Dated : 10-04-2023

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

MM : 720 **Test - 03** Time : 3 hrs. 20 min.

Physics	:	Mechanical Properties of Matter, Thermal Properties of Matter, KTG,Thermodynamics
Chemistry	:	Chemical Bonding, p-block elements, s-block lements, Periodic Properties
Zoology	:	Locomotion & movement, Cell: The unit of life, Cell cycle & cell division
Botany	:	Anatomy of angiosperms, Plant growth and development & Mineral nutrition

PHYSICS : SECTION-A

All questions are compulsory in section A

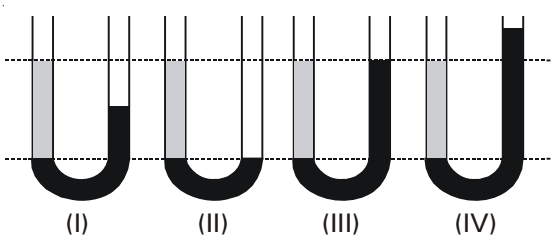
1. The increase in length of a wire of original length L by a longitudinal stress is ℓ. Then the stress in the wire is proportional to
   (1) L/ℓ (2) ℓ/L
   (3) ℓL (4) $L\ell^2$
2. In a cyclic process, work done by the system is
   (1) zero
   (2) equal to heat given to the system
   (3) more than the heat given to system
   (4) independent of heat given to the system
3. Recently, the phenomenon of superconductivity has been observed at 95 K. This temperature is nearly equal to
   (1) – 288°F (2) – 146°F
   (3) – 368°F (4) +178°F
4. Two identical rods of metal are welded end to end as shown in figure (i), 20 calories of heat flows through it in 4 minutes. If the rods are welded as shown in figure (ii), the same amount of heat will flow through the rods in

   (1) 1 minute (2) 2 minutes
   (3) 4 minutes (4) 16 minutes
5. Lengths of two steel rods P and Q are in the ratio of 3 : 4 and their diameters are in the ratio of 2 : 3. Then ratio of modulus of rigidity of P to that of Q is
   (1) 27 : 16 (2) 9 : 16
   (3) 1 : 1 (4) 3 : 2
6. The value of g at a place decreases by 2%. The barometric height of mercury
   (1) increases by 2%
   (2) decreases by 2%
   (3) remains unchanged
   (4) sometimes increases & sometimes decreases
7. The thermal capacity of a body is 60 cal/°C, then its water equivalent is
   (1) 60 cal/gm (2) 60 kg
   (3) 60 gm (4) 6 gm
8. An ideal refrigerator has a freezer at a temperature of –13°C. The coefficient of performance of the engine is 5. The temperature of the air (to which heat is rejected) will be
   (1) 325°C (2) 325K
   (3) 39°C (4) 320°C
9. Which of the following statements about kinetic theory of gases is wrong?
   (1) The molecules of a gas are in continuous random motion
   (2) The molecules continuously undergo inelastic collisions
   (3) The molecules do not interact with each other except during collisions
   (4) The collisions amongst the molecules are of short duration

10. An object measuring 2 cm × 2cm × 5 cm has a mass of 16 g. It is put in water of density 1 g/cc. The percentage of its volume outside water while floating is

(1) 10% (2) 20%
(3) 30% (4) 40%

11.



Which of the above situations can never represent static equilibrium of liquids?

(1) I (2) II
(3) III (4) IV

12. If a liquid is heated in weightlessness, the heat is transmitted through

(1) conduction
(2) convection
(3) radiation
(4) neither, because the liquid cannot be heated in weightlessness

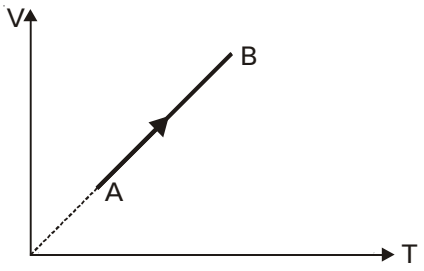
13. The total internal energy of CO gas is a combination of translational and rotational energies. Their respective shares are

(1) 50% and 50% (2) 100% and 0%
(3) 60% and 40% (4) 40% and 60%

14. 1 g of a steam at 100°C melts how much ice at 0°C?

(1) 1 gm (2) 2 gm
(3) 4 gm (4) 8 gm

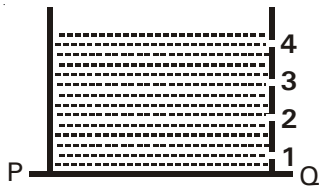
15.



An ideal monoatomic gas undergoes the process AB as shown in the figure. If the heat supplied and the work done in the process are ΔQ and ΔW respectively, the ratio $\Delta Q : \Delta W$ is

(1) 5 : 2 (2) 5 : 3
(3) 3 : 2 (4) 2 : 1

16. A cylindrical vessel of 90 cm height is kept filled upto the brim. Holes 1, 2, 3 & 4 are respectively at heights of 20, 30, 45 and 50 cm from horizontal floor PQ. Water falling at a maximum horizontal distance from the vessel comes from



(1) hole number 4 (2) hole number 3
(3) hole number 2 (4) hole number 1

17. **Assertion :** A smaller value of Reynold's number indicates that the force of viscosity dominates whereas a larger Reynold's number indicates that viscous forces are of little consequence.
Reason : Reynold's number is defined as the ratio of inertial forces to the viscous force.

(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

18. The upper end of a wire of radius 4 mm and length 100 cm is clamped and its other end is twisted through an angle of 30°. The angle of shear is
(1) 12° (2) 1.2°
(3) 0.12° (4) 0.012°

19. A metal tyre is to be fitted onto a wooden wheel 0.5 m in diameter. Diameter of tyre is 4mm smaller than that of wheel. If $\gamma_{metal} = 3.3 \times 10^{-5}$ per °C, tyre should be heated so that its temperature increases by a minimum of
(1) 467°C (2) 727°C
(3) 642°C (4) 835°C

20. In a process, the amount of work done on the gas is 100 cal and increase in internal energy of gas is 200 cal. Then the heat supplied to the gas is
(1) 300 cal (2) 300 J
(3) −100 cal (4) 100 cal

21. The coefficient of apparent expansion of a liquid in a glass vessel is $190 \times 10^{-6}/°C$ and in a steel vessel is $180 \times 10^{-6}/°C$. If α for steel is $12 \times 10^{-6}/°C$, then that of glass is
(1) $9 \times 10^{-6}/°C$ (2) $6 \times 10^{-6}/°C$
(3) $3.6 \times 10^{-6}/°C$ (4) $8.7 \times 10^{-6}/°C$

22. The equation of state for 5 g of oxygen at a pressure P and temperature T, when occupying a volume V, will be
(1) $PV = \frac{5}{32}RT$ (2) $PV = 5RT$
(3) $PV = \frac{5}{2}RT$ (4) $PV = \frac{5}{16}RT$

