Dated :
8-1-2023

M.L. Syal's Helix Institute

S.C.O. 343-345, Top Floor, Sector 34-A, Chandigarh. Ph : 0172-2623155

XII cum Competition Course for Medical

MM : 720 **Test - 23** Time : 3 hrs. 20 min.

Full Syllabus XI

PHYSICS : SECTION-A

All questions are compulsory in section A

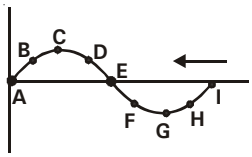
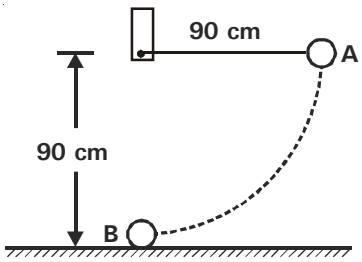
1. A cylindrical tank has a hole of 1 cm^2 in its bottom. If the water is allowed to flow into the tank from a tube above it at the rate of 200 cm^3/sec. then the maximum height up to which water can rise in the tank is
   (1) 4 cm (2) 10 cm
   (3) 6 cm (4) 20 cm
2. Which of the following statements is incorrect w.r.t. an orbiting satellite in circular orbit?
   (1) Total energy is negative
   (2) Potential energy is negative
   (3) Magnitude of kinetic energy is twice the magnitude of potential energy
   (4) Kinetic energy is positive
3. Two rods of length 20 cm and 30 cm are made of materials whose coefficient of linear expansion are α_1 and α_2. If the difference between the two lengths is independent of temperature then $\frac{\alpha_1}{\alpha_2}$ is
   (1) 1 (2) $\frac{2}{3}$
   (3) $\frac{3}{2}$ (4) $\frac{9}{4}$
4. An engine of a train moving with uniform acceleration passes an electric pole with velocity 60 km/hr and the last compartment passes the same pole with a velocity 80 km/hr. The middle point of the train passes past the same pole with a velocity of
   (1) 70 km/hr
   (2) more than 70 km/hr
   (3) less than 70 km/hr
   (4) 100 km/hr
5. Consider a system of two identical particles, one of the particle having acceleration of 4.25 m/s^2, while the other at rest. The centre of mass will have an acceleration of
   (1) zero (2) 4.25 m/s^2
   (3) 3.18 m/s^2 (4) 2.125 m/s^2
6. 

   Figure shows the simple harmonic progressive transverse wave, moving towards left. The particle having maximum velocity directed downwards is at
   (1) A (2) C
   (3) E (4) F

7. A stone is shot straight upward with a speed of 20 m/sec from a tower 200 m high. The speed with which it strikes the ground is approximately
(1) 60 m/sec (2) 66 m/sec
(3) 70 m/sec (4) 76 m/sec

8. A particle having a mass 0.5 kg is projected under gravity with a speed of 98 $m\,s^{-1}$ at an angle of 60^{o} with horizontal. The magnitude of change of momentum of the particle during 10 s is
(1) 0.5 N s (2) 49 N s
(3) 98 N s (4) 490 N s

9. 

The bob A of a pendulum released from horizontal position hits another bob B of double the mass at rest on a table as shown above. If we neglect the size of the bobs, the height to which bob A will rise after elastic collision will be
(1) 90 cm (2) 30 cm
(3) zero (4) 10 cm

10. A gas mixture consists of 1 mole of oxygen and 3 moles argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is
(1) 4 RT (2) 7 RT
(3) 6 RT (4) 9 RT

11. A mass is whirled in a circular path with constant angular velocity and its angular momentum is L. If the string is now halved keeping the angular velocity the same, the angular momentum is
(1) $\frac{L}{4}$ (2) $\frac{L}{2}$
(3) 2L (4) 4L

12. A body of mass 1 kg tied to a string is moved in a vertical circle of radius 2m. The difference in tensions at lowest point and the highest point is
(1) 20 N (2) 60 N
(3) 80 N (4) zero

13. 5.74 g of a substance occupies 1.2 cm^3. The density of the substance, keeping in view the significant figures, is
(1) 4.78 g cm^{-3} (2) 4.783 g cm^{-3}
(3) 4.8 g cm^{-3} (4) 5.0 g cm^{-3}

14. A block of mass 'm' is released from height 'h' as shown. The horizontal surface is rough having coefficient of friction μ. Distance moved by the block on horizontal surface before coming to rest is

(1) h (2) $\frac{h}{\mu}$
(3) μh (4) can't be calculated

15. The radius of gyration of a thin rod of length L about an axis passing through one of its ends and perpendicular to it is
(1) $\frac{L}{\sqrt{2}}$ (2) $\frac{L}{3}$
(3) $\frac{L}{2\sqrt{3}}$ (4) $\frac{L}{\sqrt{3}}$

16. **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

17. A tuning fork of frequency 280 Hz produces 10 beats per sec when sounded with a vibrating sonometer string. When the tension in the string increases slightly, it produces 11 beats per sec. The original frequency of the vibrating sonometer string is

(1) 269 Hz (2) 291 Hz

(3) 270 Hz (4) 290 Hz

18. An engine is moving with a speed 20 m/s towards a stationary observer. If frequency of the whistle of the engine is 600 cycles/s, the frequency heard by the observer is (speed of sound = 320 m/s)

(1) 640 cycles/s (2) 630 cycles/s

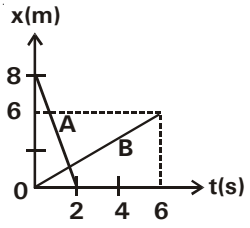
(3) 660 cycles/s (4) 600 cycles/s

19. A particle executes linear simple harmonic motion with an amplitude of 2 cm. When the particle is at 1 cm from the mean position the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is

(1) $\frac{\sqrt{3}}{2}\pi$ (2) $2\sqrt{3}\,\pi$

(3) $\frac{2}{\sqrt{3}}\pi$ (4) $\sqrt{3}\,\pi$

20. The displacement-time graphs for two cars (A and B) moving on same track is shown in figure. The magnitude of their relative velocity is



(1) 0 (2) 5 m/s

(3) 3 m/s (4) 3.5 m/s

21. 10 gm of ice at 0°C is kept in a calorimeter of water equivalent 10 gm. How much heat should be supplied to the apparatus to melt the ice and and convert the water thus formed into steam at 100°C? ($L_{ice} = 80$ cal/g, $L_{steam} = 540$ cal/g)

(1) 7400 cal (2) 8200 cal

(3) 6000 cal (4) 5400 cal

22. Equation of trajectory of a projectile is

$y = \sqrt{3}\,x - \frac{x^2}{5}$. Then the range of the projectile is

(1) $5\sqrt{3}$ m (2) 5 m

(3) $\sqrt{3}$ m (4) 3 m

23. Two bodies of masses 6 kg and 3 kg are hanging from the ends of a string which passes over a fixed smooth pulley. The total downward thrust on the pulley is nearly

(1) 5×9.8 N (2) 6×9.8 N

(3) 7×9.8 N (4) 8×9.8 N

24. If the distance between the earth and the sun were half its present value, the number of days in a year would have been

(1) 64.5 (2) 129

(3) 182.5 (4) 730

25. Equation of a plane progressive transverse wave in a dissipative medium has a general form given by $y = Ae^{-\alpha x} \sin\beta(t - Bx)$, where α, A, B and β are constants, x and y are displacements, t is time. Match the quantities in column-I with their corresponding dimensions in column-II

	Column-I		Column-II
a.	α	p.	$M^0L^1T^0$
b.	β	q.	$M^0L^0T^{-1}$
c.	A	r.	$M^0L^{-1}T$
d.	B	s.	$M^0L^{-1}T^0$

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

26. A wooden block of mass 6 kg is tied to a string attached to the bottom of the tank. In the equilibrium the block is completely immersed in water. If relative density of wood is 0.6 and $g = 10\ ms^{-2}$, the tension T, in the string is
(1) 60 N (2) 100 N
(3) 120 N (4) 40 N

27.

