurity than that of the pure metal

(3) greater noble character of the solid metal than that of the impurity

(4) greater solubility of the impurity in the molten state than in the solid

95. The volume strength of 1.5 N H_2O_2 solution is

(1) 4.8 (2) 8.4

(3) 3.0 (4) 8.0

96. Choose the incorrect statement among the following

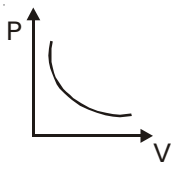
(1) Tincture of iodine is used as a strong disinfectant

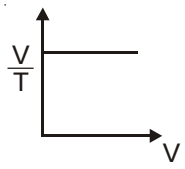
(2) Dilute solutions of boric acid and H_2O_2 are used as antiseptics

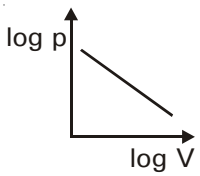
(3) 0.2% solution of phenol is an antiseptic white 1% solution acts as a disinfectant

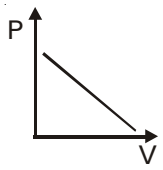
(4) Disinfectants can not be applied on living tissues

97. Which of these is not a correct graph?

(1) 

(2) 

(3) 

(4) 

98. Cetyltrimethyl ammonium bromide is a popular
(1) anionic detergent
(2) cationic detergent
(3) non-ionic detergent
(4) antioxidant.

99. Match the items in column-I with the relevant item in column-II

Column-I	Column-II
i. Dihydrogen	a. Zeolite
ii. Used in calgon method	b. Sodium hexametaphosphate
ii. Permanent hardness of hard water is removed by	c. Bosch's process

(1) i-b,c ; ii-c ; iii-a,b (2) i-c ; ii-b ; iii-a
(3) i-c ; ii-b ; iii-a,b (4) i-a,c ; ii-b ; iii-b,c

100. **Statement-I** : A molar property χ_m, the value of an extensive property χ of the system for 1 mole of the substance is independent of the amount of matter.
Statement-II : Temperature, volume and internal energy of a system are state functions.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. The hepatic portal vein drains blood to liver from
(1) stomach (2) kidney
(3) intestine (4) heart

102. How many among the following belong to phylum Arthropoda?
Locusta*, *Apis*, *Ophiura*, *Sepia*, *Bombyx*, Spider, *Pheretima
(1) 5 (2) 4
(3) 6 (4) 7

103. Anti Rh antibodies are given to mother after delivery if mother is _____ and foetus is _____ respectively
(1) Rh^+, Rh^- (2) Rh^-, Rh^+
(3) Rh^+, Rh^+ (4) Rh^-, Rh^-

104. A jawless fish, which lays eggs in fresh water and whose ammocoete larvae after metamorphosis return to the ocean is :
(1) *Petromyzon* (2) *Exocoetus*
(3) *Myxine* (4) *Trygon*

105. Proteins that help in blood clotting are
(1) Fibrinogen and vitamin K
(2) Fibringoen and prothrombin
(3) Prothrombin and Ca^{++}
(4) All of these

106. The opening between right atrium and right ventricle is guarded by
(1) Tricuspid valve which get closed during atrial systole
(2) Bicuspid valve which remains open during atrial systole
(3) Tricuspid valve which gets closed during ventricular systole
(4) Bicuspid valve which gets closed during ventricular systole

107. Identify the incorrect statement
(1) SAN and AVN of nodal tissue can generate cardiac impulses
(2) Nodal musculature generates action potentials through external stimulus
(3) SAN generates maximum number of action potentials
(4) Rhythmic contractile activity of heart is maintained by SAN

108. Which of the following cells resist infections and are associated with allergic reactions?
(1) Basophils (2) Eosinophils
(3) Neutrophils (4) Monocytes

109. Which among the following use water from their surroundings through their body cavities to facilitate the cells to exchange substances?
(1) Flatworm and roundworms
(2) Annelids and arthropods
(3) Poriferans and coelentrates
(4) Molluscans and echinoderms

110. Which of the following is an example of gregarious pest ?
(1) Lac insect (2) *Anopheles*
(3) Locust (4) Silkworm

111. Which of the following statements is incorrect?
(1) A person of 'O' blood group has anti 'A' and anti 'B' antibodies in his blood plasma.
(2) A person of 'B' blood group can't donate blood to a person of 'A' blood group.
(3) Blood group is designated on the basis of the presence of antibodies in the blood plasma.
(4) A person of AB blood group is universal recipient.