23. In a Carnot's engine, the source and sink temperature are 672°C and 42°C respectively and the engine extracts 1000 J of heat from source in each cycle. Area enclosed by the PV diagram is
(1) 333 J (2) 667 J
(3) 500 J (4) 800 J

24. The r.m.s. speed of the molecules of a gas in a vessel is 400 m/s. If half of the gas leaks out, at constant temperature, the r.m.s. speed of the remaining molecules will be
(1) 800 m/s (2) $400\sqrt{2}$ m/s
(3) 400 m/s (4) 200 m/s

25. A ball falling in a lake of depth 80 m shows 0.2% decrease in its volume at the bottom. What is the bulk modulus of the material of the ball?
(Take $g = 10\ m/s^2$)
(1) $2 \times 10^9\ N/m^2$ (2) $1 \times 10^9\ N/m^2$
(3) $2 \times 10^8\ N/m^2$ (4) $4 \times 10^8\ N/m^2$

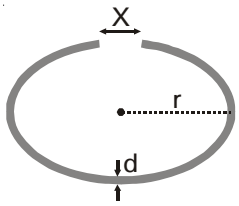
26. A manometer connected to a closed tap reads 4.5×10^5 pascal. When the tap is opened the reading of the manometer falls to 4×10^5 pascal. Then the velocity of flow of water is
(1) 7 m/s (2) 8 m/s
(3) 9 m/s (4) 10 m/s

27. A rectangular vessel when full of water takes 10 minutes to be emptied through an orifice in its bottom. How much time will it take to be emptied when half filled with water?
(1) 9 minute (2) 7 minute
(3) 5 minute (4) 3 minute

28. When an ideal gas in a cylinder was compressed isothermally by piston, work done on gas was found to be 1.5×10^4 joules. During this process about
(1) 3.6×10^3 cal of heat flowed out of the gas
(2) 3.6×10^3 cal of heat flowed into the gas
(3) 1.5×10^4 cal of heat flowed into the gas
(4) 1.5×10^4 cal of heat flowed out of the gas

29. A boat having a length of 2 m and breadth 1 m is floating on a lake. The boat sinks by 2cm when a boy gets on it. The mass of the boy is
(1) 60 kg (2) 50 kg
(3) 40 kg (4) 80 kg

30. A cylindrical metal rod of length L_0 is shaped into a ring with a small gap as shown. On heating the system



(1) x decreases, r and d increase

(2) x and r increase, d decreases

(3) x, r and d all increase

(4) Data insufficient to arrive at a conclusion

31. A flat plate of area 10 cm^2 is separated from a large plate by a layer of glycerine 1 mm thick. If the coefficient of viscosity of glycerine is 20 poise, the force required to keep the plate moving with a velocity of 1 cm/s is

(1) 80 dyne (2) 200 dyne

(3) 800 dyne (4) 2000 dyne

32. **Statement-I** : Mean kinetic energy per degree of freedom of gas molecules is $\frac{1}{2}kT$.

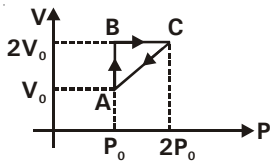
Statement-II : Relation between the gas pressure P and average translational kinetic energy per unit volume E is $P = 1.5\ E$.

(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

33. 

Work done for the cyclic process ABCA as shown above is

(1) $\frac{1}{2}P_0V_0$ (2) $-4P_0V_0$

(3) $2P_0V_0$ (4) $-\frac{1}{2}P_0V_0$

34. The rate of radiation of a black body at 0°C is E. The rate of radiation of this black body at 273°C will be

(1) 16 E (2) 8 E

(3) 4 E (4) E

35. A lens of diameter 10cm is used to focus sun rays on a block of ice. 10 gm of ice melts in 20 minutes. Rate of heat received from sun on surface of earth is

(1) 0.51 cal/cm^2-min (2) 2.04 cal/cm^2-min

(3) 1.15 cal/cm^2-min (4) 0.76 cal/cm^2-min

PHYSICS : SECTION-B

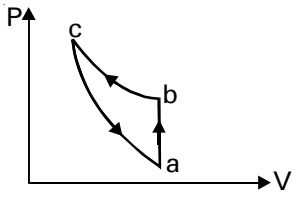
This section has 15 questions, attempt any 10 questions of them.

36. Hailstone at 0°C falls from a height of 1 km on an insulating surface converting the whole of its kinetic energy into heat. What part of hailstone will melt?

(1) $\frac{1}{33}$ (2) $\frac{1}{8}$

(3) $\frac{10^{-4}}{33}$ (4) all of it will melt

37. During the adiabatic expansion of 2 moles of a gas, the internal energy of the gas is found to decrease by 2 joules. The work done by the gas is
(1) 1 J (2) −1 J
(3) 2 J (4) − 2 J

38. 

An ideal gas taken through the cyclic process a→b→c→a absorbs 100 J of heat during the part ab, no heat during b→c. 50 J of work is done on the gas during the part b→c. If internal energy of the gas at 'a' is 1200 J, then internal energy at 'c' is
(1) 1050 J (2) 150 J
(3) 1350 J (4) −150 J

39. If work done in increasing the size of a soap film from 10 cm × 6 cm to 10 cm × 11 cm is 2×10^{-4} J, then the surface tension is
(1) 2×10^{-2} Nm^{-1} (2) 2×10^{-4} Nm^{-1}
(3) 2×10^{-6} Nm^{-1} (4) 2×10^{-8} Nm^{-1}

40. The specific heat of an ideal gas is
(1) proportional to T (2) proportional to T^2
(3) proportional to T^3 (4) independent of T

41. Two rods of different materials with thermal conductivity in the ratio 5 : 3 have same thermal resistance. If area of crossection of the two rods are in the ratio 3 : 2, the ratio of their lengths is
(1) 3 : 5 (2) 5 : 3
(3) 2 : 5 (4) 5 : 2

42. In an isothermal expansion
(1) internal energy of the gas increases
(2) internal energy of the gas decreases
(3) internal energy remains unchanged
(4) average kinetic energy of gas molecule decreases

43. **Assertion** : Two spheres of same size, material and identical surface, one solid and other hollow, are at same temperature. The fall of temerature is faster for hollow sphere.
Reason : The solid sphere emits more radiation than the hollow sphere.
(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

44. In an adiabatic change, for a monoatomic gas $P \propto T^C$. Then C is equal to
(1) $\frac{5}{2}$ (2) $\frac{2}{5}$
(3) $\frac{3}{5}$ (4) $\frac{7}{2}$

45. If wavelengths of maximum intensity of radiation emitted by the sun and the moon are 0.5×10^{-6} m and 10^{-4}m respectively, the ratio of temperature of sun to that of moon is
(1) 1/100 (2) 1/200
(3) 100 (4) 200

46. A sample of metal weighs 360 gm in air, 270 gm in water and 180 gm in liquid. Then relative density of metal is
(1) 4 (2) 3
(3) 5 (4) 6

