Dated : 12-04-2023

M.L. Syal's Helix Institute

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

Test Series HMC-8 [Option -2]

Test - 05

MM : 720 Time : 3 hrs. 20 min.

Physics	: Motion in a Straight Line, Motion in a Plane, Units, Dimensions & Errors, Laws of Motion and Friction, WEP, Circular and Rotational motion, Mechanical & Thermal Properties of Matter, KTG, Thermodynamics, SHM, Waves, Gravitation
Chemistry	: Structure of atom, Chemical equilibrium, Ionic equilibrium, Environmental chemistry, Mole concept, Solutions, Redox reactions, Electrochemistry, Chemical bonding, Periodic properties, s-Block, p-Block, Chemical Coordination and Integration, Thermodynamics, Hydrogen, Chemistry in action, Gaseous state, Extraction
Zoology	: Breathing and exchange of gases, Excretory products and Elimination, Biomolecules, Digestion and Absorption, Nervous System, Sense Organs, Locomotion and movement, Cell: The unit of life, Cell cylce & cell division, Body fluids & Circulation, animal Kingdom, Epithelial tissues & CT proper
Botany	: The Living world, Biological classification (i/c virus), Monera, Fungi, Protista, Transport in Plants, Photosynthesis, Respiration, Plant Growth & Development, Mineral Nutrition, Anatomy of Flowering Plants, Plant Kingdom, Strategies for Enhancement in food production

PHYSICS : SECTION-A

All questions are compulsory in section A

1. The equation of trajectory of a projectile is $y = \sqrt{3}x - \frac{g}{2}x^2$. Find the velocity of projection.

   (1) 1 m/s (2) 2 m/s

   (3) 0.5 m/s (4) 4 m/s

2. Which of the following pairs has the same dimensional formula?

   (1) Energy density and strain

   (2) Linear momentum and torque

   (3) Linear impulse and energy

   (4) Torque and heat

3. The period of oscillation of a simple pendulum in an experiment is recorded as 2.6 s, 2.4 s, 2.3 s, 2.9 s and 2.8 s respectively. The mean absolute error (in s) for all measurements is

   (1) 0.2 (2) 0.1

   (3) 0.4 (4) 0.0

4. A solid cylinder of mass M and radius R rolls down an inclined plane of height 'h'. Angular velocity of cylinder when it reaches bottom of plane will be

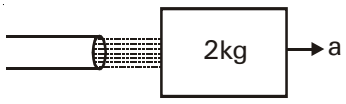
   (1) $\frac{1}{2R}\sqrt{gh}$ (2) $\frac{2}{R}\sqrt{gh}$

   (3) $\frac{2}{R}\sqrt{\frac{gh}{3}}$ (4) $\frac{2}{R}\sqrt{\frac{gh}{2}}$

5. A body of mass m_1 moving with a velocity 3 ms^{-1} collides with another body at rest of mass m_2. After collision, the velocities of the two bodies are 2 ms^{-1} and 5 ms^{-1} respectively in the original direction of motion of m_1 . The ratio m_1/m_2 is

   (1) $\frac{5}{12}$ (2) 5

   (3) $\frac{1}{5}$ (4) $\frac{12}{5}$

6. 

A metallic block of 2kg is placed on a smooth plane & a flow of water is released from a pipe at the rate of 1kg/s with a velocity 5 m/s on it. Then initial acceleration of the block will be

(1) 2.5 m/s^2 (2) 5 m/s^2
(3) 0.4 m/s^2 (4) 0

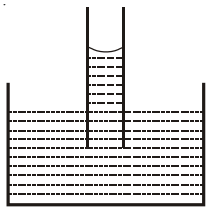
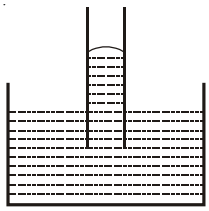
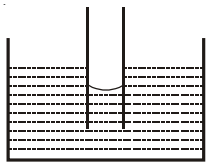
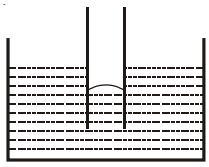
7. The height to which a person should go such that acceleration due to gravity of earth decreases by 1% is

(1) 32 km (2) 16 km
(3) 8 km (4) 64 km

8. For which combination of working temperatures the efficiency of Carnot's engine is highest

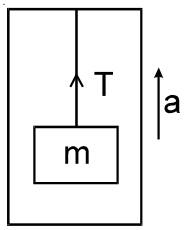
(1) 80 K, 60 K (2) 100 K, 80 K
(3) 60 K, 40 K (4) 40 K, 20 K

9. You dip a capillary tube into beakers with different fluids. From observation of the shape of the fluid surface, deduce that in which figure cohesive forces dominate over adhesive forces.

(1) 
(2) 
(3) 
(4) 

10. One body is dropped, while a second body is thrown downward with an initial velocity of 1m/s simultaneously. The separation between them is 1.8 m after a time of

(1) 4.5 s (2) 9 s
(3) 1.8 s (4) 36 s

11. 

A block of mass 'm' is suspended by a light thread from an elevator. The elevator starting from rest is accelerating upward with uniform acceleration 'a'. Work done by tension on the block during first 't' second with respect to an observer on ground is

(1) $\frac{m}{2}(g + a)\,at^2$ (2) $\frac{m}{2}(g - a)at^2$

(3) $\frac{m}{2}gat^2$ (4) zero

12. **Assertion** : Force is required to move a body along a circle at constant speed.
Reason : Although this is a case of uniform motion, direction of motion is changing.

(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

13. A weightless thread can bear tension upto 3.7 kg-wt. A stone of mass 500 gm is tied to it and revolved in a circular path of radius 4 m in a vertical plane. If $g = 10\ ms^{-2}$, then the maximum angular velocity of the stone will be

(1) 4 rad/s (2) 16 rad/s
(3) 8 rad/s (4) 2 rad/s

14. There is a hole in the bottom of tank having water. If total pressure at bottom is 5 atm, then the velocity of water flowing from hole is about

(1) 20 m/s (2) 14 m/s
(3) 40 m/s (4) 28 m/s

15. Two wires P and Q of different materials but same crossectional area are connected end to end and fixed to a rigid support. If a force is applied such that the compound wire elongates, then the two wires have

(1) same stress and same strain
(2) same strain but different stresses
(3) different strains but same stress
(4) different stresses and different strains

16. A gas is at pressure P. If the mean free path of atoms is doubled at constant temperature, then the pressure of gas will become

(1) P/4 (2) P/2
(3) P/8 (4) P

17. The period of oscillation of a simple pendulum of length L suspended from the roof of a vehicle which moves without friction down an inclined plane of inclination α, is given by

(1) $2\pi\sqrt{\frac{L}{g\cos\alpha}}$ (2) $2\pi\sqrt{\frac{L}{g\sin\alpha}}$

(3) $2\pi\sqrt{\frac{L}{g}}$ (4) $2\pi\sqrt{\frac{L}{g\tan\alpha}}$

18. An observer standing near the shore of a river notes that a man is swimming upstream at 0.8 m/s and a child is swimming downstream at 1.2 m/s. If swimming speed of both man and child in still water is same, the speed of the river is

(1) 0.1 m/s (2) 0.2 m/s
(3) 0.3 m/s (4) 0.4 m/s

19. The initial velocity of a particle is 'u' and its acceleration is given by 'at^2' where 'a' is constant. Which relation is valid?

