Aakash
Medical | IIT-JEE | Foundations

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Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 **Final Test Series(P1)_NEET2026_Test-04B** **Time : 180 Min.**

Topics Covered:
Physics: Thermodynamics, Kinetic Theory, Oscillations, Waves
Chemistry: Solutions, Electrochemistry, Chemical Kinetics
Botany: Plant Growth and Development, Sexual Reproduction in Flowering Plants
Zoology: Excretory Products and Their Elimination, Locomotion and Movement, Neural Control and Coordination

General Instructions :
Duration of Test is 3 hrs.
The Test consists of 180 questions. The maximum marks are 720.
There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.
Each question carries +4 marks. For every wrong response, –1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
Use blue/black ballpoint pen only to darken the appropriate circle.
Mark should be dark and completely fill the circle.
Dark only one circle for each entry.
Dark the circle in the space provided only.
Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

PHYSICS

1. For a given number of molecules of ideal gas, mean free path is
A. Inversely proportional to the square of the molecular diameter.
B. Inversely proportional to the pressure of the gas, at constant volume.
C. Directly proportional to the temperature of the gas, at constant pressure.
D. Directly proportional to the mass of each molecule.
Choose the **correct** statement(s) from the options given below.

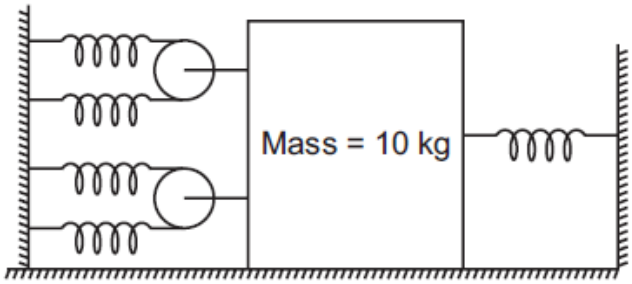
(1) A only

(2) A, C and D only

(3) C only

(4) All A, B, C and D

2. In the shown figure, all the springs and pulleys are ideal. Initially, the system is at rest and all springs are relaxed. If the block is displaced slightly rightwards and released, then the time period of oscillations is (all springs are identical and have force constant 2 N/m)



(1) $\left(1+\sqrt{5}\right)\pi$ s

(2) $\left(1+\frac{\sqrt{5}}{2}\right)\pi$ s

(3) $\pi\sqrt{5}$ s

(4) π s

3. An ideal gas has initial volume *V* and pressure *P*. To triple its volume, the minimum work done by the gas among the below given processes will be in

(1) Isothermal process

(2) Adiabatic process

(3) Isobaric process

(4) Equal in all processes

4. A real gas behaves like an ideal gas at

(1) Low pressure, high temperature

(2) Low pressure, low temperature

(3) High pressure, low temperature

(4) High pressure, high temperature

5. An ideal monoatomic gas undergoes adiabatic process. The pressure of the gas will be proportional to (where *V* is volume of the ideal gas)

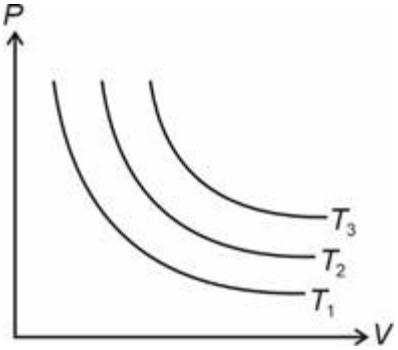
(1) $V^{-\frac{3}{5}}$

(2) $V^{-\frac{5}{3}}$

(3) $V^{\frac{3}{5}}$

(4) $V^{\frac{5}{3}}$

6. The figure shows graph of pressure and volume of an ideal gas at temperatures T_1, T_2 and T_3. Choose the correct relation.



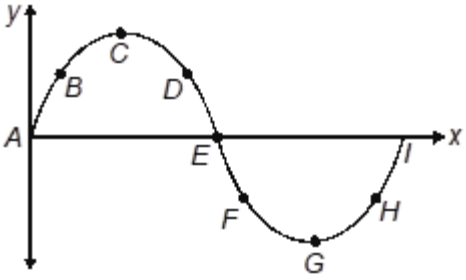
(1) $T_1 > T_2 > T_3$

(2) $T_3 > T_2 > T_1$

(3) $T_1 = T_2 = T_3$

(4) $T_2 > T_3 > T_1$

7. *y* versus *x* graph of a transverse wave propagating along positive *x*-direction through the medium is shown, where *y* is displacement of particles from their mean position at distance *x* from the source at *t* = 0. Select the incorrect statement about particles shown in figure.