47. An open glass capillary tube is lowered in a vessel having water and 'm' mass of water rises to a height 6 cm in the capillary tube. The mass of water which rises in another glass tube of twice the radius is
(1) m (2) 2m
(3) 0.5m (4) 4m

48. Three identical adiabatic containers A, B and C contains helium, neon and oxygen respectively at equal pressure. The gases are compressed suddenly to half their original volumes
(1) The final pressure in three containers will be same
(2) The final temperature in three containers will be same
(3) The final pressure of helium and oxygen will be same
(4) The temperature of Helium and neon will be same but that of oxygen will be different

49. If longitudinal strain 'x' is produced in a wire of young's modulus Y, then energy stored in the material of the wire per unit volume is
(1) $0.5\ Y/x^2$ (2) $2Yx^2$
(3) $0.5\ Y^2x$ (4) $0.5\ Yx^2$

50. A water drop of radius 1cm is broken into 729 equal droplets. If surface tension of water is 75 dyne/cm, then the gain in surface energy is nearly
(1) 7.5×10^{-4} J (2) 5.5×10^{-4} J
(3) 8.5×10^{-4} J (4) 4.5×10^{-4} J

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. Which of the following gas is coloured
(1) NO_2 (2) N_2O_4
(3) N_2O (4) N_2O_5

52. The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution.
(1) sublimation enthalpy
(2) ionisation enthalpy
(3) hydration enthalpy
(4) electron-gain enthalpy

53. Which of the following pairs is(are) isostructural?
(1) SF_4 and CF_4 (2) CF_4 and CH_4
(3) SF_6 and SF_4 (4) BF_3 and NH_3

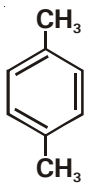
54. Photoelectric effect is maximum in
(1) Cs (2) Na
(3) K (4) Li

55. I_2 dissolves appreciably in aq. solution of KI forming
(1) I_3^+ ions (2) I^+ ions
(3) I_3^- ions (4) I^{3-} ions

56. The order of penetration effect of electrons of s, p, d and f orbitals of a given shell of an atom is
(1) s > p > d > f (2) f > d > p > s
(3) p > d > s > f (4) f > p > s > d

57. **Assertion** : Conc.H_2SO_4 cannot be used to prepare HBr or HI from KBr or KI.
Reason : Conc. H_2SO_4 is an oxidising agent while HBr or HI are reducing agent.
(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

58. The number of σ and π bonds present in the following molecule is



p-xylene

(1) $\sigma - 18, \pi - 3$ (2) $\sigma - 18, \pi - 6$
(3) $\sigma - 12, \pi - 3$ (4) $\sigma - 14, \pi - 3$

59. What is the composition of transparent bead obtained in Borax bead test?
(1) $Na_2[B_4O_5(OH)_4].8H_2O$
(2) $NaBO_2 + B_2O_3$
(3) $Na_2B_4O_7$
(4) $NaBO_2 + Co(BO_2)_3$

60. PbI_4 is not known. The correct reason(s) is/are
(1) I^- is a good reducing agent and reduces Pb^{4+} to Pb^{2+}
(2) energy released by the initially formed Pb−I bonds is insufficient to unpair the $6s^2$ electrons of Pb
(3) $6s^2$ electrons fail to unpair as they are stable due to poor screening effect of 4f electrons.
(4) all of these

61. The correct ionic radii order is
(1) $N^{3-} > O^{2-} > F^- > Na^+$
(2) $N^{3-} > Na^+ > O^{2-} > F^-$
(3) $Na^+ > O^{2-} > N^{3-} > F^-$
(4) $O^{2-} > F^- > Na^+ > N^{3-}$

62. The molecule with which the terms : distorted tetra hedron and folded square, can be associated is
(1) SF_4 (2) NH_3
(3) H_2O (4) BrF_5

63. **Statement-I** : By Solvay's process Na_2CO_3 is formed where as K_2CO_3 is not formed
Statement-II : $KHCO_3$ is highly soluble in water and does not precipitate easily..
(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

64. The planar triangular shape is shown by
(1) BF_3 (2) CO_2
(3) N_2 (4) F_2O

65. What are the products obtained when xenon tetrafluoride reacts with water ?
(1) Xe and XeO_3 (2) Xe and XeO_2
(3) Xe and XeO_4 (4) Xe and $XeOF_4$

66. Which of the following has a highest polarising power?
(1) Mg^{2+} (2) Al^{3+}
(3) Na^+ (4) Ca^{2+}

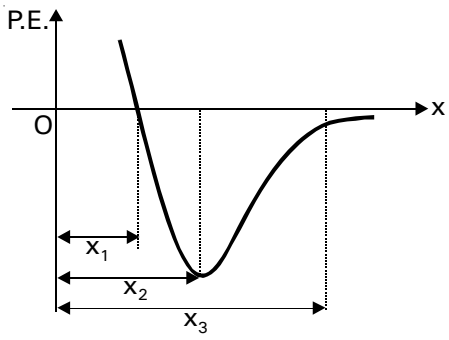
67. Which of the following is an electrovalent linkage
(1) CH_4 (2) MgF_2
(3) $SiCl_4$ (4) BF_3

68. Complete the given equation
(i) $Zn + HNO_3\ (dil) \rightarrow Zn(NO_3)_2 + W + H_2O$
(ii) $Cu + HNO_3\ (conc) \rightarrow Cu(NO_3)_2 + X + H_2O$
(iii) $P + HNO_3\ (conc) \rightarrow Y + NO_2 + H_2O$

	W	X	Y
(1)	NO	NO_2	H_3PO_3
(2)	NO_2	N_2O	H_3PO_2
(3)	N_2O	NO_2	H_3PO_4
(4)	NH_4NO_3	NO	H_3PO_4

69. In XeF_4 molecule, how many lp-bp repulsions are significant?
(1) 2 (2) 4
(3) 6 (4) 8

70. Which of the following nitrates on heating decomposes to given NO_2 gas?
(1) $NaNO_3$ or KNO_3 (2) $LiNO_3$ or KNO_3
(3) $LiNO_3$ or $Mg(NO_3)_2$ (4) $NaNO_3$ or $MgNO_3$

71. 