112. The presence of operculum & air bladder is seen in animals, that are also accompained with which of the following characters?
(1) Persistent notocord (2) Placoid scales
(3) Terminal mouth (4) Internal fertilization

113. In the ECG
(1) P-wave represent excitation or repolarization of atria
(2) Q RS represent initiation of ventricular diastole
(3) end of T wave marks the end of ventricular systole
(4) Q shows ventricular repolarization while T marks the ventricular depolarization

114. Viviparous pouched mammal in which young ones are underdeveloped and development is completed in marsupium is
(1) *Ornithorhynchus* (2) *Balaenoptera*
(3) *Delphinus* (4) *Macropus*

115. If the number of action potentials generated by SA node increases to 120/min. Select the correct option.
a. Heart rate
b. Duration of cardiac cycle, respectively
(1) 70/ min ,0.8 sec
(2) 70–75/min , 0.94 sec
(3) 120, 2sec
(4) 120, 0.5sec

116. Loose connective tissue & dense connective tissue are different in
(1) arrangement of fibres
(2) type of fibres & fibroblast
(3) amount of adipose cells
(4) none of these

117. In the walls of blood vessels, layer with smooth muscles and elastic fibres is
(1) Tunica intima (2) Tunica externa
(3) Tunica media (4) Both (1) and (3)

118. Consider following statements with four blanks w.r.t. Amphibians. Find out the correct option to fill these blanks.
a. Notochord is present on ____(i)____ side of the body and ____(ii)____ the nerve cord.
b. Fertilization is ____(iii)____
c. Heart pumps ____(iv)____ blood.

	(i)	(ii)	(iii)	(iv)
(1)	dorsal	ventral	external	mixed
(2)	ventral	ventral	internal	oxygenated
(3)	ventral	dorsal	external	deoxygenated
(4)	dorsal	dorsal	external	mixed

119. Which one of the following type of tissue is present in the lining of blood vessels?
(1) Cuboidal epithelium
(2) Columnar epithelium
(3) Squamous epithelium
(4) Stratified epithelium

120. Choose the correct option considering animals with their common feature
(1) *Echinus* and *Chaetopleura*– Radial symmetry
(2) *Cucumaria* and *Culex* – Pseudocoelomates
(3) *Anopheles* and *Brittle star*– Open circulation
(4) *Asterias* and *Pila* –Water vascular system

121. **Statement-I** : Polyp and medusa forms alternate in life cycle of all coelenterata.
Statement-II : *Aurelia* exists as umbrella-shaped medusoid form while *Hydra* exists as cylindrical polyp form.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

122. Which of the given statements is incorrect
(1) All vertebrates are chordates but all chordates are not vertebrates.
(2) Protochordates includes urochordates and cephalochordates
(3) Amphibians, reptiles, aves, mammals have two limbs and thus are grouped under tetrapoda.
(4) In heart of frog, a triangular structure called sinus venosus joins right atrium.