(1) Particles *A*, *E* and *I* have maximum speed

(2) Particles *C* and *G* have minimum speed

(3) Particles *D*, *E* and *F* are moving in upward direction

(4) Particles *A*, *B* and *D* are moving in upward direction

8. Consider the following two statements
a. On a humid day, sound in air, travels slower than on a dry day
b. Sound waves cannot propagate in vacuum.
The correct statement is

(1) a only

(2) b only

(3) a and b both

(4) Neither a nor b

9. Eight molecules of a gas have speeds $0.1, 0.1, 0.2, 0.2, 0.3, 0.3, 0.3$ and 0.4 km/s. The most probable speed of the gas molecule is (in km/s)

(1) 0.1

(2) 0.2

(3) 0.3

(4) Both (1) and (2)

10. 2 moles of a monoatomic gas undergoes a process $P = P_0\left[1 - \left(\frac{V_0}{V}\right)^2\right]$ where P_0 and V_0 are constants. The translational kinetic energy of the gas when $V = 2\,V_0$ is given by (where P is pressure and V is volume of the gas)

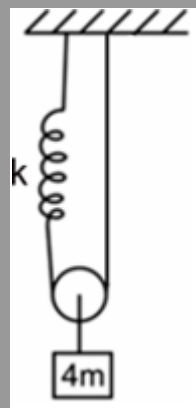
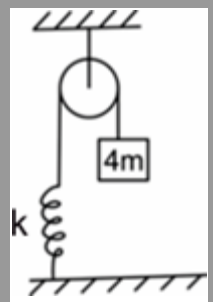
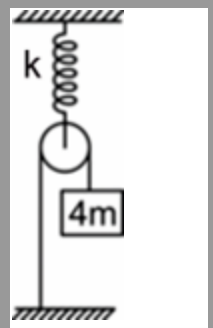
(1) $\frac{3}{4}P_0V_0$

(2) $\frac{3}{2}\,P_0V_0$

(3) $\frac{9}{4}\,P_0V_0$

(4) $3P_0V_0$

11. A block of mass 4*m* hangs from a smooth light pulley and by an inextensible string fitted with a spring of stiffness *k* in three separate configuration as shown in List-I. Match List-I with the corresponding time period of oscillation of the block (given in List-II).

	List-I		List-II
A.		(i)	$\pi\sqrt{\frac{m}{k}}$
B.		(ii)	$2\pi\sqrt{\frac{m}{k}}$
C.		(iii)	$4\pi\sqrt{\frac{m}{k}}$
		(iv)	$8\pi\sqrt{\frac{m}{k}}$

Choose the correct answer from the options given below.

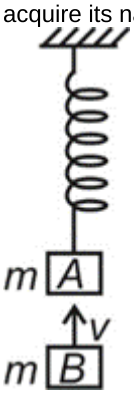
(1) A-(i),B-(ii),C-(iii)

(2) A-(iii),B-(iii),C-(iii)

(3) A-(ii),B-(iii),C-(iv)

(4) A-(iv),B-(iii),C-(ii)

12. Block *A* is hanging at rest from a vertical spring of constant *k*. Another block *B* strikes the block *A* with velocity *v* and sticks to it. Minimum value of *v* for which the spring will just acquire its natural length will be



(1) $\sqrt{\frac{8mg^2}{k}}$

(2) $\sqrt{\frac{3mg^2}{k}}$

(3) $\sqrt{\frac{6mg^2}{k}}$

(4) $\sqrt{\frac{4mg^2}{k}}$

13. The displacement of a particle is represented by the equation $y = \cos\omega t + \sin\omega t$. The motion is

(1) Non-periodic

(2) Periodic but not simple harmonic

(3) Simple harmonic with period $\frac{\pi}{\omega}$

(4) Simple harmonic with period $\frac{2\pi}{\omega}$

14. The differential equation of motion of a particle executing S.H.M. is given by $\frac{d^2y}{dt^2} + 4y = 0$ where symbol have their usual meanings. The angular velocity of the particle is given by