The curve between potential energy for the formation of A_2 molecule versus internuclear distance between A-atoms is shown. At what distance the new repulsive forces in A_2 molecule predominate over its attractive forces?
(1) 0 (2) x_1
(3) x_2 (4) x_3

72. The stability of $+1$ oxidation state increases in the sequence
(1) $Ga < In < Al < Tl$ (2) $Al < Ga < In < Tl$
(3) $Tl < In < Ga < Al$ (4) $In < Tl < Ga < Al$

73. SF_6 is formed, whereas OF_6 is not formed. Which one of the following is correct regarding this?
(1) oxygen cannot expand its octet due to absence of d-orbitals
(2) electronegativity of S is less than O
(3) affinity of O is less towards F
(4) O and F both are electronegative

74. There is no S—S bond in
(1) $S_2O_4^{2-}$ (2) $S_2O_5^{2-}$
(3) $S_2O_3^{2-}$ (4) $S_2O_7^{2-}$

75. Match the species in column-I with the type of hybrid orbitals in column-II

Column-I		**Column-II**	
i.	SF_4	a.	sp^3d^2
ii.	IF_5	b.	d^2sp^3
iii.	NO_2^+	c.	sp^3d
iv.	NH_4^+	d.	sp^3
		e.	sp

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

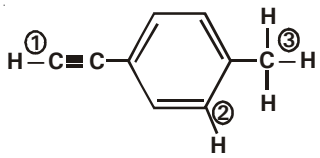
76. Which of the following statement is false?
(1) N_2, CO and NO^+ have the same bond order.
(2) If a molecule or ion contains a number of polar bonds, it is may have zero dipole moment.
(3) Peroxide ion bond is weaker than the superoxide ion bond.
(4) $\pi(2p_x)$ and $\pi(2p_y)$ always have lower energy than that of $\sigma(2p_z)$.

77. Which one of the following has highest dipole moment?
(1) NH_3 (2) CCl_4
(3) BF_3 (4) NF_3

78. Which of the following statement is INCORRECT about s-block elements?
(1) They have low ionisation energy
(2) They have high reactivity
(3) They have low melting point and boiling point
(4) They show variable oxidation state

79. The correct decreasing order of acidic strength is
(1) $HClO_4 > HClO_3 > HClO_2 > HClO$
(2) $HClO_4 > HClO > HClO_3 > HClO_2$
(3) $HClO > HClO_2 > HClO_3 > HClO_4$
(4) $HClO > HClO_4 > HClO_3 > HClO_2$

80. Which of the following transitions involves maximum amount of energy?
(1) $M(g) \rightarrow M^+(g)$
(2) $M^+(g) \rightarrow M^{2+}(g)$
(3) $M^{2+}(g) \rightarrow M^{3+}(g)$
(4) all involve same amount of energy

81. 

In the above compound, the correct order of bond lengths is
(1) $1 > 2 > 3$ (2) $3 > 2 > 1$
(3) $2 > 1 > 3$ (4) $1 > 3 > 2$

82. Inorganic graphite is
(1) BF_4^- (2) $(BN)_x$
(3) $B_3N_3H_6$ (4) B_2H_6

83. $K_{a_1}, K_{a_2}, K_{a_3}$ and K_{a_4} are the dissociation constants of H_2O, H_2S, H_2Se and H_2Te respectively. Decreasing order of dissociation constants of given acids is
(1) $K_{a_1} > K_{a_2} > K_{a_3} > K_{a_4}$
(2) $K_{a_2} > K_{a_1} > K_{a_3} > K_{a_4}$
(3) $K_{a_4} > K_{a_2} > K_{a_3} > K_{a_1}$
(4) $K_{a_4} > K_{a_3} > K_{a_2} > K_{a_1}$

84. Which of the following is incorrect
(1) Covalent radius of an atom is more than its vander waals radius.
(2) Chalcogens belongs to 16th group of the periodic table.
(3) The size of cation is always smaller than its neutral atom.
(4) Chlorine has highest electron affinity in group 17

85. The correct order of dipole moments of orthodichlorobenzene(o), metadichlorobenzene(m), and paradichlorobenzene(p) is
(1) p>m>o (2) o>m>p
(3) p>o>m (4) o>p>m

CHEMISTRY : SECTION-B

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

86. Arrange P_4O_6, Sb_4O_6, As_4O_6, Bi_2O_3, N_2O_3 in the decreaesing order of their acidic character
(1) $N_2O_3 > P_4O_6 > As_4O_6 > Sb_4O_6 > Bi_2O_3$
(2) $P_4O_6 > N_2O_3 > As_4O_6 > Bi_2O_3 > Sb_4O_6$
(3) $As_4O_6 > Sb_4O_6 > N_2O_3 > P_4O_6 > Bi_2O_3$
(4) $As_4O_6 > Sb_4O_6 > Bi_2O_3 > N_2O_3 > P_4O_6$

87. The dipole moment of HBr is 2.60×10^{-30} C. m and the interatomic spacing is 141 pm. The percentage of ionic character of HBr is
(1) 11.5 (2) 21.5
(3) 30.5 (4) 22.8

88. Which of the following statement is true?
(1) The ionic mobility of Li^+ ions in water is higher than that of Na^+ ion.
(2) Impure common salt becomes wet in rainy season due to presence of $MgSO_4$ and $CaSO_4$.
(3) Density of potassium is higher than that of sodium.
(4) Magnesium burns in air forming MgO and Mg_3N_2.

89. Which one of the following is correct for castner Kellner cell?
(1) $Na_2Hg_x + 2OH \rightarrow 2NaOH + xHg$ (anode of central compartment)
(2) $2H^+ \xrightarrow{2e^-} H_2\uparrow$ (cathode of outer compartment)
(3) $2Cl^- \xrightarrow{-2e^-} 2Cl \rightarrow Cl_2\uparrow$ (anode of central compartment)
(4) $2Na^+ + 2e^- \rightarrow 2Na$(cathode of central compartment)

90. The metal with highest melting point is
(1) Chromium (2) Tungsten
(3) Diamond (4) Silver

91. Match the correct ionisation enthalpies and electron gain enthalpies of the following elements

	Elements		ΔH_1	ΔH_2	$\Delta_{eg}H$
i.	Most reactive non metal	A.	419	3051	–48
ii.	Most reactive metal	B.	1681	3374	–328
iii.	Noble gas	C.	738	1451	–40
iv.	Metal forming binary halide	D.	2372	5251	48

(1) I–B, II–A, III–C, IV–D
(2) I–B, II–A, III–D, IV–C
(3) I–A, II–B, III–D, IV–C
(4) I–A, II–B, III–C, IV–D

92. A molecule contains 3 σ bonds, one π bond and 2 lone pair of electrons in valence shell of central atom. The arrangement of lone pair and bond pair around central atom and example of this arrangement respectively are
(1) Square pyramidal & ClF_3
(2) Tetrahedral & PO_4^{3-}
(3) Trigonal bipyramidal & $XeOF_4$
(4) Trigonal bipyramidal & $XeOF_2$

93. The increasing order of the first ionization enthalpies of elements B, Be, N and O is
(1) B < Be < N < O (2) N < Be < O < N
(3) B < Be < O < N (4) B < O < N < Be

94. When F_2 reacts with hot and conc. alkali, then following will be obtained
i. OF_2 ii. O_2
iii. H_2O iv. NaF
(1) i, iii & iv (2) ii & iii only
(3) ii, iii & iv (4) all of these

95. ClO_2 is a mixed anhydride of
(1) $HClO_3$ and $HClO_4$ (2) $HClO_2$ and $HClO_3$
(3) HClO and $HClO_3$ (4) HCl and H_2O