123. Tegmina in the cockroach are
a. opaque and leathery.
b. occur in prothorax.
c. second pair of wings.
d. covers the metathoracic wings at rest.
(1) a and d (2) b and c
(3) a and b (4) c and d

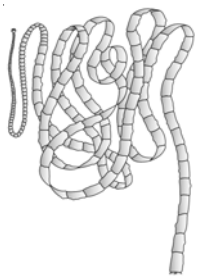
124. Which of the following option is incorrect w.r.t connective tissue?
(1) It is most abundant and widely distributed in the body of complex animals
(2) It ranges from from soft connective tissues to specialised types, which include cartilage and bone only
(3) In all connective tissues except blood, the cells secrete fibres of structural proteins called collagen or elastin
(4) Cells of connective tissue secrete modified polysaccharides, which accumulate between cells and fibres and act as matrix

125. **Assertion** : Compound epithelium has a limited role in secretion and absorption.
Reason : Compound epithelium is multilayered.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

126. Find the correct match

	Type of cells		**Count of cells in % age**
(1)	Neutrophils	–	0.5–1%
(2)	Eosinophils	–	60–65 %
(3)	Basophils	–	2–3%
(4)	Monocytes	–	6–8%

127. All protozoans have
(1) Pseudopodia
(2) Contractile vacuole
(3) Holozoic nutrition
(4) Eukaryotic organization

128. 

The above animal shows which of the following characteristic?
(1) Muscular pharynx (2) Metamerism
(3) Hooks & Suckers (4) Bioluminescence

129. How many of the following statements are correct?
a. In hypertension, blood pressure, is persistently above 140/90 mm Hg
b. Congestion of lungs is main symptom associated with heart failure
c. Human heart is neurogenic
d. Pulse rate of an individual can be determined by counting the number of QRS complexes in a given period of time
(1) one (2) two
(3) three (4) four

130. Which among the following is true ?
(1) Lymph is formed by filtratiojn of blood
(2) Lymph contains all constituents of blood except proteins
(3) Lymph is drained back to major arteries
(4) Special lymphatic vessel, lacteal is present for absorption of fats in stomach

131. Which of the following characters, is not found in all arthropods?
(1) Open circulatory system
(2) Exoskeleton
(3) True coelom
(4) Malpighian tubules

132. Which of the following statements are incorrect regarding ciliated epithelium?
i. Cells possess cilia on their free surface
ii. They generally bear microvilli at the free ends to increase surface area of the organ
iii. Mucus spreads over the epithelium as a thin layer
iv. It is found in the lining of small intestine.
(1) i and iii (2) i and ii
(3) ii and iv (4) iii and iv

133. Serial repetition of atleast some organs in segments is a feature commonly seen in
(1) pseudocoelomates
(2) spinny skinned animals
(3) flatworms
(4) truely segmented worms

134. Sclerites of the cockroach are connected to one another by
(1) auricular membrane (2) tergites
(3) arthrodial membrane (4) sternites

135. Find the correct match
(1) Heart failure – heart stops beating
(2) Cardiac arrest – sudden damage of heart muscles
(3) Heart attack – cardiac output not efficient
(4) Angina pectoris – acute chest pain

ZOOLOGY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

136. Which of the given statement is not true?
a. *Branchiostoma* is jawless vertebrate
b. *Scoliodon* shows external fertilization
c. *Torpedo* has electric organs
d. Cobra and *Rana* are oviparous animals
(1) a, b, c and d (2) a and b
(3) a and c (4) c and d

137. If an injury damages the chordae tendinae of tricuspid valve of human heart making it partially non-functional, what will be the immediate effect?
(1) Pacemaker will stop working
(2) Blood will tend to flow back into left atrium
(3) Flow of blood into pulmonary artery will be reduced
(4) Flow of blood into systemic aorta will be slowed down

138. Which of the following statements is incorrect ?
(1) Mammals are viviparous with no exception.
(2) In birds air sacs are connected to lungs to supplement respiration.
(3) Cloaca in amphibians is a common chamber in which alimentary canal, urinary bladder, reproductive tracts open
(4) Body of reptiles is covered by dry and cornified skin with epidermal scale and scutes