(1) 4 rad/s

(2) 3 rad/s

(3) 2 rad/s

(4) 4π rad/s

15. In case of damped oscillation

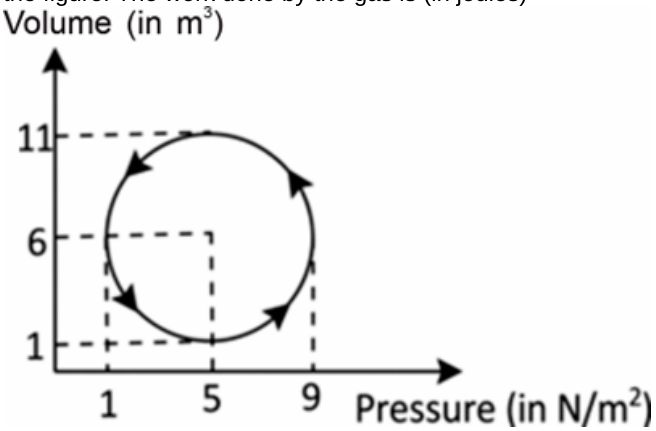
(1) Both amplitude and energy of oscillating body decreases

(2) Both amplitude and energy of oscillating body increases

(3) Amplitude of oscillating body increases but energy decreases

(4) Amplitude of oscillating body decreases but energy increases

16. An ideal gas is taken through a cyclic process as shown in the figure. The work done by the gas is (in joules)



(1) 20π

(2) 80π

(3) –20π

(4) –80π

17. A carnot engine has sink temperature 27ºC. If efficiency is 40%, then source temperature is

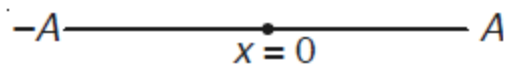
(1) 500 K

(2) 600 K

(3) 800 K

(4) 450 K

18. A particle is performing SHM between two extreme positions as shown with amplitude *A* and angular frequency ω. The minimum time taken by the particle to move from position $x = \frac{A}{2}$ to $x = \frac{A}{\sqrt{2}}$ is



(1) $\frac{\pi}{12\omega}$

(2) $\frac{\pi}{2\omega}$

(3) $\frac{\pi}{3\omega}$

(4) $\frac{\pi}{6\omega}$

19. In a closed container, temperature of a gas is increased then

(1) Number of collision per second to the container wall will increase

(2) Change in linear momentum per collision will increase

(3) Pressure will increase

(4) All of these

20. A wave pulse travelling on a string is described by $y = \frac{5}{(3x+4t)^2+5}$; where t is time in second, x and y are in metres. The pulse travels in direction along

(1) Positive y-axis

(2) Negative y-axis

(3) Positive x-axis

(4) Negative x-axis

21. Two systems *A* and *B* are separated by an adiabatic wall, while each is in contact with a third system *C* via a conducting wall. After the thermal equilibrium is achieved, we observe that (where T is temperature)

(1) $T_A = T_B > T_C$

(2) $T_A = T_C > T_B$

(3) $T_A = T_B = T_C$

(4) $T_B = T_C > T_A$

22. The average energy of an atom of a solid, vibrating about its mean position will be (where symbols have their usual meaning)

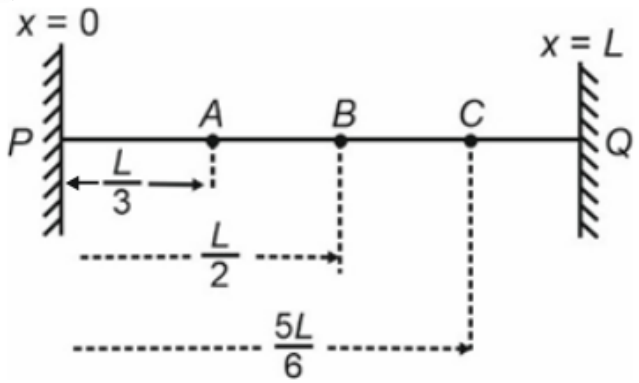
(1) $\frac{3}{2}k_BT$

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

(3) $3k_BT$

(4) $3RT$

23. A standing wave is formed in a string of length *L* = 1 m such that point *A* is a node and point *B* is an immediate anti-node. The amplitude of oscillation of point *B* is a_0 and for point *C* is *a*′, then



(1) $a' = a_0$

(2) $a' = \frac{a_0}{2}$

(3) Equation of standing wave is $y = a_0\sin(3\pi x)\sin(\omega t)$

(4) Both (1) and (3)

24. Which law of thermodynamics defines the term temperature?

(1) Zeroth law

(2) First law

(3) Second law

(4) Both (2) and (3)

25. Molar heat capacity (*C*) of a gas for a given process is (where symbols have their usual meaning)

(1) Always equal to C_V

(2) Always greater than C_V

(3) Always equal to C_p

(4) May be greater or less than C_V

26. An ideal gas of adiabatic exponent ($\gamma = \frac{5}{3}$) is expanding at constant pressure. The ratio of $dQ : dU : dW$ is (where dQ is heat supplied to gas, dU is change in internal energy of gas and dW is work done by gas)