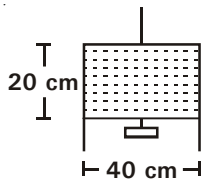
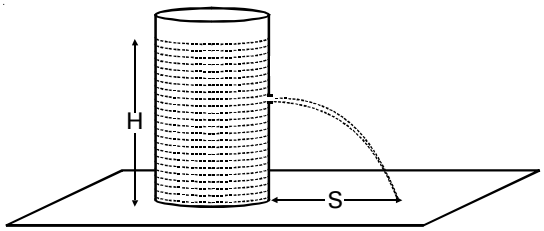


Figure shows a thin liquid film supporting a small weight 4×10^{-2} N. What is the surface tension of the liquid?
(1) 6×10^{-2} N/m (2) 3×10^{-2} N/m
(3) 5×10^{-2} N/m (4) 4×10^{-2} N/m

28. A particle projected vertically upwards attains a maximum height 'h'. If the ratio of the times taken to attain a height H (< h) is $\frac{1}{3}$, then $\frac{h}{H}$ is
(1) $\frac{3}{4}$ (2) $\frac{4}{3}$
(3) $\frac{1}{2}$ (4) 2

29. The normal reaction between two surfaces in contact is doubled. Quantity that becomes doubled is
(1) coefficient of friction
(2) friction acting
(3) limiting friction
(4) contact force

30. A liquid is coming out from the orifice of tank and falls upto a maximum horizontal distance S. If the height of the liquid level is 6m, then value of S is



(1) 1.5 m (2) 3.0 m
(3) 4.5 m (4) 6.0 m

31. A horizontal wind is blowing with a velocity 'v' towards north-east. A man starts running towards north with an acceleration 'a'. The time after which man will feel the wind blowing towards east is
(1) $\frac{\sqrt{2}\,v}{a}$ (2) $\frac{v}{a}$
(3) $\frac{2v}{a}$ (4) $\frac{v}{\sqrt{2}\,a}$

32. Equal temperature difference exists between the ends of two metallic rods 1 and 2 of equal length. Their thermal conductivity is K_1 and K_2 and cross-sectional areas are respectively A_1 and A_2. The condition for equal rate of heat transfer will be

(1) $K_1A_2 = K_2A_1$ (2) $K_1A_1^2 = K_2A_2^2$

(3) $K_1A_1 = K_2A_2$ (4) $K_1A_2^2 = K_2A_1^2$

33. A metallic wire of diameter 'd' can support a maximum load of 1500 kg. Another wire of same material but diameter 'd/2' will support a maximum load of

(1) 750 kg (2) 500 kg

(3) 3000 kg (4) 375 kg

34. The greatest height 'h' of a sand pill that can be erected on a circular area of radius 'r' without spilling the sand onto the surrounding area, if μ is the coefficient of friction between the sand particles, is

(1) r (2) μr

(3) $\frac{r}{\mu}$ (4) $\mu^2 r$

35. A chain of linear density 3 kg/m and length 8m is lying on the table with 4 m of chain hanging from the edge. The work done in lifting the chain on the table will be

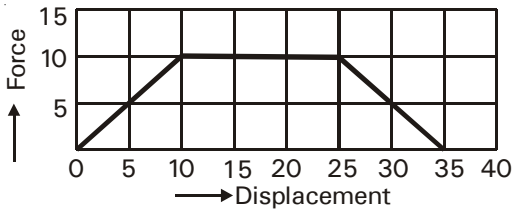
(1) 120 J (2) 240 J

(3) 100 J (4) 200 J

PHYSICS : SECTION-B

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

36.



The figure shows the force displacement graph of a moving body. If the force (in newton) acts in the direction of displacement, work done in displacing the body from $x = 0$ m to $x = 35$ m is equal to

(1) 50 J (2) 25 J

(3) 250 J (4) 200 J

37. The minimum energy required to launch a satellite of mass 'm' from surface of earth (of radius R) to an altitude of 2R is

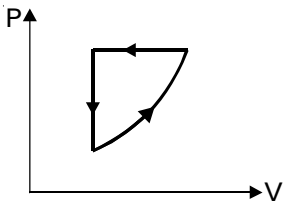
(1) $\frac{mgR}{2}$ (2) $\frac{mgR}{6}$

(3) $\frac{5}{6}$ mgR (4) $\frac{2}{3}$mgR

38. A sphere moving with a constant velocity hits another stationary sphere of same mass head on. If the coefficient of restitution is $\frac{1}{2}$, ratio of the velocity of the second sphere to that of first sphere after collision is

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

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

39. 

Which of following is correct for one complete cycle of the thermodynamic process shown above?

(1) $\Delta U<0,\ \Delta Q>0$ (2) $\Delta U=0,\ \Delta Q>0$

(3) $\Delta U>0,\ \Delta Q<0$ (4) $\Delta U=0,\ \Delta Q<0$

40. On doubling the length and tension of a sonometer wire, its fundamental frequency

(1) becomes twice

(2) remains same

(3) becomes $\frac{1}{\sqrt{2}}$ times

(4) becomes $\sqrt{2}$ times

41. The power radiated by a black body is 81 W and it radiates maximum energy around the wavelength λ_0. If the temperature of the black body is now changed so that it radiates maximum energy around wavelength $0.75\lambda_0$, the power radiated by it will increase by a factor of

(1) 19 W (2) 256 W

(3) 81 W (4) 64 W

42. Acceleration of a body rolling down an inclined plane depends upon

(1) mass of body (2) size of body

(3) radius of body (4) shape of body

43. A particle performs SHM with amplitude A. Its speed is increased by 200%, when it is at a distance $\frac{2A}{3}$ from mean position. The new amplitude of SHM is

(1) 3A (2) $\sqrt{3}$ A

(3) 9A (4) $\frac{7A}{3}$

44. For a projectile the numerical ratio of maximum height reached to the square of flight time is $(g=10ms^{-2})$

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

(3) 5 : 1 (4) 10 : 1

45. A balloon with mass 'm' is descending down with an acceleration 'a' (where $a<g$). How much mass should be removed from it so that it starts moving up with an acceleration 'a'?

(1) $\frac{ma}{g+a}$ (2) $\frac{ma}{g-a}$

(3) $\frac{2ma}{g+a}$ (4) $\frac{2ma}{g-a}$

46. Which of the following is False?

(1) A stone is thrown from a height with same speed but at different angles. On reaching the ground, its kinetic energy will be same.

(2) Work done on a body depends on the reference frame.

(3) Work done by conservative forces depends only on end points and in a closed path it is zero.

(4) If a ball hits the floor and rebounds after elastic collision, momentum of ball is conserved.

47. **Statement-I** : For the planets orbiting around the sun, angular speed and kinetic energy changes with time.

Statement-II : If the earth rotates faster than its present speed, then, the weight of an object will decrease at equator but remain unchanged at the poles.