139. Choose the correct one in each group a, b, c and then choose the correct option
a. **Polymorphonuclear leucocytes :** Lymphocytes, Neutrophils, Monocytes
b. **Constitutents of serum :** Fibrinogen, Prothrombin, Minerals
c. **Vertebrate group with incomplete double circulation :** Fishes, Reptiles, Aves
(1) Lymphocytes, Minerals, Aves
(2) Lymphocytes, Prothrombin, Fishes
(3) Neutrophils, Fibrinogen, Fishes
(4) Neutrophils, Minerals, Reptiles

140. What is common to Annelida, Platyhelminthes & Nemathelminthes?
(1) Sexes are not separate
(2) Development through many larval stages
(3) Bilateral symmetry
(4) Complete digestive system

141. Which of the following option is incorrect w.r.t epithelial tissue?
(1) The cells are compactly packed with little intercellular matrix
(2) It has a free surface, which faces either body fluid or the outside environment
(3) Simple epithelium is composed of a many layers of cells and functions as a lining for body cavities, ducts, and tubes
(4) The function of ciliated epithelium is to move particles or mucus in a specific direction over the epithelium

142. The **(i)** circulation starts with the pumping of oxygenated blood by **(ii)** to **(iii)** which is carried to all body parts. Blood from the body parts is returned to **(iv)** . (i–iv) respectively are
(1) Pulmonary, lungs, left atrium, right atrium
(2) Systemic, lungs, left atrium, left ventricle
(3) Systemic, left ventricle, aorta, right atrium
(4) Pulmonary, right ventricle, aorta, left atrium

143. _____ junction facilitate the cells to communicate with each other by connecting the _____of adjoining cells.
(1) gap, cytoplasm
(2) tight, cell wall
(3) adhering, plasma membrane
(4) none of the above

144. Match the column I with column II and choose the correct option

	Column I	**Column-II**
a.	Compound epithelium	i. Tendons and ligaments
b.	Simple squamous epithelium	ii. Bowman's capsule & Alveoli
c.	Dense regular connective tissue	iii. Salivary duct & pancreatic duct

(1) (a-iii), (b-ii), (c-i) (2) (a-i), (b-ii), (c-iii)
(3) (a-ii), (b-iii), (c-i) (4) (a-i), (b-iii), (c-ii)

145. Choose the correct arrangement that lists the following given structures in an order of an action potential passes through them
1. Atrioventricular bundle
2. AV node
3. Bundle branches
4. Purkinje fibres
5. SA node
(1) 2, 5, 3, 1, 4 (2) 5, 2, 1, 3, 4
(3) 2, 5, 1, 3, 4 (4) 5, 2, 4, 1, 3

146. Which of the following is true for chordates?
a. Bilaterally symmetrical
b. Triploblastic
c. Coelomate
d. Organ system
e. Post anal tail
f. Closed circulatory system
(1) a, b, c & e (2) a, b, c, d, e & f
(3) a, b & c (4) b, c, d & e

147. **Assertion** : *Sepia, Octopus, Loligo* are molluscs with organ system level of organization, tube within tube body plan and bilateral symmetry.
Reason : Eyes of *Octopus* are analogous to vertebrate eyes.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

148. A system that provides nutrients, O_2 and other essential substances to the tissue and takes CO_2 and other harmful substances away for elimination is called
(1) systemic circulation
(2) double circulation
(3) pulmonary circulation
(4) coronary circulation

149. During atrial systole, blood flow in ventricles increases by
(1) 70% (2) 50%
(3) 30% (4) 10%

150. Which one of the following categories of animals is correctly described without any exception in it?
(1) All reptiles have three chambered heart and are poikilotherms
(2) All bony fishes have four pairs of gills
(3) In all amphibians body is divided into head,neck,trunk and tail
(4) Notochord is persistent throughout life in super class pisces

BOTANY : SECTION-A

All questions are compulsory in section A

151. Female sex organ in bryophytes is
(1) antheridium (2) archegonium
(3) capsule (4) gemma

152. In *Brassica*, hybridisation and selection has resulted in the development of new resistant varieties
(1) Pusa gaurav against white rust
(2) Pusa swarnim against aphids
(3) Pusa gaurav against aphids
(4) Himgiri against stripe rust