(1) $v = u + at^3$ (2) $v = u + a\frac{t^2}{2}$

(3) $v = u + \frac{1}{3}at^3$ (4) $v = u$

20. Two particles of equal mass go round a circle of radius R under action of their mutual gravitational attraction. The speed of each particle is

(1) $v = \frac{1}{2R}\sqrt{\frac{1}{Gm}}$ (2) $v = \sqrt{\frac{Gm}{2R}}$

(3) $v = \frac{1}{2}\sqrt{\frac{Gm}{R}}$ (4) $v = \sqrt{\frac{4Gm}{R}}$

21. A body is executing S.H.M. When its displacement from the mean position is 4 cm and 5 cm, the corresponding velocity of the body is 10 cm/s and 8 cm/s. Then the time period of the body is

(1) 2π second (2) 0.5π second
(3) π second (4) 1.5π second

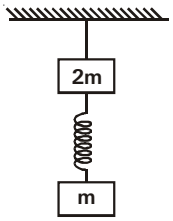
22. A solid spherical body of radius 'r' radiates a power P and its rate of cooling is R. Then

(1) $P \propto r$ (2) $P \propto r^2$
(3) $R \propto r^2$ (4) Both (2) and (3)

23. A vernier calliper has 1 mm marks on the main scale. It has 20 equal divisions on the vernier scale which match with 16 main scale divisions. Least count of the instrument is

(1) 0.02 mm (2) 0.05 mm
(3) 0.1 mm (4) 0.2 mm

24. Two blocks are connected by a spring. The combination is suspended, at rest, from a string attatched to the ceiling, as shown in the figure. The string breaks suddenly. Immediately after the string breaks, what is the initial downward acceleration of the upper block of mass 2m ?



(1) 0 (2) 3g/2
(3) g (4) 2g

25. Equation of a progressive wave is given by

$$y = 0.2 \cos \pi \left(0.02t + 0.05x + \frac{\pi}{4} \right)$$

The distance is expressed in cm and time in second. What will be the minimum distance between two particles having the phase difference of $\pi/2$?

(1) 5 cm (2) 10 cm
(3) 20 cm (4) 25 cm

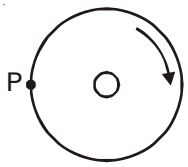
26. If 3th overtone is set up in a wire fixed at one end and free at the other, then number of nodes and antinodes formed are

(1) 3, 4 (2) 4 , 4
(3) 3, 3 (4) 5 , 5

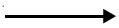
27. Vector $2\hat{k} + \hat{j} + 2\hat{i}$ is perpendicular to vector $4\hat{j} - 4\hat{i} + a\hat{k}$. Then the value of 'a' is

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

28.



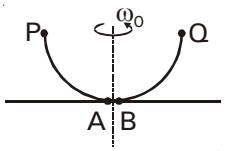
The diagram shows a CD rotating clockwise (as seen from above) in the CD-player. After turning it off, the CD slows down. Assuming it has not come to a stop yet, the direction of the acceleration of point P at this instant is

(1)  (2) 
(3)  (4) 

29. A girl riding a bicycle with a speed of 4 m/s towards north direction, observes rain falling vertically down. If she increases her speed to 10 m/s, rain appears to meet her at 53° to the vertical. The speed of the rain approximately is

(1) 5 m/s (2) 7 m/s
(3) 6 m/s (4) 8 m/s

30. Two insects of mass 'M' each are at points P and Q of a massless semicircular wire. Two more insects A and B of same mass are sitting at the bottom of the wire. The wire is given an angular velocity ω_0 about a vertical axis through its centre. If A and B crawl to meet P and Q, final angular velocity attained by the wire will be



(1) $\frac{\omega_0}{4}$ (2) $\frac{\omega_0}{2}$

(3) ω_0 (4) $2\omega_0$

31. A particle of mass 'm' is projected with a velocity 'u' making an angle 45° with the horizontal. The magnitude of the torque due to weight of the projectile, when the particle is at its maximum height, about the point of projection

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

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

32. Two particles are projected vertically upward from a point on earth's surface. Their initial velocities are $v_1 = \sqrt{\frac{2gR}{3}}$ and $v_2 = \sqrt{gR}$ respectively. R is the radius of earth and g is the acceleration due to gravity on earth surface. If the respective maximum heights are h_1 and h_2, then $h_1 : h_2$ is

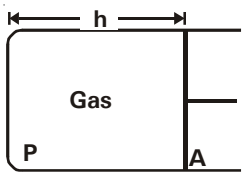
(1) 1 : 4 (2) 1 : 2

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

33. An ideal gas expands such that $PT^2 = \text{constant}$. Coefficient of volume expansion of gas is

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

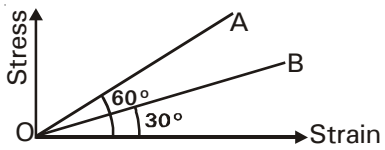
(3) $\frac{3}{T}$ (4) $\frac{4}{T}$

34. 

A cylindrical piston of mass M and area A slides smoothly inside a long cylinder closed at one end, enclosing a certain mass of gas at pressure P. The cylinder is kept with its axis horizontal. If the piston is disturbed slightly from its equilibrium position, it oscillates simple harmonically. The period of oscillation will be

(1) $T = 2\pi\sqrt{\frac{Mh}{PA}}$ (2) $T = 2\pi\sqrt{\frac{MA}{Ph}}$

(3) $T = 2\pi\sqrt{\frac{M}{PAh}}$ (4) $T = 2\pi\sqrt{MPhA}$

35. 

Stress versus strain graphs for wires of two materials A and B are as shown in figure. If Y_A and Y_B are the Young's modulii of the materials, then

(1) $Y_B = 2Y_A$ (2) $Y_A = Y_B$

(3) $Y_B = 3Y_A$ (4) $Y_A = 3Y_B$

PHYSICS : SECTION-B

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

36. If the kinetic energy of a body increases by 0.1%, the percent increase of its momentum will be

(1) 0.05% (2) 0.1%

(3) 1.0% (4) 10%

37. A brick of mass 2 kg placed on an inclined plane just begins to slide down when the plane is inclined at an angle of 30° with the horizontal. The force of friction (in N) on the brick in this case will be

(1) 19.6 sin 30° (2) 19.6 cos 30°

(3) 9.8 sin 30° (4) 9.8 cos 30°

38. The real coefficient of volume expansion of glycerine is 0.000597 per°C and linear coefficient of expansion of glass is 0.000009 per°C. Then the apparent volume coefficient of expansion of glycerine is

(1) 0.000558 per°C (2) 0.00057 per°C

(3) 0.00027 per°C (4) 0.00066 per°C

39. **Assertion** : A man starts walking towards west. Friction force on him from ground acts towards east.

Reason : Friction opposes relative motion.