(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

48. The length and breadth of a room are measured as (5.00 ± 0.02) m and (3.00 ± 0.03) m. Area of the room is

(1) $15.0\ m^2 \pm 1.4\%$ (2) $15.0\ m^2 \pm 1\%$

(3) $15.0\ m^2 \pm 2\%$ (4) $15.0\ m^2 \pm 0.6\%$

49. In case of a forced vibration, the resonance wave becomes very sharp when the

(1) restoring force is small

(2) applied periodic force is small

(3) damping force is small

(4) none of these

50. The thermometer used to callibrate other thermometers is

(1) platinum thermometer

(2) gas thermometer

(3) pyrometer

(4) thermoelectric thermometer

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. An element M reacts with chlorine to form a compound X. The bond angle in X is 120°. The M can be

(1) B (2) Mg

(3) N (4) Si

52. For a gaseous reaction at 300 K, $\Delta H - \Delta U = -4.98$ kJ, assuming that $R = 8.3\ J\ K^{-}\ mol^{-1}$ Δn_g for the reaction is

(1) 2 (2) 1

(3) -2 (4) zero

53. The decomposition of a certain mass of $CaCO_3$ gave 11.2 dm^3 of CO_2 gas at STP. The mass of KOH required to completely neutralise this gas is

(1) 56 g (2) 28 g

(3) 42 g (4) 20 g

54. A mixture of one mole each of H_2, He and O_2 are enclosed in a cylinder of volume, V at temperature T. If the partial pressure of H_2 is 2 atm. The total pressure of gases in the cylinder is

(1) 10 atm (2) 22 atm

(3) 6 atm (4) 16 atm

55. Which of the following has most acidic hydrogen?

(1) CH_3-NO_2 (2) CH_3CH_3

(3) $CH(NO_2)_3$ (4) $PhCH_3$

56. Gases deviate from the ideal gas behaviour because their molecules

(1) possess negligible volume

(2) have forces of attraction between them

(3) are polyatomic

(4) are not attracted to one another

57. SO_2Cl_2 on reaction with excess of water results into acidic mixture

$$SO_2Cl_2 + 2H_2O \rightarrow H_2SO_4 + 2HCl$$

16 moles of NaOH is required for the complete neutralisation of the resultant acidic mixture. The number of moles of SO_2Cl_2 used is

(1) 16 (2) 8

(3) 4 (4) 2

58. Match the Column-I with Column-II

	Column-I		**Column-II**
a.	$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$	i.	Acid rain
b.	$HOCl(g) \xrightarrow{h\nu} \dot{O}H + \dot{C}l$	ii.	Smog
c.	$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$	iii.	Ozone depletion
d.	$NO_2(g) \xrightarrow{h\nu} NO(g) + O(g)$	iv.	Tropospheric pollution

Choose the correct answer from the options given below

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

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

59. Solubility product of a salt AB is $1 \times 10^{-8}\ M^2$ in a solution in which the concentration of A^+ is 10^{-3}M. The salt will precipitate when the concentration of B^- ion is kept

(1) between 10^{-8} M to 10^{-7} M

(2) between 10^{-7} M to 10^{-6} M

(3) greater than 10^{-5} M

(4) less than 10^{-8} M

60. **Assertion** : Hydrogen is the most abundant element in the universe, but it is not the most abundant gas in the troposphere.

Reason : Hydrogen is the lightest element.

(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

61. In 6th period of modern periodic table the electronic energy levels are in the order

(1) 6s , 4p, 4f, 5d (2) 6s , 4f, 5d, 6p

(3) 4f , 5d, 6s, 6p (4) 6s , 5d, 4f, 4p

62. 0.59 gm of an organic compound when treated with caustic soda evovled ammonia, which required 20 c.c. of N/2 sulphuric acid for neutralization. The percentage of nitrogen is

(1) 31.73% (2) 32.73%

(3) 13.73% (4) 23.73%

63. Which is the following reaction is mismatched?

(1) $CH_4 + Cl_2 \xrightarrow{h\nu} CH_3Cl + HCl$ (Substitution)

(2) $CH_3CH_2OH \xrightarrow[H_2SO_4]{Conc.} CH_2 = CH_2$ (Elimination)

(3) $C_6H_6 \xrightarrow{+NO_2} C_6H_5NO_2$ (Addition)

(4) $CH_2 = CH_2 \xrightarrow{HBr} CH_3CH_2Br$ (Addition)

64. Carbon dioxide is an acid anhydride of

(1) HCOOH (2) $(HO)_2CO$

(3) CH_3CO_2H (4) HCHO

65. For the reaction

$$3A(g) + B(g) \rightleftharpoons A_3B(g) + \text{heat}$$

The amount of A_3B at equilibrium is affected by

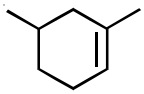
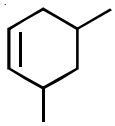
(1) temperature only

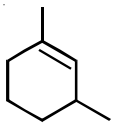
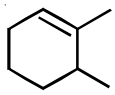
(2) pressure only

(3) temperature & pressure

(4) temperature , pressure & catalyst

66. The correct structural formula of compound 1,3 dimethyl cydohexene is

(1)  (2) 

(3)  (4) 

67. The correct order of stability is

(1) $O_2^{2+} > O_2^{+} > O_2 > O_2^{-} > O_2^{2-}$

(2) $O_2^{2-} > O_2^{-} > O_2 > O_2^{+} > O_2^{2+}$

(3) $O_2^{-} > O_2^{2-} > O_2 > O_2^{+} > O_2^{2+}$

(4) $O_2^{+} > O_2^{2+} > O_2 > O_2^{-} > O_2^{2-}$

68. **Statement- I** : BaO is soluble but $BaSO_4$ is insoluble in water.

Statement- II : Calcium, Strontium and Barium are readily attacked by air to form the oxide and nitride.

(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

69. The correct shape and I–I–I bond angle respectively in ion I_3^- are

(1) trigonal planar, 120°

(2) distored trigonal planar, 135° and 90°

(3) linear, 180°

(4) T–Shpaed, 180° and 90°

70. $CaC_2 \xrightarrow{H_2O} A \xrightarrow[\text{Fe tube}]{\text{Red hot}} B \xrightarrow[H_2SO_4]{\text{conc.}} C \xrightarrow[H_2O]{\text{Boiling}} D$

D is

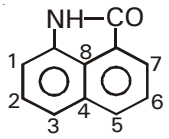
(1) phenol

(2) benzene sulphonic acid

(3) benzene

(4) none of these

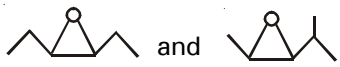
71. In the following compound, which carbon would be nitrated on treating it with H_2SO_4 and HNO_3?



(1) 7 (2) 3
(3) 6 (4) 5

72. All spontaneous processes must proceed with
(1) Increase in Enthalpy
(2) Decrease in Entropy
(3) Increase in Entropy
(4) Decrease in Gibb's energy

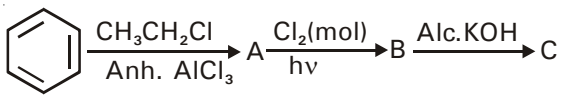
73. First four IE of element A in gaseous state are 8.5, 20, 50, 150 eV. Which of the following state is stable?
(1) A^{+2} (2) A^{+}
(3) A^{+3} (4) A^{+4}

74. Which of the following pairs are metamers?
(1) $CH_3COCH_2CH_3$ and $CH_3CH_2COCH_3$
(2)  and
(3) $CH_3CH_2CH_2NH_2$ and $CH_3CH_2NHCH_3$
(4) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{HC}}-CH_2-OH$
and $CH_3-CH_2-CH_2CH_2OH$

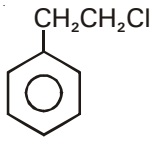
75. Match the quantum numbers with the information provided by these

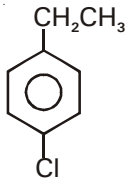
Quantum number		Information provided	
i.	Principal	a.	orientation of the orbital
ii.	Azimuthal	b.	energy and size of orbital
iii.	Magnetic	c.	spin of electron
iv.	Spin	d.	shape of the orbital

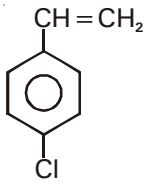
(1) i–a, ii–d, iii–c, iv–b
(2) i–b, ii–d, iii–a, iv–c
(3) i–b, ii–c, iii–d, iv–a
(4) i–a, ii–b, iii–c, iv–d

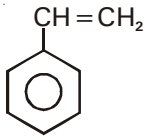
76. 