96. $CaSO_4.2H_2O \xrightarrow[120°C]{\Delta} A$

$CaSO_4.2H_2O \xrightarrow[\Delta]{220°C} B$

In the above reactions, A and B are respectively

(1) $CaSO_4$; $CaSO_4.\frac{1}{2}H_2O$

(2) $CaSO_4.\frac{1}{2}H_2O$; $CaSO_4$

(3) $CaSO_4.\frac{1}{2}H_2O$; Gypsum

(4) Gypsum ; $CaSO_4$

97. Which of the following oxides is acidic as well as solid at room temperature?
(1) SiO_2 (2) CO_2
(3) CO (4) N_2O

98. **Assertion :** PCl_3Br_2 is a polar molecule with polar bonds.
Reason : It has a regular geometry.
(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

99. **Statement-I** : d–block has a total of ten groups.
Statement-II : This is because d–subshell can accomodate a maximum of 10 electrons.
(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

100. The first ionization enthalpy values ($\Delta_i H$) of the third period elements, Na, Mg and Si are respectively 496, 737, and 786 kJ mol^{-1}. The first $\Delta_i H$ value for Al
(1) will be in between 737 and 786 kJ/mol
(2) will be more close to 575 kJ/mol
(3) will be more close to 786 kJ/mol
(4) can't predict

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. During mitosis, ER and nucleolus begin to disappear at
(1) Early metaphase (2) Late metaphase
(3) Prophase (4) Interphase

102. Contractile vacuoles occur in
(1) fresh water prokaryotes
(2) fresh water single celled eukaryotes
(3) marine prokaryotes
(4) marine single celled eukaryotes

103. Find correct statement regarding cell membrane
(1) it is composed of lipids arranged in a monolayer
(2) the lipid content of membrane consists of mainly phosphoglycerides
(3) the ratio of protein and lipid is constant in different cell types
(4) non polar tails of saturated hydrocarbons is not protected from aqueous environment

104. How many of the following statements are true?
a. Muscle is a specialised tissue of mesodermal origin
b. About 50–60% of the body weight is made up of muscles
c. Muscles have special property of excitability, contractibility and extensibility
d. Muscles are classified as skeletal, visceral and cardiac, based on their shape
(1) Three (2) Two
(3) One (4) Four

105. Each coxal bone is formed of _____ bones & _____ bones form a pelvic girdle.
(1) 2 ; 3 (2) 3 ; 2
(3) 6 ; 4 (4) 2 ; 2

106. The role of nucleolus in the cells actively involved in protein synthesis is
(1) Ribosomal-RNA synthesis
(2) Lysosomes synthesis
(3) Mitochondria synthesis
(4) Nucleus synthesis

107. H-zone seen in skeletal muscle, is a central part
(1) of thin filament, not overlapped by thick filaments
(2) where no filament exists at all
(3) seen in thick filament, overlapped by thin filament
(4) seen in thick filament, not overlapped by thin filament

108. Read the following statements and identify the correct options
a. Sap Vacuoles-contain digestive enzymes with the help of which nutrients are digested.
b. Contractile vacuoles–take part in osmoregulation and excretion
c. Food vacuoles –store and concentrate mineral salts as well as nutrients
(1) a and b (2) a and c
(3) b only (4) a only

109. Intercalated disc is a special feature of muscle fibres present in the wall of
(1) abdomen (2) stomach
(3) heart (4) kidney

110. **Assertion :** During Telophase-I, the chromosomes undergo some dispersion but do not reach extremely extended state of interphase nucleus.
Reason : The cell has to enter into prophase-II and again it needs to become condensed.
(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

111. Which of the following statement is not true w.r.t. pseudopodial movements ?
(1) Shown by macrophages, leucocytes and osteocytes
(2) Pseudopodia are formed by streaming of protoplasm
(3) *Amoeba* locomote by pseudopodia
(4) Cytoskeletal elements like microfilaments are involved in amoeboid movement

112. The following events are found to take place during the process of mitosis
i. disappearance of nuclear envelope
ii. spindle formation
iii. DNA replication
iv. cytoplasm divides
v. chromosome line up at middle of cell
The correct chronological order in which these events take place is
(1) i, iii, ii, v, iv (2) iii, i, ii, v, iv
(3) iii, i, ii, iv, v (4) i, ii, iii, iv, v

113. Anatomical unit of muscle and functional unit of contraction are respectively
(1) muscle fibre and sarcomere
(2) Sarcomere only
(3) Sarcomere and muscle fibre
(4) Muscle and muscle fibre.

114. Which of the following statements is /are correct?
a. Repeated activation of the muscle can lead to accumulation of lactic acid
b. Muscle contraction is initiated by a signal sent by CNS via a sensory neuron
c. White muscle fibres help in slow and sustained muscle contraction for a long period
d. Skeletal tissue in intervertebral discs is stronger than that in ear pinna of man
(1) a and d (2) b and c
(3) c and d (4) a and b

115. The pattern of microtubule organisation in a centriole is
(1) 9 doublet + 2 central singlet
(2) 9 doublet + no central singlet
(3) 9 triplet + no central singlet
(4) 9 triplet + 2 central singlet

116. Which of these statements about the molecular structure of myofilaments is true?
(1) ATPase is found on troponin
(2) Tropomyosin has a binding site for Ca^{2+}
(3) Troponin binds to the rod like portion of myosin
(4) The head of the myosin binds to an active site on actin

117. Match the name of the scientist to his contribution to cell biology

a.	Leeuwoenhoek	i.	cell theory
b.	Robert Brown	ii.	discovered nucleus
c.	Robert Hooke	iii.	discovered cell
d.	Schwann	iv.	saw live cell

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

118. How does muscle contraction occur?
(1) Both actin & myosin filaments shorten
(2) Only actin filaments shorten
(3) Only myosin filaments shorten
(4) Thin filaments slide over thick filaments

119. A somatic cell that has just completed S-Phase of its cell cycle, as compared to gamete of same species has _____the number of chromosomes and _____the amount of DNA respectively
(1) twice, twice
(2) same, twice
(3) twice, four times
(4) fourtimes, twice

120. Select the correct statement about G1 phase
(1) Cell is metabolicaly inactive
(2) DNA in the cell does not replicate
(3) It is not a phase of synthesis of macromolecules
(4) Cell stops growing

121. Number of seeds formed after 200 meiotic divisions will be
(1) 150 (2) 50
(3) 160 (4) 250

122. Ribs are attached to
(1) Scapula (2) Sternum
(3) Clavicle (4) Ilium

123. Which one of the following cellular parts is correctly described?
(1) SER – Site of protein synthesis
(2) Contractile vacuole – Tonoplast for excretion
(3) Centrosome – Containing two cylindrical structures
(4) Lysosomes –optimally active at alkaline pH

124. Paired facial bones are
(1) Zygomatic, inferior nasal conchae, maxilla, nasals
(2) Maxilla, nasals, mandible, hyoid
(3) Ethmoid, sphenoid, hyoid, nasal
(4) None of these