(1) 3 : 2 : 1

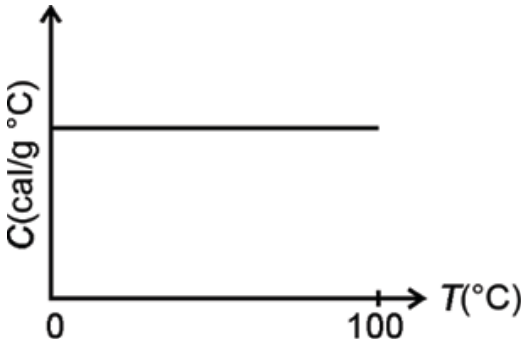
(2) 4 : 3 : 2

(3) 5 : 3 : 2

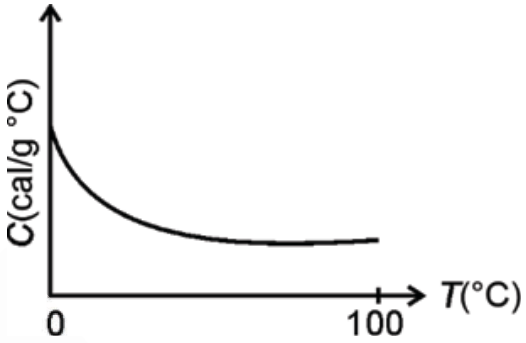
(4) 7 : 5 : 2

27. Choose the correct graph of specific heat capacity (*C*) of water with temperature (*T*) at constant pressure.

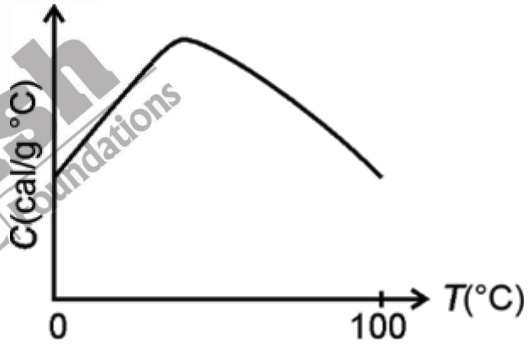
(1)



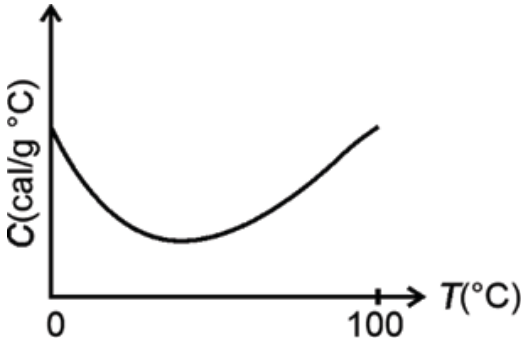
(2)



(3)



(4)



28. A gaseous mixture consists of 4 mol of O_2 and 4 mol of Ar at temperature *T*. Neglecting all vibrational modes, the total internal energy of the system is

(1) 4*RT*

(2) 8*RT*

(3) 12*RT*

(4) 16*RT*

29. A uniform string of length L is suspended from the ceiling. At $t = 0$ a transverse wave is propagated from its lower end. At the same instant a particle is dropped from the ceiling. Distance from the ceiling at which they pass each other is

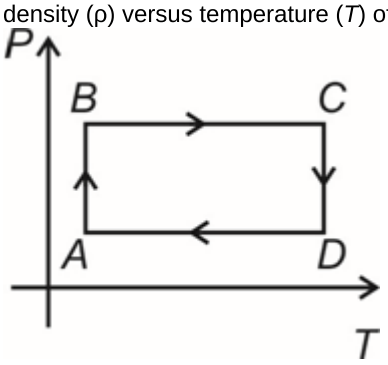
(1) $\frac{L}{2}$

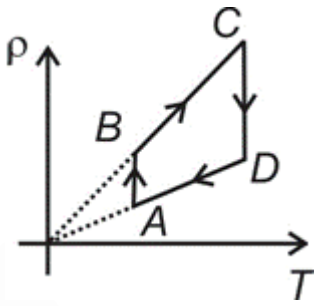
(2) $\frac{L}{3}$

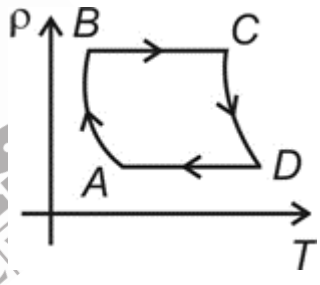
(3) $\frac{2L}{3}$

(4) $\frac{L}{4}$

30. The pressure (P) versus temperature (T) graph for an ideal gas is as shown in the figure. The correct corresponding density (ρ) versus temperature (T) of the graph will be