The product 'C' is

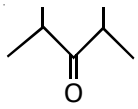
(1) 

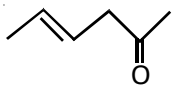
(2) 

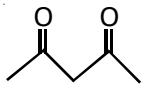
(3) 

(4) 

77. Which of the following process has negative value of ΔS ?
a. dissolution of sugar in water
b. combustion of methane
c. stretching of rubber band
d. boiling of an egg
e. reaction between ammonia and hydrogen chloride
(1) a & b (2) b & d
(3) b, c & d (4) b, c & e

78. Maximum enol content is present in which of the following compounds?
(1) 

(2) 

(3) $F-CH_2-CHO$ (4) 

79. The correct statement about B_2H_6 is
(1) All B–H–B angles are of 120°
(2) Its fragment BH_3, behaves as a lewis base
(3) Terminal hydrogens and boron atoms are in same plane
(4) The two B–H–B bonds are not of the same length

80. The standard reduction potential values of three metallic cations, X, Y, Z are 0.82, −2.03 and −1.01 V respectively. The order of reducing power of the corresponding metals is

(1) $Y > Z > X$ (2) $X > Y > Z$

(3) $Z > Y > X$ (4) $Z > X > Y$

81. The reaction of $CH_3CH=CH-C_6H_4-OH$ with HBr gives

(1) $CH_3-CHBrCH_2-C_6H_4-OH$

(2) $CH_3CH_2-CHBr-C_6H_4-OH$

(3) $CH_3-CHBr-CH_2-C_6H_4-Br$

(4) $CH_3CH_2CHBr-C_6H_4-Br$

82. Maximum number of electrons in a subshell having same spin is given by the expression?

(1) $2\ell + 2$ (2) $4\ell + 2$

(3) $2\ell + 1$ (4) $\frac{\ell}{2}$

83. For the reaction at 300 K

$$2A \rightleftharpoons B + C \quad \Delta_r G^o = 2494.2J$$

The composition of the reaction mixture at a given time is

[A] = 0.5, [B] = 2, [C] = 0.5. The reaction proceeds in the

(1) forward direction because $Q > K_C$

(2) backward direction because $Q > K_C$

(3) forward direction because $Q < K_C$

(4) backward direction because $Q < K_C$

84. The ionic product of $Ni(OH)_2$ is 2.0×10^{-15}. The molar solubility of $Ni(OH)_2$ in 0.10 M KOH is

(1) 2×10^{-13} M (2) 2×10^{-15} M

(3) 2.1×10^{-18} M (4) 0.1×10^{-13} M

85. The H—H bond energy is 430 kJ mol and Cl—Cl bond energy is 240 kJ/mol. ΔH_f for HCl is −90 kJ. The H—Cl bond energy is about

(1) 180 kJ/mol (2) 360 kJ/mol

(3) 213 kJ/mol (4) 425 kJ/mol

CHEMISTRY : SECTION-B

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

86. Which of the given reactions is not an example of disproportionation reaction?

(1) $2H_2O_2 \rightarrow 2H_2O + O_2$

(2) $2NO_2 + H_2O \rightarrow HNO_3 + HNO_2$

(3) $3MnO_4^{2-} + 4H^+ \rightarrow MnO_2 + 2H_2O + 2MnO_4^-$

(4) $MnO_4^- + 4H^+ \rightarrow MnO_2 + 2H_2O$

87. Fish growth gets inhibited if concentration of dissolved oxygen is

(1) above 6 ppm (2) below 10 ppm

(3) above 10 ppm (4) below 6 ppm

88. Chose the correct set of statements

a. KNO_3 undergoes anionic hydrolysis

b. Equimolar mixture of CH_3COOH and NH_4OH can act as buffer

c. $ZnCl_2$ undergoes cationic hydrolysis

d. pH of acidic buffer must be less than 7

(1) a, b, c (2) b and c

(3) b, c, d (4) c and d

89. Hydrocarbon (A) on bromination gives (B) which on reaction with alcoholic KOH changes to another hydrocarbon (C). The later decolourises Baeyer's reagent and on ozonlysis forms acetaldehyde only. (A) is

(1) methane (2) ethene

(3) ethane (4) butane

90. **Statement-I :** Equivalent weight of Cu in CuO and Cu_2O is same.
Statement-II : Valency of Cu in both compounds are equal.
(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

91. The correct set about melting point among the following is
(1) LiF > LiCl (2) MgO > NaCl
(3) NaCl > MgO (4) Both (1) &(2)

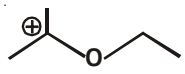
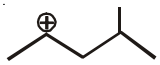
92. In which of the following process the product formed has hybridization involving d-orbital(s)?
(1) Complete combustion of methane
(2) Hydrolysis of beryllium carbide
(3) Solidification of phosphorous pentachloride
(4) Decomposition of $(NH_4)_2BeF_4$

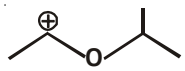
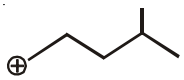
93. Correct order of bond angle is?
(1) $PF_3 > PCl_3 > PBr_3 > PI_3$
(2) $CI_4 > CBr_4 > CCl_4 > CF_4$
(3) $Br_2O > Cl_2O > H_2O$
(4) $BF_3 > BeF_2 > XeF_2$

94. **Assertion** : BF_3 does not have a proton but still acts as an acid and reacts with NH_3.
Reason : It accepts the lone pair of electrons of NH_3.
(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

95. Which of the following statement regarding hydrides is incorrect?
(1) s-block elements except Be and Mg forms ionic hydride and are polymeric in nature
(2) Hydrides of group 15 act as lewis bases
(3) Saline hydrides are non-stoichiometric
(4) Metallic hydrides do not follow law of constant composition

96. The correct stability order for the following is

I.  II. 

III.  IV. 

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

97. Hydrolysis of one mole of peroxodisulphuric acid produces
(1) 2 moles of sulphuric acid
(2) 2 moles of peroxomonosulphuric acid
(3) 1 mole of H_2SO_4 and 1 mole of peroxomonosulphuric acid
(4) 1 mole of H_2SO_4 and 1 mole of peroxomonosulphuric acid and 1 mole of H_2O_2

98. What is the maximum number of electrons in an atom that can have the following quantum numbers $n = 4$, $m_l = +1$?
(1) 4 (2) 15
(3) 3 (4) 6

99. The ΔH_f^o of $CaCO_3(s)$, CaO(s) and $CO_2(g)$ are -1206.9, -635.1 and -393.5 kJ/mol respectively. Their S^o values are 92.9, 38.2 and 213.7J/K respectively. The reaction

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$$

will be spontaneous
(1) at 1121.38 K
(2) above 1121.38 K
(3) below 1121.38 K
(4) at all temperatures

100. In the following process

$$Si + 2CH_3-Cl \xrightarrow[570\ K]{\text{Cu powder}} A \xrightarrow{H_2O} B \xrightarrow{\text{polymerisation}} C$$