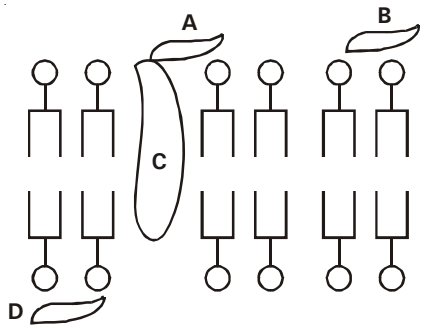
125. Cytoplasmic ribosomes
(1) may be 70s or 80s in eukaryotes
(2) are made of 60s and 40s subunit in eukaryotes
(3) are more in mature mammalian RBC
(4) are restricted to prokaryotes

126. Structures /components common to eukaryotic and prokaryotic cells are
(1) cell membrane, ribosomes, genetic material
(2) ribosomes, cell wall, sap vacuoles
(3) sap vacuoles, cell membrane, gas vacuoles
(4) cell membrane, RNA, food vacuoles

127. Identify incorrect difference between cilia and centriole

	Cilia		**Centriole**
(1)	9 + 2 arrangement	i.	9 + 0 arrangement
(2)	Have peripheral doublets	ii.	have peripheral triplets
(3)	Microtubules with arms	iii.	no arms with microtubules
(4)	Seen in animal and plant cells	iv.	seen in eukaryotic and prokaryotic cells

128. In the diagram given below, extrinsic proteins are



(1) A & B (2) A, B & C
(3) A, B & D (4) A, B, C & D

129. Ribosomes, mitochondria, plastids, nucleus, centriole, peroxisomes
How many of these contain nucleic acids ?
(1) three (2) four
(3) five (4) six

130. Match the columns

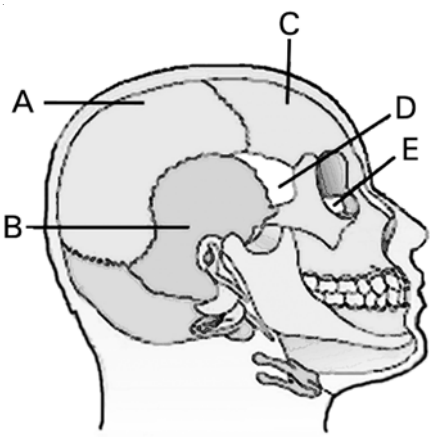
Column A		**Column B**
A.	Interphase	i. cleavage furrow
B.	Prophase	ii. spindle fibres
C.	Telophase	iii. splitting of centromere
D.	Anaphase	iv. DNA synthesis

(1) A–iv, B–ii, C–i, D–iii
(2) A–i, B–ii, C–iii, D–iv
(3) A–iv, B–ii, C–iii, D–i
(4) A–ii, B–i, C–iii, D–iv

131. Cytokinesis in plant cells is by cell plate method which grows
(1) centripetally
(2) centrifugally
(3) first centripetally then centrifugally
(4) first centrifugally then centripetally

132. **Statement- I** : Skeletal system is grouped into two principal divisions, the axial and the appendicular skeleton.
Statement-II : Number of bones in appendicular skeleton is double the number of bones in axial skeleton.
(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

133.



Identify the correctly labelled bones
(1) A–Temporal B–Parietal
(2) C–Occipital D–Sphenoid
(3) E–Frontal F–Zygomatic
(4) A–Parietal D–Sphenoid

134. Crossing over occurs between
(1) sister chromatids of given chromosome
(2) non sister chromatids of a given chromosome
(3) non sister chromatids of homologous chromosomes
(4) sister chromatids of homologous chromosomes

135. Which one of the following options is incorrect?
(1) Hinge joint – between Humerus and Pectoral girdle
(2) Pivot joint – between atlas and axis
(3) Gliding joint – between the carpals
(4) Saddle joint – between carpal and metacarpals of thumb

ZOOLOGY : SECTION-B

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

136. Intervertebral disc is made up of
(1) Elastic cartilage (2) Fibrous cartilage
(3) Calcified cartilage (4) Hyaline cartilage

137. Pelvic girdle consists of which of the following bones?
(1) Ilium and pubic symphysis
(2) Acetabulum and ischium
(3) Ilium, ischium & pubis
(4) both (1) & (2)

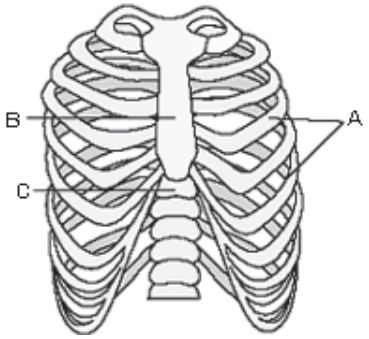
138. Given are certain statements. Find out the true (T) and false (F)
i. There can be DNA replication without cell division
ii. There can be mitosis without DNA replication
iii. Cytokinesis precedes karyokinesis
iv. Cell growth in terms of cytoplasmic increase continues through out cell cycle.
(1) T, T, T, T (2) T, T, F, T
(3) T, F, F, T (4) T, F, T, T

139. Which of the following is correct?
(1) all movements are locomotion
(2) all locomotion are movements
(3) movement and locomotion are entirely separate phenomenon
(4) most of our internal tubular organs are lined by flagellated epithelium

140. The correct sequence of organelles without membrane, with single unit membrane and with double unit membranes is
a. nucleus
b. centriole
c. golgi bodies
(1) c, b, a (2) b, a, c
(3) a, b, c (4) b, c, a

141. Electron microscopic studies reveal the presence of a network or reticulum of tiny tubular structures scattered in cytoplasm and is called
(1) Golgi apparatus
(2) Cytoskeletal element
(3) Endoplasmic reticulum
(4) Chromatin reticulum

142. In the given diagram A, B, C are respectively



(1) ribs, sternum, vertebral column
(2) sternum, ribs, vertebral column
(3) ribs, vertebral column, sternum
(4) sternum, vertebral column, ribs

143. **Statement-I** : In animal cells centrioles play important role in cell division and can duplicate during S-phase of cell cycle.

Statement-II : Centrioles, like mitochondria and plastids have their own DNA in pericentriolar space which aid in replication.