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

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

(3) Assertion is true statement but Reason is false

(4) Assertion is false

40. Two rectangular blocks A and B of different metals have same length. Area of cross-section of A is double that of B. They are joined in series. The temperature at free end of A is 100°C and that of B at the free end is 0°C. If the ratio of their thermal conductivity is 1 : 3. then under steady state, the temperature of the joint will be

(1) 60°C (2) 50°C

(3) 75°C (4) 40°C

41. Screw gauge is said to have positive error when head scale zeroth division

(1) coincides with base line of main scale

(2) is above with base line of main scale

(3) is below with base line of main scale

(4) both (1) and (3)

42. A ball projected from ground at 15m/s at an angle 37^0 with horizontal hits a smooth vertical wall 10m away from point of projection. If the collision is elastic, how far away from the wall will the ball fall on ground? ($g = 10m/s^2$)

(1) 8.6 m (2) 11.6 m

(3) 12.8 m (4) 10.8 m

43. A ball is given a velocity 2 m/s and is subjected to acceleration 4 m/s^2 perpendicular to the initial direction of motion. What is its displacement after 2 seconds?

(1) 15 m (2) 12 m

(3) $\sqrt{80}$ m (4) $\sqrt{30}$ m

44. To what approximate temperature, helium gas should be heated so that the r.m.s. speed of helium atoms becomes equal to escape velocity on earth surface?

(1) 10000 K (2) 20000 K

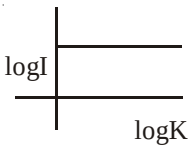
(3) 40000 K (4) 16000 K

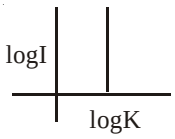
45. A ball of density 'd' is dropped from height 'h' at $t = 0$ on a liquid of density d_L and it stops momentarily inside liquid at time $t = t_2$. If t_1 is the time spent by ball in air during fall, then

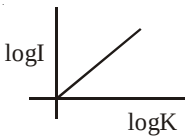
(1) $t_2 = \frac{dt_1}{d_L - d}$ (2) $t_2 = \frac{d_L t_1}{d_L - d}$

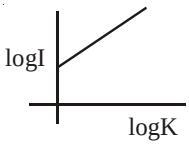
(3) $t_2 = \frac{d_L - d}{d} t_1$ (4) $t_2 = \frac{d_L - d}{d_L} t_1$

46. Which of the following graphs represents relation between log K & log I, where K & I are radius of gyration & moment of inertia respectively?

(1) 

(2) 

(3) 

(4) 

47. A disc of mass 500 gm and radius 10 cm can rotate about its axis which is fixed. A string wound over the disc is pulled with a constant force 10 N. Angular momentum acquired by the disc in 10 s after the start is

(1) 5 kg-m^2/s (2) 10 kg-m^2/s

(3) 2 kg-m^2/s (4) 1 kg-m^2/s

48. In changing the state of a gas adiabatically from an equilibrium state A to another equilibrium state B, an amount of work equal to 22.3 J is done on the system. If gas is taken from state A to B via a process in which net heat absorbed by system is 9.35 cal, how much is net work done by system in latter case? (Take 1 cal = 4.19 J)

(1) 18.3 J (2) 14.4 J

(3) −13 J (4) 16.9 J

49. A body moving in a straight line with uniform acceleration has velocities 20 m/s and 30 m/s, when passing two points A and B on its path. Then the velocity mid way between A and B is approximately

(1) 25 m/s (2) 25.5 m/s

(3) 24.5 m/s (4) 10 m/s

50. A tuning fork vibrating with a frequency of 512 Hz is kept close to the open end of a tube filled with water. The water level in the tube is gradually lowered. When the water level is 17cm below the open end, maximum intensity of sound is heard. The speed of sound in air is approximately

(1) 300 m/s (2) 320 m/s

(3) 350 m/s (4) 400 m/s

CHEMISTRY : SECTION-A

All questions are compulsory in section A

51. The difference of water molecules in gypsum and plaster of paris is

(1) 2.5 (2) 2

(3) 0.5 (4) 1.5

52. The first ionisation enthalpies of Na, Mg, Al and Si are in the order

(1) Na < Mg > Al < Si (2) Na > Mg > Al > Si

(3) Na < Mg < Al < Si (4) Na > Mg > Al < Si

53. If K_1 and K_2 are equilibrium constants for reactions (I) and (II) respectively for

$N_2 + O_2 \rightleftharpoons 2NO$ ...(i)

$NO \rightleftharpoons \frac{1}{2} N_2 + \frac{1}{2} O_2$ ...(ii) then....

(1) $K_2 = K_1$ (2) $K_2 = \sqrt{\frac{1}{K_1}}$

(3) $K_1 = 2K_2$ (4) $K_1 = (\frac{1}{2})K_2$

54. Mixture of volatile components A and B has total vapour pressure (in torr)

$$P = 254 - 119\ x_A$$

where x_A is mol fraction of A in mixture. Hence p_A^0 and p_B^0 are (in torr)

(1) 254, 119 (2) 119, 254

(3) 135, 254 (4) 154, 119

55. A process is spontaneous at all temperatures if

(1) $\Delta H > 0$ and $\Delta S > 0$ (2) $\Delta H > 0$ and $\Delta S < 0$

(3) $\Delta H = 0$ and $\Delta S < 0$ (4) $\Delta H < 0$ and $\Delta S > 0$

56. The relationship between osmotic pressure at 273K when 10 g glucose (P_1), 10 g urea (P_2) and 10 g sucrose (P_3) are dissolved in 250 ml of water is

(1) $P_1 > P_2 > P_3$ (2) $P_3 > P_1 > P_2$

(3) $P_2 > P_1 > P_3$ (4) $P_2 > P_3 > P_1$

57. An elements with very low melting point but considerably high boiling point is

(1) B (2) Ga

(3) Al (4) In

58. The standard e.m.f. of a cell involving one electron change is found to be 0.591 V at 25°C. The equilibrium constant of the reaction is

(1) 10^{30} (2) 10^5

(3) 10^{10} (4) 10^1

59. Which of the following does not play any role in smog?

(1) SO_2 (2) NO_2

(3) O_3 (4) Freons

60. **Statement-I** : 14 g CO and 14 g of N_2 have same number of molecules.

Statement-II : 14 g CO and 14 g of N_2 have same number of atoms.

(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

61. According to Le Chatelier's principle adding heat to a solid and liquid in equilibrium with endothermic nature will cause the

(1) amount of solid to decrease

(2) amount of liquid to decrease

(3) temperature to rise

(4) temperature to fall

62. Match the items of Column I with the items of Column II and assign the correct

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

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

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

63. Detergents are better cleansing agent than soaps becuase

(1) they wash clothes better

(2) absorb the hardness of water

(3) they are less affected by hard water

(4) they are less soapy

64. Number of gram equivalents present per litre of solution in a semi normal solution is

(1) $\frac{1}{2}$ (2) $\frac{1}{5}$

(3) $\frac{1}{10}$ (4) $\frac{1}{100}$

65. Which of the following mixtures can act as a buffer?

a. $HCl + CH_3COONa$ (3 : 1 molar ratio)

b. $CH_3COOH + NaOH$ (2 : 1 molar ratio)

c. $CH_3COOH + NaOH$ (3 : 1 molar ratio)

d. $CH_3COOH + NaOH$ (1 : 1 molar ratio)