(1)


(2)


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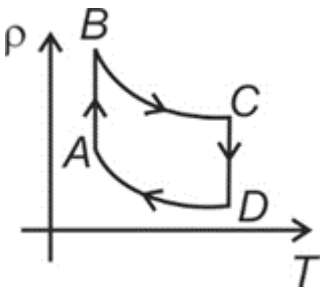
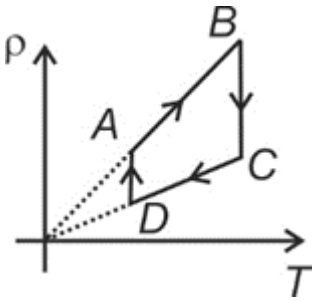


(4)


31. Two tuning forks *A* and *B* produce 6 beats per second when sounded simultaneously. When *A* is filed and *B* is loaded with a little wax, 3 beats per second are produced. If frequency of *A* is known to be $250\ \text{Hz}$, then initial frequency of *B* was

(1) $244\ \text{Hz}$

(2) $256\ \text{Hz}$

(3) $246\ \text{Hz}$

(4) $254\ \text{Hz}$

32. The equation of a progressive wave is given by $y = 2\sin 2\pi\left(20t - \frac{x}{2}\right)$ where x and y are in metre while t is in second. Phase difference between two particles separated by a distance of $\Delta x = 50\ \text{cm}$, is (in rad)

(1) $\frac{\pi}{4}$

(2) $\frac{\pi}{2}$

(3) π

(4) 2π

33. In a thermodynamic process, two moles of an ideal diatomic gas obeys $P \propto V^3$. If temperature of the ideal gas increases from 400 K to 500 K, then the ratio of work done to heat supplied in the process is

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

(2) $\frac{1}{44}$

(3) $\frac{1}{11}$

(4) $\frac{1}{55}$

34. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A): The molar heat capacity at constant volume for diatomic gas is $\frac{5R}{2}$ at very high temperature, when the diatomic gas molecule is not rigid and R is universal gas constant.
Reason (R): Each degree of freedom (neglecting vibrational mode) is associated with energy $\frac{1}{2}k_BT$, where symbols have their usual meaning.
In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(2) Both (A) and (R) are true and (R) is the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

35. Boyle's law states that for an ideal gas (where symbols have their usual meaning)

(1) $V \propto \frac{1}{P}$

(2) $V \propto T$

(3) $P \propto T$

(4) $V \propto n$

36. In a resonance tube, first and third resonance are obtained at length 22.5 cm and 116.5 cm respectively. Then end correction will be

(1) 1 cm

(2) 2 cm

(3) 3 cm

(4) 4 cm

37. Consider the following two statements:
Statement I: The velocity and acceleration of a body executing simple harmonic motion, can both be directed in the same direction.
Statement II: For a simple pendulum, time period is independent of mass of bob.
In light of the above statements, choose the **correct** option.

(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

38. A steel wire has a length of 10 m and a mass of 45 kg. If the tension in the wire is 4050 N, then speed of transverse wave (in the wire) is

(1) 10 m/s

(2) 20 m/s

(3) 30 m/s

(4) 40 m/s

39. A point mass is subjected to three simultaneous sinusoidal displacements in *X*-direction. x_1 = *A* sin ω*t*, $x_2 = A\sin\left(\omega t + \frac{2\pi}{3}\right)$ and $x_3 = A\sin\left(\omega t + \frac{4\pi}{3}\right)$. The resultant amplitude is

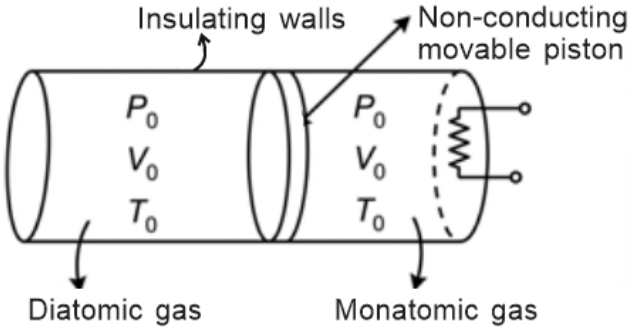
(1) 2*A*

(2) *A*

(3) Zero

(4) $\sqrt{3}A$

40. A cylindrical container having insulating walls is partitioned into two equal parts each of volume V_0. Gas on the right is slowly heated so that the gas on left is compressed upto volume $\frac{V_0}{32}$. Heat given by the heater to the gas must be (assume pressure, temperature and number of moles of both parts intially are P_0, T_0 and 4 respectively)