(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

144. Nucleus removed from a fertilized egg is introduced into an enucleated zygote, then animal developed from zygote will have DNA from

(1) 2 parents (2) single parent
(3) three parents (4) four parents

145. Which among the following has univalent and monad nature of chromosomes?

a. Prophase of Mitosis
b. G_1 of cell cycle
c. Metaphase of Meiosis II
d. Prophase of Meiosis II

(1) a and b only (2) a, b and c
(3) d only (4) b only

146. Match column-I with column-II and find the correct answer

Column-I	**Column-II**
a. Myasthenia gravis	i. Degeneration of muscles due to genetic disorder
b. Muscle fatigue	ii. Auto immune disorder
c. Muscular dystrophy	iii. Rapid spasm due to low Ca^{++}
d. Tetany	iv. Accumulation of lactic acid

(1) a–ii, b–iv, c–i, d–iii (2) a–i, b–ii, c–iii, d–iv
(3) a–ii, b–i, c–iv, d–iii (4) a–iv, b–iii c–ii, d–i

147. Meiosis II is initiated

(1) Usually before the chromosomes have fully elongated

(2) When chromosomes align at the equator of cell

(3) With the simultaneous splitting of the centromere

(4) When nuclear membrane disappears

148. Red muscle fibres are ideal for

a. slow contraction b. rapid contraction
c. prolonged activity d. forceful activity

(1) a and c (2) a and d
(3) b and c (4) c and d

149. **Assertion** : Contraction of a muscle fibre is accompanied by shortening of sarcomeres, H zone, I band & actin filaments.

Reason : Actin & myosin filaments are contractile filaments & shorten for muscle contraction.

(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 false

(4) Assertion is true statement but Reason is false

150. Discovery of nucleus-A
Cell theory –B
Discovery of ribosomes –C
Fluid mosaic model –D
Arrange the above in correct chronological sequence, beginning with the oldest

(1) B - A - C - D
(2) A - B - C -D
(3) C - B - D - A
(4) D - C - B - A

BOTANY : SECTION-A

All questions are compulsory in section A

151. The night period of a plant is interrupted by a white light flash, flowering is inhibited. It is

(1) LDP
(2) SDP
(3) DNP
(4) None of the above

152. How many of the following statements are true?

a. Atmosphere is a reservoir of nitrogen.

b. Glutamine has more nitrogen than glutamic acid.

c. In soyabean, ureides are transported via xylem.

d. Enzyme nitrogenase requires manganese for its activity.

(1) one (2) two
(3) three (4) four

153. Manganese is required for

(1) chlorophyll synthesis
(2) plant cell wall formation
(3) photolysis of water in photosynthesis
(4) nucleic acid synthesis

154. Which of the following is activator of RuBisCO enzyme?

(1) Magnesium (2) Zinc
(3) Manganese (4) Molybdenum

155. **Statement-I** : Amount of secondary xylem produced is more than secondary phloem.
Statement-II : The cambium is generally more active on the inner side than on the outer.
(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

156. Hydroponics has been successfully employed as a technique for the commercial production of vegetables. Which of the following vegetable is not covered in this?
(1) Tomato (2) Seedless cucumber
(3) Potato (4) Lettuce

157. Natural plant hormone isolated from corn kernels and coconut milk is
(1) florigen (2) GA_3
(3) auxin (4) zeatin

158. Which of the following is incorrect?
(1) Auxins promote apical dominance.
(2) Ethylene induces flowering in mango.
(3) ABA induce seed dormancy
(4) Cytokinin promote senescence.

159. i. spherical, oval or cylindrical cells
ii. highly thickened dead cells
iii. very narrow lumen.
Identify the type of cell on the basis of above information.
(1) Collenchyma
(2) Sclereids
(3) Sclerenchyma fibres
(4) Tracheids

160. The balloonlike outgrowth of xylem parenchyma into the lumen of the vessels is known as
(1) histogen (2) tyloses
(3) phellogen (4) tunica

161. Which of the following statements is not correct?
(1) Seed dormancy can be overcome only by natural means
(2) Winter varieties if planted in spring season would normally fail to flower in summer
(3) Common biennial plants are cabbage, carrot and sugar beet
(4) The sight of perception of photoperiodism are the leaves

162. Which phytohormone is used for counteracting apical dominance?
(1) Auxin (2) Cytokinin
(3) Ethylene (4) ABA.

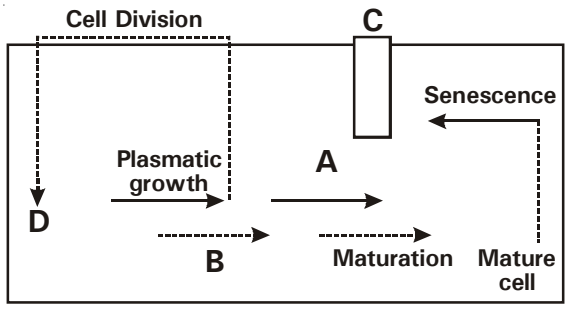
163. Which of the following elements does not cause chlorosis on being deficient?
(1) Ca (2) N
(3) S (4) Zn

164. The fascicular cambium in a dicotyledonous stem is a meristematic tissue referred to as
(1) apical (2) secondary
(3) lateral (4) intercalary

165. Mineral nutritents are not responsible for
(1) enzyme activation
(2) forming the structure of biomolecules
(3) forming energy related compounds
(4) always causing toxicity to the plant

166. All given tissues are formed as a result of redifferentiation process except
(1) Phellem
(2) Secondary xylem
(3) phelloderm
(4) Sclerenchyma

167. In a dicot stem the oldest secondary xylem is present
(1) just outside the vascular cambium
(2) inside the vascular cambium
(3) inside the primary xylem
(4) just inside the secondary cortex

168.


In the above figure, the terms labelled as A, B, C and D are respectively
(1) Differentiation, Expansion, Death, Meristematic cell
(2) Expansion, Meristematic cell, Differentiation, Death
(3) Differentiation, Expansion, Meristematic cell, Death
(4) Death, Meristematic cell, Differentiation, Expansion

169. Ammonification means
(1) conversion of nitrite into NH_4
(2) transformation of nitrate into NH_4
(3) fixation of atmospheric nitrogen in the form of NH_3
(4) conversion of nitrogenous organic compunds into NH_4 compounds

170. **Assertion** : A short day plant shows flowering when it is exposed to a photoperiod longer than critical period.
Reason : Before flowering,shoot apices modify themselves into floral apices.
(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

171. The height of sugarcanes has been increased by the application of
(1) IAA (2) 2, 4 D
(3) zeatin (4) gibberellins

172. Pick the incorrect match.
(1) root hair___unicellular
(2) mesophyll__ground tissue
(3) eustele___monocots
(4) velamen__dead cells

173. Which of the following is not a simple permanent tissue?
(1) Parenchyma (2) Collenchyma
(3) Sclerenchyma (4) Xylem

174. Which of the following inhibitors are chemically identical?
(1) Inhibitor-A, Abscissin-II, dormin
(2) Inhibitor-B, Abscissin-II, dormin
(3) Inhibitor-A, Abscissin-I, dormin
(4) Ethylene-A, Abscissin-II, dormin

175. Conjoint, collateral, endarch and open vascular bundles are found in
(1) monocot root (2) monocot stem
(3) dicot root (4) dicot stem