(1) a & b only (2) b & d only

(3) b & c only (4) a, b & c

66. The molar conductivity is maximum for the solution of concentration

(1) 0.001 M (2) 0.005 M

(3) 0.002 M (4) 0.004 M

67. The number of moles of Fe^{2+} ion oxidised by one mole of MnO_4^- ions (in acidic medium)is

(1) 1/5 (2) 2/3

(3) 5 (4) 3/2

68. Which of the following equations depict the oxidising nature of H_2O_2?

(1) $2MnO_4^- + 6H^+ + 5H_2O_2 \rightarrow 2Mn^{2+} + 8H_2O + 5O_2$

(2) $2Fe^{3+} + 2H^+ + H_2O_2 \rightarrow 2Fe^{2+} + 2H_2O + O_2$

(3) $2I^- + 2H^+ + H_2O_2 \rightarrow I_2 + 2H_2O$

(4) $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

69. The electrons in the atom of P (atomic number 15) with $n + l + m = 3$ are

(1) 8 (2) 12

(3) 5 (4) 6

70. Electronic configurations of four elements A, B, C and D are given below

A. $1s^2\ 2s^2\ 2p^6$ B. $1s^2\ 2s^2\ 2p^4$

C. $1s^2\ 2s^2\ 2p^6\ 3s^1$ D. $1s^2\ 2s^2\ 2p^5$

Element with highest electron affinity is

(1) A (2) B

(3) C (4) D

71. Which one of the following is/are direct consequence of Henry's law?

a. Painful condition known as bends

b. Fizzing of soda water bottle on opening it

c. Sprinkling of salt on snow covered roads

d. Comfort of aquatic species in cold water in comparison to hot water

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

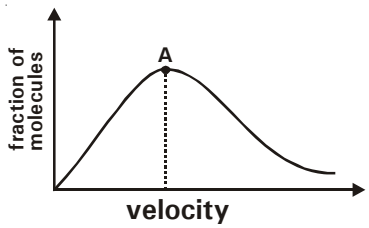
(3) a, b, d (4) only a & b

72. $Ba(OH)_2$ is a strong base. The pH of its 0.005 M soluiton would be

(1) 11.31 (2) 12.7

(3) 12 (4) 11.2

73. The following graph is obtained when the fraction of molecules is plotted against velocity



Velocity corresponding to point A is given by

(1) $\sqrt{\frac{RT}{M}}$ (2) $\sqrt{\frac{3RT}{M}}$

(3) $\sqrt{\frac{8RT}{\pi M}}$ (4) $\sqrt{\frac{2RT}{M}}$

74. The value of IP_1, IP_2, IP_3, IP_4 of an atom are respectively 7.5 eV, 25.6 eV, 48.2 eV, 170.6 eV. The configuration of atom is

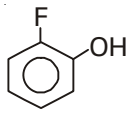
(1) $1s^2, 2s^2, 2p^6, 3s^1$

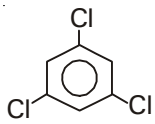
(2) $1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

(3) $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$

(4) $1s^2, 2s^2, 2p^6, 3s^2$

75. Which of the following molecules has zero dipole moment?

a. 

b. 

c. NHF_2 d. XeO_4

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

(3) a and c (4) a and d

76. van der Waal's constant 'a' gives us an information regarding

(1) molecular size (2) attractive forces

(3) ease of liquifaction (4) both (2) & (3)

77. Given

i. $A + e^- \rightarrow A^-$ $E^o = 0.92V$

ii. $D + 2e^- \rightarrow D^{2-}$ $E^o = 0.32V$

iii. $B^{2+} + 2e^- \rightarrow B$ $E^o = -2.70V$

iv. $E \rightarrow E^{2+} + 2e^-$ $E^o = +0.54V$

Which of the following combinations will give the highest cell potential (EMF)?

(1) ii & iii (2) i & iv

(3) i & iii (4) ii & iv

78. Bismuth cannot form a pentahalide because of

(1) unavailability of vacant d-orbital

(2) shielding effect

(3) penetration effect

(4) inert pair effect

79. Silicones are formed by condensation polymerisation of $(CH_3)_2\ SiCl_2$. The length of the polymer can be controlled by adding

(1) $(CH_3)_3\ SiCl$ (2) $(CH_3)_4Si$

(3) SiO_2 (4) CH_3SiCl_3

80. **Assertion** : The entropy of fusion of solid and vaporization of liquid is positive.

Reason : Both the change of solid into liquid and liquid into vapour takes place with increase of disorder.

(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

81. Solubility of $PbSO_4$ at 25°C is 1.1×10^{-4} mol/L. Then its K_{sp} is

(1) 1.21×10^{-8} (2) 12.1×10^{-6}

(3) 121×10^{-1} (4) 1.21×10^{-10}

82. Heat of neutralisation of acetic acid (CH_3COOH) with strong base is

(1) 57.32 kJ (2) >57.32 kJ

(3) <57.32 kJ (4) 68 kJ

83. In pyrophosphoric acid molecule, the number of P—O—P and P—O—H bonds present respectively are

(1) 1 & 2 (2) 0 & 4

(3) 1 & 4 (4) 1 & 8

84. Which of the following on the addition will cause intensity of deep red colour to increase?

$$\underset{\text{Pale yellow}}{Fe^{3+}(aq)} + \underset{\text{colourless}}{SCN^-} \rightleftharpoons \underset{\text{deep red}}{Fe(SCN)^{2+}(aq)}$$

I. $FeCl_3$ II. $HgCl_2$

III. $H_2C_2O_4$(oxalic acid) IV. KSCN

(1) I, IV (2) IV, III

(3) II, III (4) I, II, III

85. The correct balanced equation for the reaction

$I_2 + S_2O_3^{2-} \rightarrow I^- + S_4O_6^{2-}$ is

(1) $I_2 + S_2O_3^{2-} \rightarrow I^- + S_4O_6^{2-}$

(2) $I_2 + S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$

(3) $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$

(4) $I_2 + 4S_2O_3^{2-} \rightarrow 2I^- + 2S_4O_6^{2-}$

CHEMISTRY : SECTION-B

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

86. Two sulphide ores are separated by froth floatation method by addition of

(1) depressants (2) inhibitors

(3) coagulants (4) precipitators

87. How many Coulombs are required in the change when HCl is mixed with $Cr_2O_7^{-2}$?

$(Cr_2O_7^{2-} + HCl \rightarrow CrCl_3)$

(1) 2 × 96500 C (2) 3 × 96500 C
(3) 96500 C (4) 6 × 96500 C

88. A 100 watt bulb emits monochromatic light of wavelength 400nm. Calculate the number of photons emitted per second by the bulb

(1) $2.012 \times 10^{20} s^{-1}$ (2) $1.012 \times 10^{10} s^{-1}$
(2) $3.45 \times 10^{5} s^{-1}$ (2) $5 \times 10^{10} s^{-1}$

89. 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

90. The formula of sodium zeolite which is used in permutit process for softening water is

(1) $Na_2Al_2Si_2O_8.xH_2O$
(2) $Na_2\ Al_2Si_2O_4.xH_2O$
(3) $Na_2O.Al_2O_3.SiO_4.xH_2O$
(4) $K_2Al_2SiO_8.xH_2O$

91. In a molecule of $[I(CN)_2]^-$, the number of lone pairs is X, the number of sigma bonds is Y and the number of pi bonds is Z. Then $\frac{XY}{Z}$ is

(1) 6.25 (2) 5
(3) 307 (4) 4

92. **Assertion** : Value of Z helps us to tell the extent to which real gas deviates from ideal gas behaviour.