153. Breeders try to incorporate all the given features into the crops except
(1) Increased tolerance to environment
(2) Resistance to pathogens
(3) Susceptible to insect pests
(4) Increased crops yield

154. "Conventional plant breeding is often constrained by the availability of _____ number of disease resistance _____. Inducing mutations in plants and then screening the plant materials for resistance sometimes leads to desirable genes being ____." Which of the following is correct fill-up of the above paragraph in sequence?
(1) vast, genes, destroyed
(2) limited, plants, destroyed
(3) vast, plants, identified
(4) limited, genes, identified

155. **Assertion :**The spread of pteridophytes is limited and restricted to narrow geographical area
Reason : Pteridophyte require specific enviromental conditions to grow and need water for fertilization
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

156. System of classification which was based on external morphology,ultrastructure, anatomy, embryology and phytochemistry was given by
(1) Linnaeus (2) Bentham & Hooker
(3) Engler and prantle (4) Theophrastus

157. The main step in breeding a new genetic variety of a crop are (in seq.)
(1) selection and testing of superior recombinants; collection of variability; evaluation and selection of parents; cross hybridization; testing; release and commercialisation
(2) collection of variability; evaluation and selection of parents; cross hybridization; selection and testing of superior recombinants; testing, release and commercialisation
(3) evaluation and selection of parents; collection of variability; cross hybridization; selection and testing of superior recombinants; testing, release and commercialisation
(4) testing, release and commercialisation; evaluation and selection of parents; collection of variability; cross hybridization; selection and testing of superior recombinants

158. Gymnosperms are referred to as "naked seeded plants" because
(1) they lack ovule
(2) they lack ovaries
(3) have no seed coat
(4) embryo is not protected

159. A green plant possessing single-celled reproductive organs, no vascular tissue, and no root, stem or leaf should be classified as
(1) algae (2) fungi
(3) bryophyte (4) mycoplasma

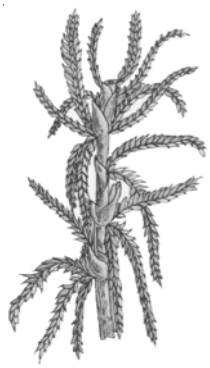
160. Pick out wheat varieties
a. Taichung native-I b. Jaya
c. Ratna d. Shakti
e. Kalyan Sona f. Sonalika
(1) e, f (2) a, c, d, e, f
(3) b, c, d (4) a, d, e, f

161. Which of the following is used as food supplements by space traveller?
(1) *Volvox* (2) *Chlorella*
(3) *Gelidium* (4) *Porphyra*

162. In which of the following plants would you look for mycorrhiza?
(1) algae (2) *Pinus*
(3) mosses (4) lichens

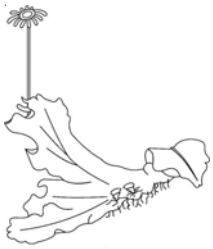
163. Which of the following algae has stored food in form of floridean starch ?
(1) green and brown algae
(2) brown algae
(3) red algae
(4) blue green algae

164. Which of following is a horsetail?

(1) 

(2) 

(3) 

(4) 

165. Gametophyte of pteridophyte is
a. small but multicellular
b. free-living
c. non-photosynthetic
d. thalloid
e. called protonema
(1) c, d, & e only (2) b, c & e only
(3) a, b & d only (4) a, b, c, d & e

166. Which stage of mosses bear sex organs ?
(1) Protonema stage
(2) Sporophytic stage
(3) Leafy stage
(4) Capsule of sporophyte

167. Wheat variety resistant to leaf and stripe rust is
(1) Himgiri
(2) Pusa swarnim
(3) Pusa komal
(4) Pusa sadabahar

168. In Gymnosperms, the megaspore mother cell is differentiated from one of the cell of the
(1) nucellus (2) pollen grain
(3) microsporangia (4) archegonium