Hybridization of 'Si; in A, B & C respectively is

(1) sp^3, sp^3, sp^3 (2) sp^2, sp^3, sp^3d

(3) sp^3, sp^3, sp^3d (4) sp^2, sp^2, sp^3

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. Considering human teeth, how many of the given types are included in

i. deciduous set of teeth

ii. teeth that erupt only once respectively

Canines ,1st molar, premolars , incisors, 3rd molar

(1) Four; one (2) three; two

(3) two; four (4) two; three

102. Which part of the brain is responsible for thermoregulation?

(1) Cerebrum (2) Hypothalamus

(3) Corpus callosum (4) Medulla oblongata

103. How many of the following structures form a part of respiratory tract and do not allow gaseous exchange?

Primary bronchi, Terminal bronchioles, Secondary bronchi, Alveoli, Trachea, Tertiary bronchi

(1) Five (2) Six

(3) Seven (4) Eight

104. Choose the animals with bony endoskeleton

a. *Catla* b. *Petromyzon*

c. *Psittacula* d. *Calotes*

e. *Torpedo*

(1) a, b and c (2) a, c and d

(3) b, c and e (4) c, d and e

105. In the structure of golgi apparatus there are present many flat 0.5 μm to 1.0 μm diameter structures. Which among the following is correct regarding these structures?

(1) These are tubular and called tubules

(2) There are disc shaped

(3) These are called cisternae

(4) Both (2) & (3)

106. Regarding Meiosis, which of the statements is incorrect ?

(1) Meiosis reduces the number of chromosomes during gametogenesis

(2) DNA replication occurs in S phase just before Meiosis-II

(3) Pairing of homologous chromosomes and recombination occurs in Meiosis-I

(4) Four haploid cells are formed at the end of Meiosis-II

107. Choose the odd one out in the following sets

(i) *Salpa, Doliolum*, Lancelet

(ii) *Neophron, Macropus, Corvus*

(iii) *Ichthyophis, Bangarus, Heloderma*

(iv) *Betta, Pristis, Catla*.

(1) *Doliolum, Macropus, Heloderma, Catla*

(2) Lancelet, *Macropus, Icthyophis, Pristis*

(3) *Salpa*, *Macropus, Icthyophis, Pristis*

(4) *Doliolum, Macropus, Bangarus, Catla*

108. Which of the following is an incorrect statement ?

(1) The endocrine system provides an organised network of point-to-point connections for a quick coordination.

(2) Coordination is the process through which two or more organs interact and complement the functions of one another

(3) The endocrine system provides chemical integration through hormones.

(4) In our body the neural system and the endocrine system jointly coordinate and integrate all the activities of the organs so that they function in a synchronised fashion.

109. Identify the correct statements

a. One can breath out air totally without oxygen

b. RV/FRC air helps prevent lung collapsing

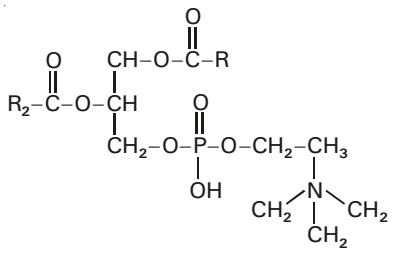
c. Intra-abdominal pressure increases during inspiration

d. Normal inspiration does not involve muscle contraction

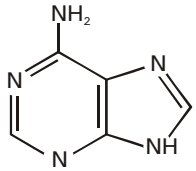
(1) a, b, c & d (2) a, b & c

(3) b, c & d (4) b & c

110. Which of the following structural formulae of two organic compounds is correctly identified along with its related function ?



A



B

(1) B : Adenine – A nucleotide that makes up nucleic acids

(2) A: Triglyceride – major source of energy

(3) B-Uracil – A component of DNA

(4) A : Lecithin – A component of cell membrane

111. Choose the type of tissue based on given information

a. Cells rest on a non cellular membrane secreted by cells

b. Avascular with nerve supply

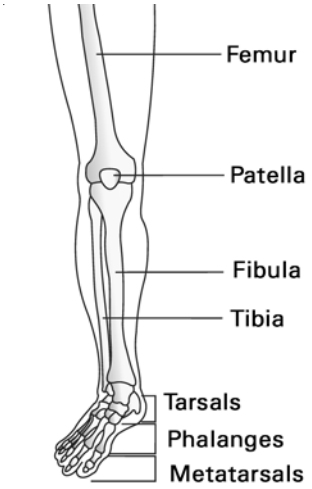
(1) Adipose tissue

(2) Epithelial tissue

(3) Tissue lining the wall of digestive tract

(4) Both (2) & (3)

112. Given below is a diagram of human hindlimb as seen from front. it has certain mistakes in labelling. Two of the wrongly labelled bones are



(1) tibia & tarsals (2) femur & fibula

(3) fibula & phalanges (4) tarsals & femur

113. Which hormone stimulate the production of pancreatic juice and bicarbonate?

(1) Angiotensin and epinephrine

(2) Gastrin and insulin

(3) Cholecystokinin and secretin

(4) Insulin and glucagon

114. **Assertion** : Each haemoglobin molecule can carry a maximum of four molecules of O_2.

Reason : Binding of oxygen with Hb. is primarily related to partial pressure of CO_2.

(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

115. How many of the following are correct statements ?

a. Nephridia help to remove nitrogenous wastes and maintain a fluid and ionic balance

b. Malpighian tubules are the excretory structures of most of the insects including cockroaches.

c. Antennal glands or green glands perform the excretory function in crustaceans like prawns.

d. Each kidney of an adult human measures 10-12cm in length, 5-7cm in thickness, 2-3cm in width with an average weight of 120-170 g.

e. A fall in glomerular blood flow/glomerular blood pressure/GFR can activate the JG cells to release rennin

(1) 2 (2) 3

(3) 5 (4) 4

116. Match list-I with list-II

List-I	**List-II**
a. Cuboidal	i. Skin
b. Ciliated	ii. Inner lining of blood vessels
c. Columnar	iii. Stomach
d. Squamous	iv. Inner lining of fallopian tube
e. Stratified squamous	v. Ducts of glands

(1) a-i, b-iv, c-iii, d-ii, e-v

(2) a-v, b-iv, c-iii, d-ii, e-i

(3) a-v, b-iii, c-iv, d-ii, e-i

(4) a-iv, b-ii, c-iii, d-i, e-v

117. Select the correct matching of a hormone, its source and function

	Hormone	Source	Functions
(1)	Vasopressin	Posterior Pituitary	Increase loss of water through urine
(2)	Norepinephrine	Adrenal medulla	Increases heart beat, rate of respiration & alertness
(3)	Glucagon	Beta-cells of islets of langerhans	Stimulates glycogenolysis
(4)	Prolactin	Posterior pituitary	Regulates growth of mammary glands and milk formation in females

118. Read the following statements

A. Palatine rugae are transverse ridges on the soft palate which hold food during mastication.

B. Uvula is the posterior most part of hard palate.

Mark the correct option.

(1) only A is correct
(2) only B is correct
(3) both A and B are correct
(4) both A and B are incorrect

119. In which of the following stages these events occur?

a. Chromosomes cluster at opposite poles
b. Nucleolus, golgi complex and ER reform

(1) Prophase I and Telophase I
(2) Metaphase I and Telophase I
(3) Telophase I and Telophase
(4) Telophse II and Prophase

120. Homologous chromosome separation occurs during

(1) Metaphase-I (2) Anaphase-II
(3) Anaphase-I (4) Metaphse-II

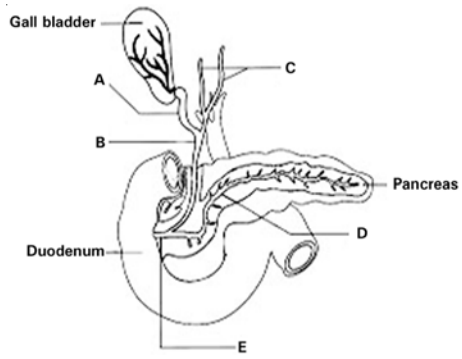
121. Which one of the given is incorrect statement?