Reason : Gases showing –ve deviation have $V_m < 22.4L$ (at STP).

(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

93. An orbital of fourth stationary state has electron density in XY plane. Then correct set of quantum numbers may be (n, l, m respectively)

a. 4, 0, 0 b. 4, 2, +2
c. 4, 2, –2 d. 4, 2, 0
(1) b and c (2) c and d
(3) b, c and d (4) a, b, c and d

94. The number of neutrons in 1g of H_2O^{18} is

(1) $\frac{N_A}{2}$ (2) $10N_A$
(3) $12N_A$ (4) $\frac{10}{18}N_A$

95. An interhalogen compound has a T-shape and on hydrolysis it produces HF and $HClO_2$. The interhalogen compound must be

(1) ClF_3 (2) ClF_5
(3) ClF_7 (4) ClF

96. For the reaction

$$3BaCl_2 + 2Na_3PO_4 \rightarrow Ba_3(PO_4)_2 + 6NaCl$$

If 0.5 mole of $BaCl_2$ is mixed with 0.1 mole of Na_3PO_4 the maximum number of mole of $Ba_3(PO_4)_2$ that can be formed is

(1) 0.07 (2) 0.05
(3) 0.03 (4) 0.02

97. The limiting molar conductivities of $BaCl_2$, $Ba(OH)_2$ and NH_4Cl are x, y and z s cm^2 mol^{-1} respectively. Then the limiting molar conductivity of NH_4OH will be

(1) $y+z-x$ (2) $2y+2z-x$

(3) $\frac{1}{2}y+z-\frac{1}{2}x$ (4) $\frac{1}{2}y+\frac{1}{2}z-x$

98. **Statement-I** : Alkali metals impart colour to the Bunsen flame.

Statement-II : Their ionization energies are low.

(1) Both statement-I and statement-II are correct

(2) Both statement-I & statement-II are incorrect

(3) Statement-I is correct but statement-II is incorrect

(4) Statement-I is incorrect but statement-II is correct

99. The pair of species with the same bond order is

(1) NO, CO (2) N_2, O_2

(3) O_2^{2-}, B_2 (4) O_2^+, NO^+

100. pH of 0.1 M solution of following compounds increases in the order

(1) $NaCl < NH_4Cl < NaCN < HCl$

(2) $HI < NH_4Cl < NaCl < NaCN$

(3) $NaCN < NH_4Cl < NaCl < HCl$

(4) $HCl < NaCl < NaCN < NH_4Cl$

ZOOLOGY : SECTION-A

All questions are compulsory in section A

101. Early embryonic stages usually has neurons having

(1) one axon and two or more dendrites

(2) cell body with one axon only

(3) one axon and one dendrite

(4) either several neurites or none

102. Choose the correct option in which all animals have external fertilisation

(1) *Spongilla, Euspongia, Fasciola*

(2) *Pleurobrachia, Beroe, Taenia*

(3) *Tubipora, Spongilla, Fasciola*

(4) *Pleurobrachia, Ctenoplana, Beroe*

103. Various types of movements which help in thorough mixing of food are due to

(1) striated muscle of the small intestine

(2) smooth muscles of the stomach

(3) muscular coat of the alimentary canal

(4) both (2) and (3)

104. Choose an odd member in the following group **a, b** and **c** and select the right option

a. Branchial respiration–Crustaceans, earthworm, fish

b. Direct respiration – Flatworm, insects, amphibians

c. Pulmonary respiration–Fish, reptiles, birds

(1) Crustaceans, amphibians, birds

(2) Earthworm, amphibians, fish

(3) Earthworm, flatworms, birds

(4) Fish, flatworms, reptiles

105. If the stroke volume is 80 mL and heart rate is 75 times/min, the cardiac output will be

(1) 5 L (2) 5.5 L

(3) 6 L (4) 7 L

106. **Statement-I** : All movements are locomotion, but all locomotions are not movements.

Statement-II : Methods of locomotion vary with habitat of animal and demand of the situation..

(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

107. The blind spot is a point where

(1) blood vessels enter retina

(2) olfactory nerve leave the eye

(3) resolution is greatest

(4) both (1) and (2)

108. Choose the incorrect statement

(1) The tertiary structure of protein gives us a 3D view of protein

(2) Protein is regarded acidic if it has more amino acids like C, S and A

(3) A protein thread does not exist throughout as extended rigid rod

(4) Protein thread is folded to form helix similar to revolving stair case

109. Match the following

a. Amphibia	i. Air bladder
b. Mammals	ii. Cartilaginous notochord
c. Chondrichthyes	iii. Mammary glands
d. Ostichthyes	iv. Pneumatic bones
e. Cyclostomata	v. Dual habitat
f. Aves	vi. Sucking & circular mouth without jaws.

(1) a–v, b–iii, c–ii, d–i, e–vi, f–iv

(2) a–v, b–iii, c–i, d–ii, e–vi, f–iv

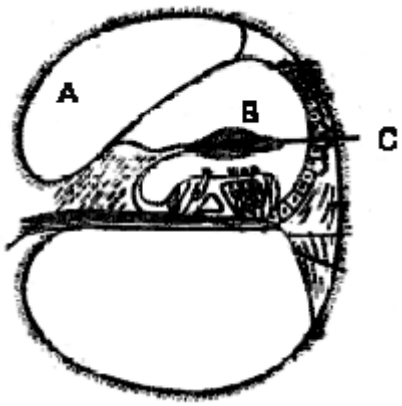
(3) a–v, b–iii, c–i, d–ii, e–iv, f–vi

(4) a–iii, b–v, c–ii, d–i, e–vi, f–iv

110. How many of the following will have true coelom?
Ancylostoma, Pheretima, Pennatula, Sepia, Echinus, Locusta, Taenia, Bombyx, Ctenoplana

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

111. What is true regarding A, B and C in the given figure?



(1) 'C' is called Reissner's membrane
(2) 'A' is filled with perilymph & called scala tympani
(3) 'B' contain crista ampullaris
(4) Bending of sensory hair cells against 'C' generates nerve impulses

112. If Henle's loop were to be absent from mammalian nephron, which one of the following is to be expected?
(1) There will be no urine formation
(2) There will be hardly any change in the quality and quantity of urine formed
(3) The urine will be more concentrated
(4) The urine will be more dilute

113. Which is the correct sequence for the origin of lysosome (L)?
(1) Golgi bodies → ER → L
(2) ER → golgi bodies → L
(3) Nucleus → golgi bodies → L
(4) Centrosome → ER → golgi bodies → L

114. Which of the following organelle found in both plant and animal cells, is membrane bound and included under endomembrane system?
(1) Peroxisomes (2) Vacuoles
(3) Centriole (4) Ribosomes

115. Match the column-I with column-II and select the correct option from the codes given below

	Column-I	**Column-II**
a.	PCT	i. Maintains high osmolarity in interstitium
b.	DCT	ii. Filtration of blood
c.	Loop of Henle	iii. Major site for active reabsorption
d.	Renal corpuscle	iv. Extends from cortex deep into the medulla
e.	Collecting duct	v. Conditional reabsorption of Na+ and water

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

116. A cell has 16 chromsomes and is undergoing mitosis, how many chromosomes will the cell have at S phase and also what will be DNA content of cell at the end of S phase, if initial amount of DNA was 2C?
(1) 32, 4C (2) 32, 2C
(3) 16, 4C (4) 16, 2C

117. How many of the following are included in the fore brain?
Thalamus, Cerebral aqueduct, Pons, Cerebellar hemisphere, Medulla, Corpora quadrigemina, Amygdala
(1) 2 (2) 4
(3) 1 (4) 3

118. Which of the following is incorrect match?
(1) Pivot – between atlas and axis
(2) Saddle – between carpal and metacarpal of thumb
(3) Gliding – between carpals
(4) Hinge – between head of humerus & glenoid cavity

119. The number of QRS complexes that occur in a given time period
(1) can determine the B.P. of an individual
(2) can determine the heart beat rate of an individual
(3) can determine the force of ventricular contraction
(4) both (1) and (2)

120. **Statement-I :** Low RBF releases Renin which activates a plasma protein called angiotensinogen to finally form angiotensin II.