(1) $608RT_0$

(2) $1506RT_0$

(3) $638RT_0$

(4) $1536RT_0$

41. If a particle performs SHM with unit angular frequency, then the graph between its velocity and displacement would be in the shape of

(1) Circle

(2) Ellipse

(3) Parabola

(4) Hyperbola

42. A particle is oscillating simple harmonically with a period of 2 seconds. Time period of oscillation of its potential energy must be

(1) 1 second

(2) 2 seconds

(3) 3 seconds

(4) 4 seconds

43. For a given mass of an ideal diatomic gas, pressure and density changes adiabatically from (*P*, *d*) to (*P* ', *d*'). If $\frac{d'}{d} = 32$, then $\frac{P'}{P}$ is equal to

(1) 32

(2) 128

(3) $\frac{1}{32}$

(4) $\frac{1}{128}$

44. The RMS speed of the molecules of a given mass of an ideal gas increase when

(1) Pressure increases at constant temperature

(2) Volume increases at constant temperature

(3) Pressure increases at constant volume

(4) Temperature decreases at constant volume

45. Select the correct option regarding simple harmonic motion.

(1) Equilibrium at mean position must be stable

(2) Its motion must be periodic

(3) Its potential energy will not be conserved

(4) All of these

CHEMISTRY

46. 75% of a first-order reaction is completed in 30 minutes. The time required for completion of 93.75% of the reaction (in minutes) is

(1) 120

(2) 45

(3) 60

(4) 90

47. For a chemical reaction
$2A + 3B \rightarrow 6C + 9D$
Rate of formation of C is 6×10^{-2} mol L^{-1} s^{-1}. The rate of reaction will be

(1) 10×10^{-2} mol L^{-1} s^{-1}

(2) 10^{-2} mol L^{-1} s^{-1}

(3) 10 mol L^{-1} s^{-1}

(4) 1 mol L^{-1} s^{-1}

48. In a zero order reaction, 10% of the reaction completes in 20 s. The time required to complete 50% of the reaction is

(1) 80 s

(2) 60 s

(3) 120 s

(4) 100 s

49. If the rate constant of a first order reaction is 1.8424×10^{-3} s^{-1} then the time required for the completion of 20% of the reaction will be

(1) 400 s

(2) 350 s

(3) 250 s

(4) 125 s

50. What would be the activation energy if slope of graph between log k and $\frac{1}{T}$ is –11?

(1) 11 R

(2) $\frac{R}{11 \times 2.303}$

(3) $\frac{11\,R}{2.303}$

(4) 2.303×11×R

51. The rate of a reaction becomes quadruples when temperature changes from 303 K to 323 K. The energy of activation of the reaction will be (Assuming energy of activation does not change with temperature)

(1) 56.2 kJ/mol

(2) 28.2 kJ/mol

(3) 102.8 kJ/mol

(4) 92.8 kJ/mol

52. How much time will it take to reduce 1 g of a radioactive element to $\frac{1}{32}g$ if half life of element is 4s ?

(1) 20 s

(2) 10 s

(3) 16 s

(4) 8 s

53. The rate constant for a chemical reaction taking place at 500 K is expressed as $k = Ae^{-1000}$. The activation energy of the reaction is

(1) 100 cal mol^{-1}

(2) 1000 k cal mol^{-1}

(3) 10^4 k cal mol^{-1}

(4) 10^6 k cal mol^{-1}

54. Which of the following is not a colligative property?

(1) Relative lowering of vapour pressure

(2) Elevation in boiling point

(3) Freezing point

(4) Osmotic pressure

55. 4g of sodium hydroxide is dissolved in enough water to make 500 mL of solution. The molarity of the aqueous solution is

(1) 1 M

(2) 0.2 M

(3) 0.5 M

(4) 0.4 M

56. The Osmotic pressure of 0.1 M solution of glucose at 27°C is

(1) 1.5 atm

(2) 0.75 atm

(3) 3.5 atm

(4) 2.46 atm

57. 92 g ethyl alcohol is dissolved 144 g of water. The mole fraction of water in the solution is

(1) 0.2

(2) 0.4

(3) 0.6

(4) 0.8

58. How many grams of concentrated nitric acid solution should be used to prepare 800 mL of 3.0 M HNO_3? (Given concentrated nitric acid is 70% $\left(\frac{w}{w}\right)$ HNO_3)