(1) No plant cell carries centriole
(2) In bilipid layer polar heads are projected towards the exterior
(3) 'Cis' face of Golgi cisternae is convex in shape
(4) Vesicles from RER fuse with forming face of Golgi apparatus

122. Which of the following is incorrect statement?

(1) Crop and gizzard are present in alimentary canal of cockroach and peacock.
(2) Open circulatory system is present in earthworm and honey bees
(3) Protonephridia are present in rotifers, Platyhelminthes and cephalochordates
(4) Heart of mammals is myogneic

123. Which of the following option is correct with respect to the given diagram ?



(1) A– Common bile duct
(2) B – Cystic duct
(3) D – Bile duct
(4) E – Hepato pancreatic duct

124. What does (i) and (ii) represent in the given flow chart?

Parent cell (2n) $\xrightarrow{\text{Meiosis-I}}$ 2 daughter cell (i) $\xrightarrow{\text{Meiosis-II}}$ 4 daughter cell (ii)

(1) i = n, ii = n (2) i = 2n, ii = n
(3) i = n, ii = 2n (4) i = 2n, ii = 2n

125. What's true for macula present in membranous labyrinth of ear?

(1) Ampulla of each semcircular duct bears one macula
(2) Hair of their sensory cells are embedded in cupule i.e. gelatinous mass with otoconia
(3) They detect stimuli related to linear acceleration and position of head
(4) All of these

126. **Statement-I** : Multicellular organisms have division of labour .

Statement-II : Virchow explained that cells are formed from pre-existing cells.

(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

127. Match the cartilage under column I to its site in the human body under column II

	Column I		**Column II**
a.	Hyaline cartilage	p.	Pinna & external auditory canal
b.	White fibrous cartilage	q.	Between cranial sutures
c.	Yellow elastic cartilage	r.	Intervertebral discs
		s.	Articular surfaces at joints

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

128. Specialised excretory organs are not found in members of which phylum

(1) Platyhelminthes (2) Annelida
(3) Hemichordata (4) Echinodermata

129. Fill in the gaps using the correct option

"_____ are primarly involved in defense mechanisms of the body and the _____ help in osmotic balance"

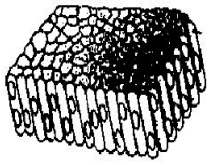
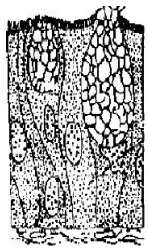
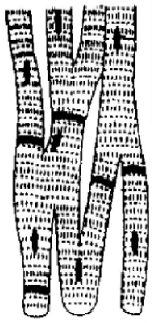
(1) Globulins and Albumins
(2) Albumins and Globulins
(3) Globulins and Fibrins
(4) Fibrins and Albumins

130. Match the following :

Column I (Endocrine glands)	Column II (Position in body)
A. Pituitary gland	p. Above kidney
B. Thyroid gland	q. Inside pancreas
C. Adrenal gland	r. On larynx
D. Islets of langerhans	s. On gonads
	t. At the base of brain

(1) A = s, B = t, C = p, D = q
(2) A = q, B = s, C = t, D = p
(3) A = t, B = r, C = p, D = q
(4) A = p, B = q, C = r, D = t

131. The four sketches (A, B, C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function ?

(A) 
(B) 
(C) 
(D) 

		Tissue	Location	Function
(1)	(A)	Columnar epithelium	Nephron	Secretion and absorption
(2)	(B)	Glandular epithelium	Intestine	Secretion
(3)	(C)	Collagen fibres	Cartilage	Attach skeletal muscles to bones
(4)	(D)	Smooth muscle tissue	Heart	Heart contraction

132. Identify the incorrect match
(1) *Trygon*– Poison sting
(2) *Ascidia* – Retrogressive metamorphosis
(3) *Soliodon* – Teeth are modified placoid scales
(4) *Carcharodon* – Claspers on pectoral fins

133. Which of the following is incorrect match?
(1) *Pila* – Radula
(2) Earthworm – Bisexual
(3) *Laccifer* – Gregarious pest
(4) *Limulus* – Living fossil

134. Identify the correct sequence of action of enzymes as food is ingested and swallowed

A.	Protease	B.	Nucleosidase
C.	Lipase	D.	Amylase
(1)	A–D–B–C	(2)	A–C–D–B
(3)	D–A–C–B	(4)	C–A–D–B

135. "The cerebral cortex contains motor area, sensory area and association area responsible for intersensory association, __(a)__ and __(b)__.The cerebrum wraps around a structure called __(c)__"
In the above paragraph a, b & c are respectively
(1) memory, communication, thalamus
(2) communication, memory, cerebellum
(3) memory, communication, pons varoli
(4) emotimal behaviour, will power, cerebellum

ZOOLOGY : SECTION-B

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

136. Which of the following is an incorrect statement?
(1) A centre present in the pons region of brain can moderate the functions of respiratory rhythm centre
(2) Pneumotaxic centre can reduce the duration of inspiration and thereby alter the respiratory rate
(3) Decrease in H^+ ions concentration can activate chemosensitive area which in turn signals the rhythm centre to make necessary adjustments
(4) The role of oxygen in the regulation of respiratory rhythm is quite insignificant

137. Match the following

a.	Synaptenemal complex	(i)	Pachytene
b.	Recombination module	(ii)	Leptotene
c.	Terminalisation	(iii)	Zygotene
d.	Chiasmta	(iv)	Diplotene
		(v)	Diakinesis

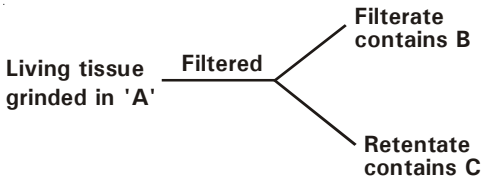
(1) a–(iii); b–(v); c–(i) ; d–(iv)
(2) a–(iii); b–(i); c–(iv) ; d–(v)
(3) a–(iii); b–(iv); c–(v) ; d–(ii)
(4) a–(iii); b–(i); c–(v) ; d–(iv)

138. Cellular organelles with membranes are
(1) Lysosomes, Golgi apparatus and mitochondria
(2) Nuclei, ribosomes and mitochondria
(3) Chromosomes, ribosomes and endoplasmic reticulum
(4) Endoplasmic reticulum, centrioles and nuclei

139. Set of oviparous animals with internal fertilization is
(1) *Balaenoptera, Rana*
(2) *Hippocampus, Ichthyophis*
(3) *Testudo , Neophron*
(4) *Locusta, Panthera*

140. How many statements are correct among the following?
a. In liquid endosperm of coconut cytokinesis is not followed by karyokinesis
b. It is essential for the cell to divide to restore nucleocytoplasmic ratio
c. Meiosis-I is initiated after parental chromosomes have replicated to produce identical sister chromatids at S-phase
d. In anaphase-I, each pole recieves half the chromosome number of parent cell
e. Cell division stops with the formation of a mature organism
(1) Two (2) Three
(3) Four (4) Five

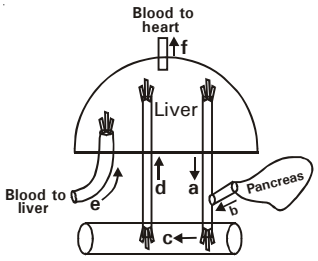
141. Study the following process to analyse organic components of a living tissue