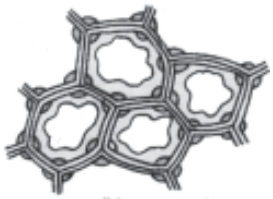
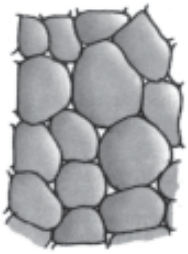
176. Trichomes are
(1) epidermal stem hair
(2) multicellular
(3) branched or unbranched
(4) all of these

177. Which one is not correctly matched?
(1) Cytokinin - cell division
(2) IAA - cell elongation
(3) Abscisic acid - stomatal closure
(4) Gibberellic acid - leaf fall

178. Pick the correct sequence of tissues from outside to inside in a dicot root after secondary growth.
(1) Bark, Cork cambium, Stele, Periderm
(2) Epidermis, Phellogen, Secondary cortex, Phellem
(3) Periderm, Secondary phloem, Vascular cambium, Secondary xylem
(4) Vascular cambium, Secondary phloem, Secondary cortex, Cork cambium

179. Intercalary meristem helps in
(1) erection of fallen stem of cereals
(2) formation of wood
(3) increasing girth of the plant
(4) formation of vascular tissue

180. Match the tissues in column-I with their figures in column-II

column-I		**column-II**
a. Parenchyma	p.	
b. Collenchyma	q.	
c. Sclerenchyma	r.	

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

181. In which of the following character, a monocot leaf differs from dicot leaf?
(1) Mesophyll is well differentiated
(2) Conjoint and collateral vascular bundles
(3) Presence of bulliform cells
(4) Different size of vascular bundles

182. The pigment taking part in photoreception in flowering is
(1) cytochrome (2) phytochrome
(3) lycopene (4) carotene

183. All tissues on the innerside of endodermis constitute
(1) pith (2) vascular bundles
(3) pericycle (4) stele

184. Which of the following is correct about dorsiventral leaf?
(1) Palisade parenchyma is made up of elongated cells
(2) Vascular bundle are open
(3) Spongy parenchyma is absent
(4) Xylem is present towards the abaxial side of leaf.

185. Nodules are formed due to cell division of
(1) only cortical cells
(2) only pericycle cells
(3) cortical and epidermal cells
(4) cortical and pericycle cells

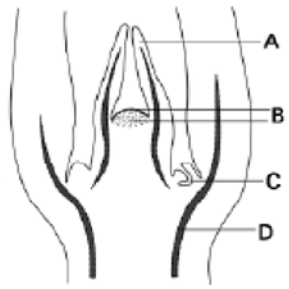
BOTANY : SECTION-B

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

186. The moderate decrease in amount of micronutrients in plants will
(1) not effect the growth
(2) cause toxicity
(3) result in deficiency symptoms
(4) not affect reproduction

187. **Statement-I** : Chilling treatment in winter wheat varieties helps in promoting flowering.
Statement-II : Vernalisation prevents precocious flowering in winter varieties.
(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. Identify the diagram and choose the correct option for its labeling



(1) A = SAM B = Leaf primordia C = Axillary bud D = Vascular tissue
(2) A = Leaf primordia B = SAM C = Axillary bud D = Differentiating vascular tissue
(3) A = Leaf primordia B = Axillary bud C = SAM D = Differentiating vascular tissue
(4) A = Leaf primordia B = SAM C = Differentiating vascular tissue D = Axillary bud

189. Select the incorrect match
(1) True vessels–angiosperms
(2) Phloem parenchyma–absent in monocots
(3) Exarch condition–root
(4) Cotton fibre – bast fibre.

190. Match the items in list I with those in list II.

List I	List II
a. *Nitrobacter*	i. non-symbiotic N_2-fixer
b. *Azotobacter*	ii. conversion of nitrite into nitrate
c. nitrogenase	iii. transformation of nitrate to NH_3
d. leghemoglobin	iv. pigment of leguminous plants; necessary for N_2-fixation
	v. symbiotic bacteria
	vi. reduction of molecular N_2 to NH_3 in root nodules of beans

(1) a-ii, b-i, c-vi, d-iv
(2) a-v, b-iii, c-ii, d-i
(3) a-vi, b-iii, c-iv, d-ii
(4) a-i, b-iii, c-ii, d-vi

191. Choose the correct statement
(1) a plant with apical bud intact promotes the growth of lateral buds
(2) Gibberellins promotes internodal elongation just after flowering
(3) Ethylene promotes vertical growth of seedling
(4) Cytokinin helps to produce lateral shoot growth

192. "The site of perception of light/dark duration are the _____. It has been hypothesised that there is a hormonal substance that is responsible for _____. This hormonal substance migrates from leaves to _____ for inducing flowering only when the plants are exposed to the necessary inductive _____."
Which of the following is correct fill-up of the above paragraph in sequence?
(1) stems, growth, stems, hormones
(2) leaves, growth, stems, photoperiod
(3) leaves, flowering, shoot apices, photoperiod
(4) stems, flowering, shoot apices, hormones

193. Which is incorrect statements w.r.t. Xylem parenchyma?
(1) Their cells are living and thick-walled
(2) Their cell walls are made up of cellulose
(3) They store food materials in the form of starch or fat and other substances like tannins.
(4) Radial conduction of water takes place by the ray parenchymatous cells

194. One annual ring constitute
(1) one ring of early wood only
(2) one ring of late wood only
(3) two alternate concentric rings of early and late wood.
(4) two alternate rings of late wood.

195. Which of the following is not a function of cytokinin?
a. Apical dominance
b. Delay senescence
c. Produce new leaves
d. Xylem differentiation
e. Lateral shoot growth
(1) a and b (2) a and d
(3) c and d (4) a and c

196. A short day plant is given inductive photoperiod for flowering. A flash of red light is given in its night period.
(1) It will not flower
(2) It will flower
(3) It will remain in vegetative state.
(4) Both (1) and (3)

197. How many statements are true ?
a. Heterophylly in plants is an example of plasticity
b. Formation of cork cambium is an example of dedifferentiation
c. Development in plants is under the control of both intrinsic and extrinsic factors
d. In plants, growth is generally measurable and determinate
(1) One (2) Two
(3) Three (4) Four

198. **Assertion** : Nitrogen fixation process requires energy in the form of ATP which is provided by legume partner in symbiotic nitrogen fixation.
Reason : Bacteria such as *Rhizobium* fix nitrogen in aerobic conditions.
(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

199. Match the functions of growth in column-I with their description in column-II

column-I	**column-II**
a. Differentiation	p. Meristems/tissues are able to divide and produce cells that once again lose the capacity to divide but mature to perform sepecific functions
b. Dedifferentiation	q. Cells undergo few to major structural changes both in their cell walls and protoplasm
c. Redifferentiation	r. Cell, that have lost capacity to divide can regain capacity of division under certain conditions

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

200. Select the incorrect statement
(1) Toxicity symptoms are easy to identify
(2) An element is said to be deficient when present below the critical concentration
(3) Some essential elements can alter the osmotic potential of the cell
(4) Nitrogen is absorbed from the soil in the form of nitrate and nitrite ions