Statement-II : Angiotensin-II signals release of aldosterone from adrenal cortex to increase Na^+ uptake from nephric filtrate.

(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

121. Enzyme causing hydrolysis of ester and peptide bond by the addition of water are known as

(1) transferases (2) hydrolases
(3) isomerases (4) oxidation reductases

122. Identify the tissue correctly matched to its place of occurrence

(1) squamous epithelium – walls of blood vessels & air sacs of lungs
(2) cuboidal epithelium – ducts of glands & tubular parts of nephrons
(3) columnar epithelium – lining of stomach & intestine
(4) all are correctly matched

123. Respiratory process is regulated by certain specialised centres in the brain. One of the following listed centres can reduce the inspiratory duration upon stimulation

(1) Medullary inspiratory centre
(2) Pneumotaxic centre
(3) Apneustic centre
(4) Chemosensitive centre

124. Small amount of urea entering thin segment of ascending limb of Henle's loop is returned to interstitium by

(1) PCT
(2) DCT
(3) collecting duct
(4) thick segment of ascending limb

125. Which among the following are common to smooth and cardiac muscles?

a. involuntry b. striated
c. cylindrical d. short branched
e. cell junctions f. syncytial

(1) a, c, e (2) a, c, d,e
(3) b, c, e (4) a, e

126. The amount of blood filtered by the kidneys per minute is _____ of the blood pumped by each ventricle per minute

(1) 20% (2) 30%
(3) 50% (4) 100%

127. Which of the following is not a correct difference between TCT and PTH?

	TCT	PTH
(1)	Decreases Ca^{2+} levels in blood	Increases Ca^{2+} levels in blood
(2)	Prevent bone resorption	Stimulate bone resorption
(3)	Hypocalcemic hormone	Hypercalcemia hormone
(4)	Increase Ca^{2+} resorption from renal tubules	Decrease Ca^{2+} resorption from renal tubules

128. Radial symmetry occurs mainly in

(1) Porifera and coelenterata
(2) Arthropoda and mollusca
(3) Coelenterata and echinodermata
(4) Coelenterata and platyhelminthes

129. The increase in the volume of thoracic chamber in the antero-posterior axis

(1) Results due to contraction of diaphragm
(2) Would create negative pressure in lungs with respect to atmospheric pressure
(3) Would facilitate inspiration
(4) All the above.

130. Which of the following statements are correct in relation to gluco-corticoids?

a. Stimulate gluconeogenesis, lipolysis and proteolysis
b. Involved in carbohydrate metabolism
c. Produces anti-inflammatory reaction
d. Activate the immune responses

(1) a, b & c (2) a, b & d
(3) b, c & d (4) a, b, c & d

131. Which of following are applicable to angina pectoris?

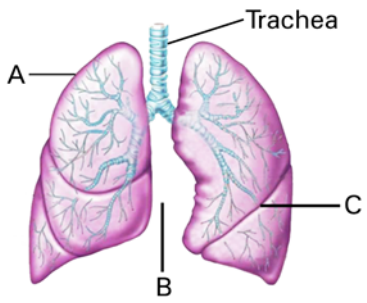
a. acute chest pain
b. common among middle aged
c. decreased blood flow to heart
d. congestion of lungs is main symptom

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

132. Choose the incorrect match

	Amino acid	Three latter symbol	One letter symbol
(1)	Serine	Ser	S
(2)	Alanine	Aln	N
(3)	Tyrosine	Tyr	Y
(4)	Glutamic acid	Glu	E

133. A, B and C in respiratory system of man are



(1) **A**-left lung, **B**-mediastinum, **C**-oblique fissure
(2) **A**-right lung, **B**-mediastinum, **C**-horizontal fissure
(3) **A**-left lung, **B**-right lung, **C**-Oblique fissure
(4) **A**-right lung, **B**-mediastinum, **C**-oblique fissure

134. What is true w.r.t blood supply to liver?
(1) there is a unique vascular connection that starts from liver and ends in digestive system
(2) hepatic portal vein carries blood from liver to heart
(3) liver receives oxygenated blood from hepatic artery and deoxygenated blood from hepatic portal vein
(4) none of these

135. Under normal physiological conditions we can find about 15 mL of O_2 in 100 mL of blood moving from
a. lungs to heart
b. heart to lungs
c. lower body parts to heart
d. heart to brain
(1) a and b (2) b and c
(3) a and c (4) b and d

ZOOLOGY : SECTION-B

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

136. All of the following statements are true w.r.t. cockroach except
(1) The nervous system is spread throughout the body.
(2) Nephrocytes plays role in excretion
(3) Urecose glands help in blood cell production
(4) Fluid circulation through heart is regulated by alary muscles which are wing shaped

137. Select the taxon which represent freshwater as well as marine species
(1) Echinodermata (2) Urochordata
(3) Cephalochordata (4) Osteichthyes

138. Chylomicrons are formed when
(1) Micelles are formed into big fat coated protein globules for transport into venous blood
(2) Micelles are reformed into small fat coated protein globules for transport to arterial blood
(3) Absorbed fats are reformed into small protein coated fat globules for transport to lymph vessels
(4) None of these

139. Match the abnormal conditions given in Column A with their explanations given in Column B and Choose the correct option

Column A	**Column B**
A. Glycosuria	i. Accumulation of uric acid in joints
B. Renal calculi	ii. Inflammation in glomeruli
C. Glomerular nephritis	iii. Mass of crystallised salts within the kidney
D. Gout	iv. presence of glucose in urine

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

140. Which of the following has $pO_2 = 40$ mm Hg value, if
Alveoli – A, **Deoxygenated blood** – B
Tissues – C, **Oxygenated blood** – D
(1) B and C (2) A and D
(3) C and D (4) A and B

141. **Assertion :** Complete loss of Ca^{+2} from synaptic cleft will result in failure of impulse conduction across the synapse.
Reason : In the absence of Ca^{2+}, exocytosis of neurotransmitter from synaptic vesicles will not occur.
(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

142. The blood cells which are nucleated, colourless due to the lack of haemoglobin and relatively lesser in number which averages _____
(1) 2000–3000 /mm^3
(2) 4000–6000 /mm^3
(3) 6000–8000 /mm^3
(4) 60000–80000 /mm^3