A, B and C respectively are
(1) glycerol, lipids, amino acids
(2) trichloroacetic acid, lipids, amino acids
(3) trichloroacetic acid, amino acids, nucleic acid
(4) glycerol, amino acids, lipids

142. 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

143. Figure of liver shows entry and exit of structures - a, b, c, d, e and f. Choose the correct combination



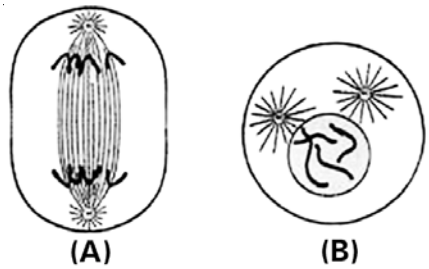
(1) a - hepatic portal vein, e - hepatic vein
(2) c - intestinal artery, f- hepatic portal vein
(3) d - hepatic portal vein, f - hepatic vein
(4) b - pancreatic artery, e - hepatic artery

144. How many statements are not correct ?
a. Cells of all living organism have a nucleus
b. Both animal and plant cells have well defined cell wall
c. In prokaryotes there are no membrane bound organelle
d. Cell are formed *de novo* from abiotic materials
(1) One (2) Two
(3) Three (4) Four

145. If the following are arranged in the correct order of involvement in electrical impulse movement-starting from synaptic knob, third would be
Synaptic knob, Dendrites, Cell body, Axon terminal, Axon
(1) dendrites (2) cell body
(3) axon terminal (4) axon

146. **Statement-I** : Skeletal muscles are closely associated with the skeletal components of the body.
Statement-II : Skeletal muscles have a striped appearance under the microscope and hence are called striated muscles.
(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

147. Which stages of cell division do the following figures A and B represent respectively?



(1) Prophase – Anaphase
(2) Metaphase – Telophase
(3) Telophase – Metaphase
(4) Late Anaphase – Prophase

148. Erythropoietin hormone which stimulates RBC formation is produced by
(1) Alpha cells of pancreas
(2) The cells of adenohypophysis
(3) The cells of bone marrow
(4) Juxtaglomerular cells of the kidney

149. **Assertion** : Enzyme activity declines both above and below the optimum value.
Reason : Low temperature destroys ezymatic activity while high temperature preserves the enzyme in a temperary inactive state.
(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

150. *Dentalium* : tuskshell : mollusca just as *Apis* : a : b. Identify a & b
(1) honey bee, arthropoda
(2) honey bee, mollusca
(3) lac insect, arthropoda
(4) lac insect, mollusca

BOTANY : SECTION-A

All questions are compulsory in section A

151. Final acceptor of electron in ETS is
(1) FMN (2) oxygen
(3) cytochrome a (4) cytochrome c

152. Which of the following is a group of vascular embryophytes?
(1) Bryophyte (2) Pteridophyte
(3) Algae (4) Mosses

153. 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 compounds into NH_3

154. Monocarpellary condition is found in
(1) Onion (2) Tomato
(3) Groundnut (4) Mustard

155. Choose the correct statements
a. Porins are proteins that form large pores in outer membranes of plastids
b. In symport, both molecules cross the membrane in opposite direction only
c. Solute potential and pressure potential are two main components that determine water potential
d. If external solution is more dilute than the cytoplasm then it is hypertonic solution
(1) a & b (2) a & c
(3) b & d (4) b & c

156. Match the pigments in column I with the corresponding colour range in column II.

Column I	Column II
a. Chlorophyll-a	p. yellow
b. Chlorophyll-b	q. bright or blue green
c. Xanthophylls	r. yellow to yellow-orange
d. Carotenoids	s. yellow green

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

157. Blue green algae like *Nostoc* and *Anabaena* are able to fix atmospheric nitrogen because they have
(1) Root nodules (2) *Rhizobium*
(3) Heterocysts (4) Leghaemoglobin

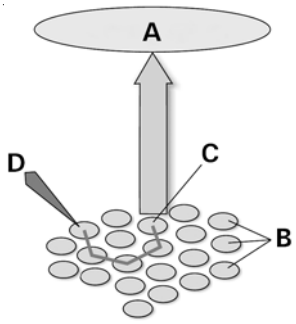
158. In haplontic life cycle
(1) haploid stage is represented by gametes only
(2) diploid stage is represented by zygote only
(3) both haploid and diploid stages are multicellular
(4) dipoid is multicellular and haploid is unicellular

159. Dioecious gametophyte is found in
(1) *Funaria* and *Selaginella*
(2) *Marchantia* and *Pinus*
(3) *Salvinia* and *Sphagnum*
(4) *Cycas* and *Dryopteris*

160. Which of the following statement is correct?
a. Plasmolysis is an irreversible process
b. Ψ_w of solution is always negative
c. Jamming of wooden doors is an example of imbibition
(1) a and b (2) b only
(3) a, b, and c (4) b and c

161. Phylloclades are
(1) green photosynthetic and succulent stem of indefinite growth
(2) one internode long stem
(3) leaf modification
(4) underground fleshy stem

162. Identify A & B in the given diagram



(1) A–Reaction centre, B–Pigment molecules
(2) A–Primary acceptor, B–Reaction centre
(3) A–Photon, B–Pigment molecules
(4) A–Primary acceptor, B–Pigment molecules

163. Prop roots and stilt roots are
(1) adventitious roots (2) tap roots
(3) fibrous roots (4) storage roots

164. Gibberellins
a. are of more than 100 types reported from different organisms
b. promotes bolting
c. hasten maturity period in conifers
d. is used to speed up the malting process
(1) b is incorrect
(2) a and d are incorrect
(3) only b and d are correct
(4) all are correct

165. Which of the following shows negligible photorespiration at high light intensity?
(1) Sugarcane (2) Maize
(3) Wheat (4) Both (1) and (2)

166. **Assertion** : Plant body of liverworts is thalloid.
Reason : In leafy liverworts there are tiny leaf-like appendages in two rows on the stem-like structures..
(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

167. Match the following

i.	Pneumatophore	a.	Pea
ii.	Thorn	b.	Bougainvillea
iii.	Leaf tendrils	c.	*Rhizophora*
iv.	Berry	d.	Rose
v.	Perigynous	e.	Tomato

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

168. Asexual spores produced exogenously on the special mycelium are called
(1) sporangiophore (2) conidiophore
(3) ascospore (4) basidiospore

169. Datura show
(1) Hypogynous flower, zygomorphic symmetry
(2) Epigynous flower, actinomorphic symmetry
(3) Perigynous flower, asymmetric symmetry
(4) Hypogynous flower, actinomorphic symmetry

170. **Statement-I** : The floral diagram doesn't give us any idea of aestivation, nor does it provide any information of placentation.
Statement-II : Most basic type of tissue in plants is sclerenchyma.
(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

171. Which of the given feature does not belong to mustard?
(1) Zygomorphic symmetry
(2) Racemose inflorescence
(3) Hypogynous condition
(4) Parietal placentation

172. Dikaryotic stage is characteristic of
(1) ascomycetes and zygomycetes
(2) basidiomycetes and phycomycetes
(3) basidiomycetes and ascomycetes
(4) zygomycetes and phycomycetes

173. Which of the following statements is incorrect?
(1) In unicellular organisms growth and reproduction are synonymous
(2) Consciousness can be an all inclusive defining characteristic of living organisms
(3) All non-living objects exhibit metabolism
(4) All plants, animals, fungi, microbes exhibit metabolism