(1) 181 g

(2) 216 g

(3) 436 g

(4) 321 g

59. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 5 and by passing hydrogen gas around the platinum wire at one atm pressure at 298 K temperature. The reduction potential of the electrode would be

(1) –0.295 V

(2) –0.148 V

(3) +0.295 V

(4) +0.148 V

60. Cell reaction taking place during discharging of lead storage battery is

(1) $2\ PbSO_4(s) + 2\ H_2O(l) \rightarrow Pb(s) + PbO_2(s) + 2\ H_2SO_4(aq)$

(2) $PbO(s) + H_2O_2(aq) \rightarrow PbO_2(s) + H_2O(l)$

(3) $Pb(s) + PbO_2(s) + 2\ H_2SO_4(aq) \rightarrow 2\ PbSO_4(s) + 2\ H_2O(l)$

(4) $PbSO_4(s) + H_2O(l) \rightarrow PbO(s) + H_2SO_4(aq)$

61. The limiting molar conductivities at infinite dilution for KOH, KNO_3 and NH_4NO_3 respectively are 239, 125 and 128 S cm^2mol^{-1}. If molar conductivity of 0.2 M of NH_4OH solution is 14 S cm^2 mol^{-1} then degree of dissociation of NH_4OH is nearly

(1) 0.01

(2) 0.02

(3) 0.06

(4) 0.15

62. Given below are two statements.
Statement (I) : Reactions with positive cell potential are spontaneous
Statement (II) : For an electrochemical cell $\Delta G = -nFE$
In the light of above statements, choose the **correct** answer.

(1) Both statement I and statement II are true

(2) Both statement I and statement II are false

(3) Statement I is correct but statement II is false

(4) Statement I is incorrect but statement II is true

63. If the standard reduction potential of Cu^{2+}/Cu and Cu^{2+}/Cu^{+} are x V and y V respectively then the standard electrode potential of Cu^{+}/Cu couple will be

(1) (2x – y) V

(2) (x – 2y) V

(3) $\left(y-\frac{x}{2}\right)\ V$

(4) (3x – y) V

64. The amount of charge required for the conversion of 0.5 mole of $Cr_2O_7^{2-}$ to Cr^{3+} is

(1) 1F

(2) 3F

(3) 2F

(4) 5F

65. For the cell reaction
$Ni(s) + 2\,Ag^{+}(aq) \rightleftharpoons Ni^{2+}(aq) + 2\,Ag(s)$
$E^{\circ}_{Cell} = 1.05$ V. The standard Gibbs energy $(\Delta_r G^{\circ})$ of the cell reaction is (F is faraday constant)

(1) 1.05 F

(2) 2.1 F

(3) – 1.05 F

(4) – 2.1 F

66. The resistance and specific conductance of 0.1 M solution of an electrolyte is 40 Ω and 0.014 S cm^{-1} respectively. For the 0.2 M solution of same electrolyte filled in identical conductometric cell if resistance is 210 Ω, then the molar conductivity(in S cm^2 mol^{-1}) will be

(1) 13.33

(2) 5.55

(3) 6.28

(4) 15.35

67. The standard electrode potential (E°) values of Al^{3+}/Al, Ag^{+}/Ag and Cr^{3+}/Cr are –1.66 V, 0.80 V and –0.74 V respectively. The correct decreasing order of reducing power of the metal is

(1) Cr > Ag > Al

(2) Al > Cr > Ag

(3) Ag > Cr > Al

(4) Al > Ag > Cr

68. Mass of copper deposited at the cathode when the aq solution of $CuSO_4$ is electrolysed for 9.65 minute with a current of 10 Ampere is

(1) 30 × 63.5 g

(2) 3 × 63.5 g

(3) 0.03 × 63.5 g

(4) 63.5 g

69. Which among the following is a best conductor of electricity?

(1) 0.1 M aq. NH_4OH

(2) 0.1 M aq. urea

(3) 0.1 M aq. CH_3COOH

(4) 0.1 M aq. NaCl

70. Match gases in List-1 with their values of Henry's Law constant K_H in $kbar^{-1}$ at $293\ K$ in List-2.

	List-1		List-2
(a)	He	(I)	76.48
(b)	N_2	(II)	69.16
(c)	H_2	(III)	144.97
(d)	O_2	(IV)	34.86

Correct match is

(1) (a)-(III), (b)-(I), (c)-(II), (d)-(IV)

(2) (a)-(IV), (b)-(II), (c)-(I), (d)-(III)