143. If the number of chromosomes in a gamete is three, how many chromatids each dividing diploid cell will have at metaphase of mitosis?
(1) 3 (2) 6
(3) 9 (4) 12

144. What are the sources of renin, angiotensinogen and ANF respectively?
(1) Macula densa, JG cells, ventricular wall of heart
(2) JG cells, liver, atrial wall of heart
(3) JG cells, macula densa, atrial wall of heart
(4) Cells of PCT, liver, JG cells

145. Which group includes all correct examples?
(1) Structural polysaccharides–pectin, heparin
(2) Neutral amino acids–alanine, lysine
(3) Basic amino acids –cysteine and methionine
(4) Aldoses –ribose, galactose

146. Which reaction is correct regarding the digestion?
(1) $\text{Starch} \xrightarrow[\text{pH. 6.8}]{\text{Salivary amylase}} \text{Maltose} + \text{Isomaltose} + \text{dextrins}$
(2) $\text{Fats} \xrightarrow[\text{pH 7}]{\text{Lipase}} \text{Diglycerides}$
(3) $\text{Starch} \xrightarrow[\text{alkaline pH.}]{\text{Lipase}} \text{Diglycerides/ Monoglycerides}$
(4) $\text{Polysaccharides} \xrightarrow[\text{pH – 7}]{\text{Pancreatic amylase}} \text{Disaccharides}$

147. **Statement- I** : Adenosine, guanosine & cytosine are nucleosides.
Statement- II : Functions of many secondary metabolites in plants are not known but many of these are useful in human welfare.
(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

148. Which of the following is not component of axial skeleton?
(1) Facial bones (2) Sternum
(3) Girdle (4) Vertebral column

149. Identify the gland correctly matched to its location
(1) Parathyroid – on front side of thyroid
(2) Thymus – ventral side of heart & aorta
(3) Adrenal gland – lateral side of kidney
(4) Hypothalamus – attached by a stalk to pineal

150. How many of the following statements are correct for Aves?
a. The forelimbs are modified into wings.
b. Endoskeleton of birds is fully ossified.
c. Oil glands are present all over skin in birds.
d. Digestive tract has additional chambers crop and gizzard
(1) 1 (2) 2
(3) 3 (4) 4

BOTANY : SECTION-A

All questions are compulsory in section A

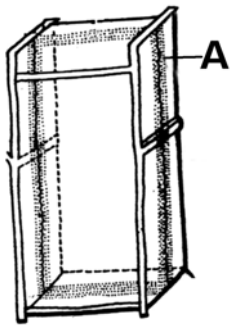
151. According to five kingdom system of classification, *Chlorella* and *Paramoecium* are kept in the kingdom
(1) Plantae (2) Fungi
(3) Protista (4) Monera

152. The bacteria which are comma shaped are called
(1) Vibrio (2) Bacillus
(3) Coccus (4) Spirillum

153. Filamentous, green, juvenile stage seen in mosses is
(1) diploid (2) prothallus
(3) leafy gametophyte (4) protonema

154. Select the incorrect statement
(1) Bacteria occur almost everywhere
(2) Bacteria can live in extreme habitat
(3) Archaebacteria can not live in salty areas
(4) Eubacteria are characterised by presence of rigid cell wall made up of peptidoglycan

155. Identify the type of cell shown in the diagram and also identify 'A'



(1) epidermal cell; A – suberised casparian strip
(2) endodermal cell; A–suberised casparian strip
(3) endodermal cell; A–cellulosic casparian strip
(4) epidermal cell; A – cellulosic casparian strip

156. Which of the following match is correct?
(1) Parasite – depends on dead plants
(2) Lichen – fungi associated with roots
(3) Saprophytes – depends on dead organic matter
(4) Mycorrhiza – term used for symbiotic algae

157. Which of the following is not a result of imbibition?
(1) Jamming of wooden doors
(2) Weed free tennis lawns
(3) Seedling emerging out of soil
(4) Agar-Agar increasing in volume

158. **Statement- I** : Genetic variability is the root of any breeding programme
Statement- II : The selection process among the recombinants is crucial to success of breeding objective
(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

159. Which of the following is wrongly matched?
(1) Pili – conjugation
(2) Cell wall – shape
(3) Mesosome – locomotion
(4) Ribosomes – protein synthesis

160. Pteridophytes include
(1) *Funaria* and ferns
(2) Ferns and horsetails
(3) Liverworts and mosses
(4) Liverworts and hornworts

161. Secondary growth is the characteristic feature of
(1) mango and *Dryopteris*
(2) *Pinus* and *Eucalyptus*
(3) *Ficus* and maize
(4) Grass and pine

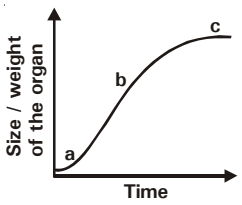
162. All are reasons for causing seed dormancy except
(1) permeable, soft seed coat
(2) hard seed coat
(3) immature embryo
(4) presence of chemical inhibitors such as abscissic acid, phenolic acids, para-ascorbic acid

163. In equifacial leaf
(1) protoxylem is present towards abaxial epidermis
(2) mesophyll is differentiated
(3) the stomata are present on both the surfaces of the epidermis
(4) vascular bundle is not surrounded by bundle sheath

164. Choose the correct sequence of steps involved in C_4-cycle of photosynthesis
(1) CO_2 fixation $\rightarrow$ Decarboxylation $\rightarrow$ Transport to bundle sheath cells $\rightarrow$ Regeneration
(2) Regeneration $\rightarrow$ CO_2 fixation $\rightarrow$ Decarboxylation $\rightarrow$ Transport to bundle sheath cells
(3) CO_2 fixation $\rightarrow$ Transport to bundle sheath cells $\rightarrow$ Decarboxylation $\rightarrow$ Regeneration
(4) CO_2 fixation $\rightarrow$ Regeneration $\rightarrow$ Decarboxylation

165. RQ value for Tripalmitin and proteins is respectively
(1) 0.7 and 0.9 (2) 4 and 0.7
(3) 0.7 and 4 (4) 1 and 0.7

166. The correct labelling for the following diagram



(1) a–log phase, b–lag phase, c–exponential phase
(2) a–log phase, b–stationary phase, c–lag phase
(3) a–lag phase, b–log phase, c–stationary phase
(4) a–stationary phase, b–log phase, c–lag phase

167. Which of the following statements is correct?
(1) Brown algae have chlorophyll a & b
(2) Reserve food in red algae is floridean starch
(3) Gametes in red algae are pyriform and bear two lateral flagella
(4) Phycocolloid in cell wall of brown algae is carrageen

168. Karyogamy and meiosis takes place in basidium in
(1) *Agaricus* (2) *Aspergillus*
(3) *Neurospora* (4) *Claviceps*

169. A farmer grows cucumber plants in his field. He wants to increase the number of female flowers in them. Which plant growth regulator can be applied to achieve this?
(1) Auxin (2) ABA
(3) Ethylene (4) Gibberellin

170. Red oceanic tides can be due to
(1) diatoms (2) dinoflagellate
(3) red algae (4) blue-green algae

171. Which of the following statement is incorrect?
(1) Gymnosperms generally have tap root system
(2) Pteridophytes are non vascular cryptogams
(3) Algae require water for fertilisation
(4) Taxonomy based on all observable characteristics where number & codes are assigned to all the characters is numerical taxonomy