169. Identify the incorrect w.r.t. alternation of generation
(1) Most algae genera – Haplontic
(2) *Polysiphonia*, *kelps* – Haplo-diplontic
(3) *Fucus* – Diplontic
(4) Mosses – Haplontic

170. How many of the following statements are true w.r.t. pteridophytes?
a. The pteridophytes include liverworts and ferns.
b. Some pteridophytes flourish well in sandy - soil conditions.
c. The main dominant phase in the life cycle is spore bearing, diploid sporophyte.
d. Microphylls are present in ferns.
(1) One (2) Two
(3) Three (4) Four

171. Pinnate leaves which persist for a few years and coralloid roots are found in
(1) *Pinus* (2) *Cycas*
(3) *Sequoia* (4) *Cedrus*

172. Identify the wrong statement about bryophytes
(1) main plant body is haploid
(2) sex organs are multicellular
(3) zygote donot undergo reduction division immediately
(4) fertilization occurs in water

173. Somatic hybridisation is accomplished by
(1) grafting
(2) fusion of two protoplasts
(3) chromosome doubling in androgenic cultures
(4) recombinant DNA technology

174. Which of the following will not show an independent free living gametophyte?
(1) *Dryopteris* (2) *Adiantum*
(3) *Pteris* (4) *Pinus*

175. Phylogenetic classification systems assumes that
(1) there are natural affinities among the organisms
(2) vegetative characters are more easily affected by environment
(3) chemical contituents of plants should be considered in classification to resolve confusions
(4) organisms belonging to the same taxa have a common ancestor

176. Which of the following group is also known as amphibians of the plant kingdom?
(1) Algae (2) Bryophytes
(3) Gymnosperms (4) Angiosperms

177. Sporophyte of bryophytes is
a. multicellular
b. absorb nutrition from gametophyte
c. diploid
d. bear sex organs, antheridia and archegonia
e. formed from spore
(1) a, b & c (2) b, d & e
(3) a, b & d (4) a, b, c & d

178. Agranal chloroplasts with storage bodies called pyrenoids are a feature of members of
(1) Rhodophyceae (2) Chlorophyceae
(3) Phaeophyceae (4) Cyanophyceae

179. **Statement-I** : In a virus infected plant, meristem (apical & axillary) is free of virus.
Statement-II : If a plant is infected with virus, one can recover a healthy plant from it.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

180. Which of the following variety developed by IARI, New Delhi, is enriched in calcium and vitamin C respectively?
(1) Carrot, Spinach (2) Bathua, Bathua
(3) Spinach, Pea (4) Bathua, Carrot

181. Which is incorrectly matched?
(1) *Salvinia* – heterosporous fern
(2) *Chara* – green algae
(3) *Pinus* – anemophilous gymnosperm
(4) *Azolla* – aquatic angiosperm

182. In how many of the following plants, sporophyte depends upon gametophyte?
Lycopodium*, *Dryopteris*, *Salvinia*, *Selaginella*, *Funaria*, *Riccia*, *Marchantia
(1) 6 (2) 2
(3) 5 (4) 3

183. *Pinus* plant is
(1) monoecious
(2) dioecious
(3) a angiosperm
(4) perrenial shrubby plant

184. Reduced male gametophyte in gymnosperm is
(1) Microsporangium (2) Megaspore
(3) Pollen grain (4) Prothalial cell

185. Which of the following pair of hormone are required for a callus to differentiate ?
(1) Gibberellins and ethylene
(2) Auxin and Gibberellins
(3) Cytokinin and abscissic acid
(4) Auxin and cytokinin

BOTANY : SECTION-B

This section has 15 questions, attempt any 10 questions of them.