174. How many of the following organisms have chlorophyll-a and chlorophyll-c?
Dinoflagellates, *Euglena*, *Porphyra*, *Laminaria*, *Sargassum*, Diatoms, *Chara*, *Ulothrix*, *Fucus*
(1) Six (2) Four
(3) Five (4) Three

175. Photosynthetic protists or protistan algae include
(1) dinoflagellates, diatoms and euglenoid algae
(2) red algae, blue green algae and diatoms
(3) euglenoid forms, slime moulds, and dinoflagellates
(4) brown algae, golden brown algae

176. Pick the true statement
(1) In opposite phyllotaxy, more than two leaves are born on a node
(2) Fungi show multicellular/loose tissue level of body organisation
(3) Photoperiodic responses are mediated by phytochrome pigment found in flowers
(4) Boron is an essential macroelement

177. How many of the following are secondary tissues?
Cork, Secondary cortex, Primary xylem, Metaphloem, Protoxylem, Springwood, Heart wood
(1) Four (2) Six
(3) Seven (4) Five

178. Which of the following is incorrect with respect to glycolysis?
(1) In this process, glucose undergoes partial oxidation to form three molecules of pyruvic acid
(2) It is the only process in respiration in anaerobic organisms
(3) It occurs in the cytoplasm of the cell and is present in all living organisms
(4) A chain of ten reactions, under the control of different enzymes, takes place to produce pyruvate from glucose

179. Which of the following does not belong to sac fungi?
(1) Morels (2) *Penicillium*
(3) Puff balls (4) Truffels

180. A dicotyledonous plant has a leaf 'A' vaselined on its upper side and another leaf'B' on the lower side. What will be the response on their relative wilting?
(1) 'B' wilts faster than 'A'
(2) 'A' and 'B' wilt equally
(3) 'A' wilts faster than 'B'
(4) Neither 'A' or 'B' shows wilting

181. The primary acceptor of CO_2 in sugarcane plant is
(1) PEP (2) RuBP
(3) Sucrose (4) Malic acid

182. **Statement-I** : In roots protoxylem is towards outerside and metaxylem is towards the centre..
Statement-II : Sclereids are present in hypodermis of dicot stem and dicot root.
(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

183. Girdling experiments show that
(1) xylem is tissue through which translocation of food occurs and that transport takes place in one direction i.e. towards roots
(2) xylem is the tissue through which translocation of food occurs and that transport takes place in all directions
(3) phloem is the tissue through which translocation of food occurs and that transport takes from sink to source
(4) phloem is the tissue through which translocation of food occurs and that transport takes place from leaves towards roots

184. How many statements are correct?
a. Priestley used candle and mouse in his experiment
b. Engelmann used *Cladophora,* an aquatic alga
c. Cornelius van Niel used radioactive oxygen in his experiments on purple and green bacteria
d. Ruben, Hassid and Kamen for the first time discovered that O_2 is released from plants.
e. Ingenhousz experiments were related to light
f. In Engelmann experiments, maximum oxygen is released by plant in red and blue regions of visible spectrum
(1) Three (2) Two
(3) Four (4) Five

185. Which of the following is used for quick referral system in taxonomic studies?
(1) Botanical garden (2) Herbarium
(3) Museum (4) Key

BOTANY : SECTION-B

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

186. How many statements are true?
a. Epiblema of roots lacks cuticle
b. Pith is large in dicot root
c. Bulliform cells are green coloured cells found in monocot leaves
d. Annual rings give an estimate of age of a tree
(1) One (2) Two
(3) Three (4) Four

187. Which of the following statement is incorrect?
(1) Archaebacteria differ from eubacteria in having different cell wall structure
(2) *Funaria* have elaborate mechanisms of spore dispersal
(3) Brown algae are always multicellular
(4) Sex organs are present in Deuteromycetes

188. The floral formula of the family solanaceae is
(1) $\%\,\♀\,P_{(3+3)}\,A_{(3+3)}\,G_{\underline{(1)}}$
(2) $\oplus\,\♀\,K_{(5)}\,\overset{\frown}{C_{(\underline{5})}\,A_5}\,G_{\underline{(2)}}$
(3) $Br\,\♀\,P_{3+3}\,G_{\overline{(3)}}$
(4) $\oplus\,\♀\,P_{3+3}$ or $_{(3+3)}\,G_{\overline{(3)}}$

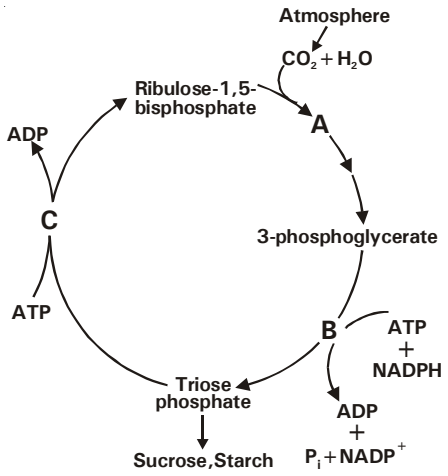
189. **Statement-I** : *Frankia* produces nitrogen fixing nodules on roots of non-leguminous plants (eg. *Alnus*).
Statement-II : *Rhodospirillum* is aerobic and free living microbe.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

190. How many of the following members in the list have diplontic life cycle?
Marchantia, Funaria, Pinus, Eucalyptus, Adiantum, Cedrus, Sphagnum, Equisetum
(1) 1 (2) 2
(3) 3 (4) 5

191. Pick the false statement
(1) A flower is a modified shoot
(2) Region of maturation contains thimble like root cap on every root hair
(3) Sunflower shows basal placentation
(4) Potato family is characterised by valvate aestivation

192. Which of the following is incorrect match?
(1) Fimbriae – Motility
(2) Mesosome – Respiration
(3) Chromatophore – Photosynthesis
(4) Zoospore – Reproduction

193. Identify the cycle and name the steps A, B, C respectively.



(1) Calvin cycle, carboxylation, regeneration, reduction
(2) Calvin cycle, carboxylation, reduction, regeneration
(3) Hatch and Slack cycle, carboxylation, regeneration, reduction
(4) Hatch and Slack cycle, initial fixation, reduction, regeneration

194. Match the column-I with column-II

	Column-I		**Column-II**
a.	NADH dehydrogenase	i.	Complex-III
b.	$FADH_2$	ii.	Complex-I
c.	Cytochrome bc_1 complex	iii.	Complex-II
d.	Cytochrome c oxidase	iv.	Complex-V
e.	ATP synthase	v.	Complex-IV

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

195. Periderm consists of
(1) secondary cortex, phelloderm and phellogen
(2) secondary cortex, cork cambium and phellogen
(3) secondary cortex, cork cambium and cork cells
(4) phelloderm, cork and phellem

196. **Assertion** : Viroids are infectious particles smaller than virus.
Reason : The most notable disease caused by them is Bovine spongiform encephalopathy.
(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 maize stem
(1) pith is present
(2) hypodermis is collenchymatous
(3) vascular bundle are closed and radial
(4) peripheral vascular bundles are generally smaller

198. Youngest layer of secondary xylem is present
(1) just inside the secondary phloem
(2) just outside the secondary phloem
(3) just inside the secondary xylem
(4) just inside the vascular cambium

199. How many statements are incorrect?
a. Gibberellins increases length of stem in sugarcane
b. Ethylene stops/inhibits senescence and abscission of plant organs
c. Abscisic acid stimulate closure of stomata
d. NAA (Naphthalene acetic acid) and 2, 4-D (2, 4-dichlorophenoxy acetic acid) are synthetic auxins
(1) One (2) Two
(3) Three (4) Four

200. Oogamy occurs in
(1) *Ulothrix* (2) *Spirogyra*
(3) *Chlorella* (4) Volvox