172. Choose a group having taxa at the same rank
(1) *Panthera*, *leo*, *pardus*
(2) Felidae, Canidae, Solanaceae
(3) Primata, Mammalia, Diptera
(4) Chordata, Arthropoda, Dicotyledonae

173. _____ demonstrated for the first time that plants could be grown to maturity in a defined nutrient solution in complete absence of soil
(1) J. Van Sachs (2) Arnon and stout
(3) Hoagland (4) Priestley

174. *Euglena* shows all, except
(1) mixotrophic nutrition
(2) longitudnal binary fission
(3) pigments identical to those present in higher plants
(4) cell wall with protein rich layer called pellicle

175. **Assertion** : Pressure flow or mass flow hypothesis can demonstrate phloem translocation.
Reason : The process of phloem loading at the source produces a hypotonic condition.
(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

176. Bryophytes resemble pteridophytes in having
(1) dependent sporophyte
(2) Independent sporophyte
(3) independent gametophyte
(4) dependent gametophyte

177. How many fungi are the member of basidiomycetes?
Alternaria, Rhizopus, Colletotrichum, Saccharomyces, Trichoderma, **Mushroom,** ***Claviceps, Puccinia,***
(1) 5 (2) 4
(3) 3 (4) 2

178. How many ATP will be synthesized via ETC from reduced coenzymes produced during aerobic respiration of two molecules of acetyl CoA?
(1) 24 (2) 22
(3) 11 (4) 12

179. In plants, direction of transport of water and organic compounds respectively is
(1) bidirectional and unidirectional
(2) unidirectional and bidirectional
(3) both unidirectional
(4) both bidirectional

180. Which of the following stages of Calvin cycle involves utilization of both ATP and NADPH?
(1) Reduction (2) Decarboxylation
(3) Regeneration (4) Carboxylation

181. Endarch bundles are observed in
(1) Monocot stem and dicot root
(2) Dicot stem and monocot root
(3) Both dicot and monocot stem
(4) Only dicot stem

182. Identify the incorrect statement w.r.t. facilitated diffusion
(1) Substances having hydrophilic moiety, needs facilitated diffusion
(2) Special proteins help move substances across membrane with expenditure of ATP
(3) Facilitated diffusion cannot cause net transport of molecules from a low to high concentration
(4) Transport reaches maximum when all transport proteins are being used.

183. Taxonomic key
(1) is an artificial analytical device
(2) have collection of preserved plant and animal specimens
(3) keeps a record of local flora
(4) have list of statements where each statement is called a couplet

184. ICBN is
(1) International Code of Botanical Nomenclature
(2) International Code of Biological Nomenclature
(3) International Code of Bacterial Nomenclature
(4) International Code of Binomial Nomenclature

185. Stele in dicot root includes
(1) pericycle and xylem only
(2) pericycle, vascular bundles and pith
(3) endodermis, vascular bundles and pith
(4) vascular bundle and pith only

BOTANY : SECTION-B

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

186. Which of the following is incorrect for nucleoid?
(1) Nucleus is without nuclear membrane
(2) It consists of naked DNA molecule
(3) It is circular double stranded DNA molecule
(4) It is associated with histone protein

187. Character that unified the whole plantae kingdom in two kingdom system of classification was
(1) Cell wall (2) Nucleus
(3) Pigment type (4) Multicellularity

188. Pick the crop wrongly matched with its variety
(1) Wheat – Sonalika
(2) Rice – Jaya
(3) Okra – Prabhani Kranti
(4) Sugarcane – Himgiri

189. Match the column

Column-I	Column-II
a. Cytoplasmic streaming	i. garden hose
b. Positive hydrostatic pressure gradient	ii. Suction through a straw
c. Negative hydrostatic pressure gradient	iii. Hydrilla leaf
d. Imbibition	iv. Solid colloids

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

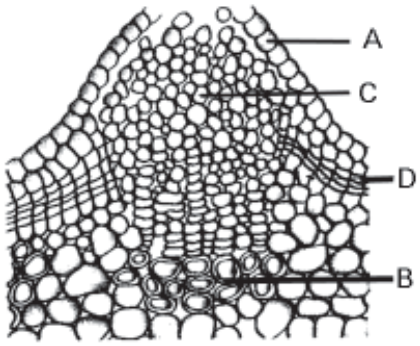
190. The phrase '*Contagium vivum fluidum*' was given by?
(1) D.J. Ivanowsky (2) M.W. Beijerinck
(3) W.M. Stanley (4) Herelle and Twort

191. **Assertion** : Calcium is considered as an immobile macronutrient.
Reason : Calcium is a part of the structural component of the cell and hence is not easily released .
(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

192. The most important amides - asparagine and glutamine - found in plants are a structural part of
(1) carbohydrates (2) proteins
(3) minerals (4) enzymes

193. How many of the following statements belong to phycomycetes?
a. Asexual reproduction takes place by zoospores or aplanospores
b. Spores are produced inside sporangium
c. Gametes are similar in morphology or disimilar in morphology
d. Mycelium is septate
e. Sexual spore is basidiospore
(1) Four (2) Three
(3) Two (4) Five

194. Label A, B, C and D in the following diagram of lenticel.



(1) A-epidermis, B-cork cambium, C-complementary cells, D-secondary cortex
(2) A-epidermis, B-secondary cortex, C-cork cambium, D-complementary cells
(3) A-epidermis, B-secondary cortex, C-complementary cells, D-cork cambium
(4) A-epidermis, B-complementary cells, C-secondary cortex, D-cork cambium

195. How many of the given features are true for factors affecting photosynthesis?
a. All factors simultaneous affect rate of photosynthesis but usually one factor is major that limits the rate
b. There is a linear relationship between incident light and CO_2 fixation rates at high light intensity
c. Current availability of CO_2 levels is limiting to the C_3 plants.
d. Optimum temperature for photosynthesis of different plants is same in different habitats
(1) a & b only (2) a & c only
(3) b & d only (4) b & c only

196. Identify the incorrect statement with respect to taxonomical aids
(1) The collection of actual specimens of plant and animal species is prime source of taxonomic studies
(2) These specimens are essential for training in systematics
(3) Taxonomic studies are useful in knowing our bio-resources
(4) Identification of organisms requires intensive laboratory studies only

197. **Statement-I** : Conjoint collateral vascular bundle are present in maize stem and mustard stem.

Statement-II : Pericycle is present above the phloem in the form of semi-lunar patch of sclerenchyma in dicot stem.

(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

198. Choose the incorrect statement

(1) Pyruvate is formed in the cytoplasm

(2) During the conversion of succinyl Co-A to succinic acid a molecule of ATP is synthesized.

(3) Oxygen is vital in respiration for removal of hydrogen.

(4) There is complete breakdown of glucose in fermentation.

199. Hormone responsible for plant and seed dormancy during drought is

(1) IBA (2) NAA

(3) ABA (4) Zeatin

200. Heterosporous pteridophytes are

(1) *Selaginella*, *Salvinia* and *Azolla*

(2) *Marsilea*, *Salvinia* and *Dryopteris*

(3) *Lycopodium*, *Selaginalla* and *Dryopteris*

(4) *Marsilea*, *Salvinia* and *Lycopodium*