186. Identify the incorrect statement
(1) The plant body of bryophtes is more differentiated than that of algae
(2) Many species of porphyra, laminaria and sargassum are among the 70 species of marine algae used as food
(3) Pteridophytes are used for medicinal purposes and as soil binders
(4) Double fertilization is an event unique to gymnosperms

187. **Statement- I** : Gemmae develop in small receptacle called gemma cups in *Marchantia*
Statement- II : *Marchantia* is a livewort
(1) Both statement -I and statement- II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement- II is correct

188. Which character of maize does not show resistance to maize stem borer?
(1) High nitrogen, high sugar
(2) Low nitrogen, low sugar
(3) Low nitrogen, high aspartic acid
(4) low sugar, high aspartic acid

189. Find the odd one out
(1) *Funaria* (2) *Polytrichum*
(3) *Sphagnum* (4) *Selaginella*

190. Which of the following statement is incorrect?
(1) In liverworts, mosses and ferns the gametophytes are free-living
(2) Homosporous ferns produce monoecious gametophyte
(3) The sporophyte in mosses is more elaborate than in liverworts
(4) *Salvinia* is also known as Peat moss

191. Protonema is
(1) a juvenile filamentous stage
(2) an adult leafy stage
(3) found in *Marchantia*
(4) develops from gamete

192. Match the type of taxonomy which is used by taxonomists these days in column I with their description in column II.

Column I		Column II	
a.	Numerical taxonomy	p.	uses of chemical constituents of plant to resolve confusions
b.	Cytotaxonomy	q.	using computers based on all observable characteristics
c.	Chemotaxonomy	r.	information about chromosome number, structure & behaviour

(1) a-r, b-p, c-q (2) a-p, b-r, c-q
(3) a-q, b-r, c-p (4) a-r, b-q, c-p

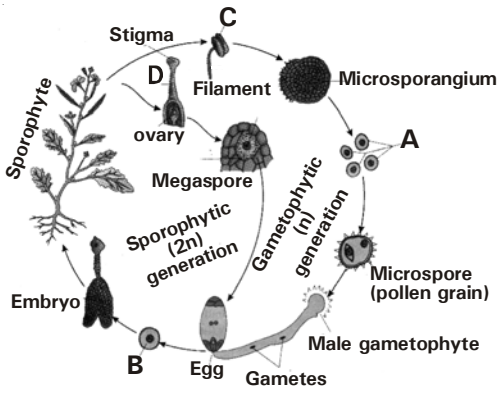
193. Which of the following statements is incorrect w.r.t leaves of gymnosperms?
(1) Their stem may be branched or unbranched
(2) In conifers, the needle-like leaves reduce the surface area
(3) Thick cuticle and sunken stomata help to reduce water loss
(4) The leaves cannot withstand extremes of temperature and humidity

194. In bryophytes, where does meiosis occur to produce spores from spore mother cells?
(1) Zygote (2) Archaegonium
(3) Sporangia (4) Capsule

195. Which of the following statement is incorrect?
(1) In *Dryopteris,* prothallus is formed
(2) In *Selaginella* leaves are microphyllous
(3) Ferns constitute the largest living group of pteridophytes
(4) In some pteridophyte like *Dryopteris*, sporophylls form distinct structure called cones

196. **Assertion** : Mosses form dense mat on soil and prevent the impact of falling rain.
Reason : Some mosses provide food for herbaceous mammals.
(1) Both Assertion and Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Assertion is false

197.



In the above figure A, B, C and D are respectively
(1) Zygote, Anther, Microspore, Style
(2) Microspore, Zygote, Anther, Style
(3) Zygote, Style, Microspore, Anther
(4) Anther, Microspore, Style, Zygote

198. Multicellular female gametophyte in gymnosperms
(1) is retained within megasporangium
(2) is dispersed into the air
(3) is represented by archegonia
(4) shows independent existence

199. An iron fortified rice variety has been developed containing over_____ as much iron as is present in commonly consumed varieties.
(1) 3 times (2) 5 times
(3) 4 times (4) 2 times

200. Which of the following is incorrectly matched?
(1) *Psilotum* – Psilopsida
(2) *Lycopodium* – Lycopsida
(3) *Equisetum* – Sphenopsida
(4) *Selaginella* – Pteropsida