(3) (a)-(III), (b)-(II), (c)-(I), (d)-(IV)

(4) (a)-(IV), (b)-(III), (c)-(II), (d)-(I)

71. Vapour pressure of $CHCl_3$ and CH_2Cl_2 at $298\ K$ are $200\ mmHg$ and $415\ mmHg$ respectively, then mole fraction of $CHCl_3$ in vapour if $51g$ of $CHCl_3$ is mixed with $80g$ CH_2Cl_2 at 298 will be

(1) 0.36

(2) 0.82

(3) 0.64

(4) 0.18

72. Given below are two statements

Statement (I): To avoid bends, as well as, the toxic effects of high concentrations of nitrogen in the blood, the tanks used by scuba divers are filled with air diluted with helium.

Statement (II): Aqueous solution of ethylene glycol is used as antifreeze in automobiles.

In the light of above statements, choose the **correct** options.

(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

73. Given below are two statements

Statement (I): Solution P_1 is prepared by dissolving 1 g of non-volatile non electrolyte solute A in 250 g of water and solution P_2 is prepared by dissolving 1 g of glucose in 250 g of water. If vapour pressure of P_1 is more than P_2 then the molar mass of A will be more than $180\ g\ mol^{-1}$.

Statement (II): Osmotic pressure is most effective colligative property to calculate molar mass of macromolecules.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(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

74. Consider the following solutions

(a) Phenol and aniline

(b) Chloroform and acetone

(c) Carbondisulphide and acetone

(d) Ethanol and water.

Solutions that will show positive deviation from Raoult's law are

(1) (a) and (c) only

(2) (b) and (d) only

(3) (a) and (b) only

(4) (c) and (d) only

75. Given below are two statements : one is assertion (A) other is reason (R)

Assertion(A): Solubility of gases in liquid increases with increase in temperature.

Reason (R): Dissolution of gas in liquid is an exothermic process

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

76. Match solutions in List-(I) with their solute in solvent combination in List-(II).

	List-(I)		List-(II)
(a)	Camphor in nitrogen gas	(I)	Liquid in liquid
(b)	Ethanol dissolved in water	(II)	Gas in solid
(c)	Glucose dissolved in water	(III)	Solid in gas
(d)	Solution of hydrogen in palladium	(IV)	Solid in liquid

Correct mathch is

(1) (a)-(IV), (b)-(III), (c)-(I), (d)-(II)

(2) (a)-(III), (b)-(IV), (c)-(I), (d)-(II)

(3) (a)-(IV), (b)-(I), (c)-(III), (d)-(II)

(4) (a)-(III), (b)-(I), (c)-(IV), (d)-(II)

77. Given below are two statements : one labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Cryoscopic constant for 0.01 aq NaCl and 0.01 aq KCl is same.
Reason (R): van't Hoff factor (i) is same for KCl and NaCl if they are undergoing 100% dissociation.
In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

78. Given below are two statements
Statement (I): $\mathrm{Fe(s)}$ can displace $\mathrm{Cu^{2+}(aq)}$ from it's solution.
Statement (II): $\mathrm{Br_2}$ is more easily reduced as compared to $\mathrm{I_2}$ in aqueous medium.
In the light of above statements, choose the **correct** option.

(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

79. Given below are two statements : one labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): For measuring the resistance of an ionic solution by Wheatstone bridge alternating current source is used.
Reason (R): Composition of ionic solution does not change on using alternating current source.
In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

80. Match cell representation in List-(I) with $\left(\mathrm{E_{cell}}-\mathrm{E^{o}_{cell}}\right)\mathrm{V}$ at $25^{\circ}\mathrm{C}$ in List-(II)

	List-(I)		List-(II)
(a)	$\mathrm{Mg(s)\vert Mg^{2+}_{(aq)}(0.01M)\Vert Cu^{2+}_{(aq)}(0.1M)\vert Cu(s)}$	(I)	-0.0394
(b)	$\mathrm{Al(s)\vert Al^{3+}_{(aq)}(0.1M)\vert\vert Ag^{+}_{(aq)}(0.1M)\vert Ag(s)}$	(II)	0.0197
(c)	$\mathrm{Zn(s)\vert Zn^{2+}_{(aq)}(0.01M)\Vert Ag^{+}_{(aq)}(0.1M)\vert Ag(s)}$	(III)	0.0295
(d)	$\mathrm{Na(s)\vert Na^{+}_{(aq)}(0.1M)\vert\vert Al^{3+}_{(aq)}(0.01M)\vert Al(s)}$	(IV)	0

Correct match is

(1) (a)-(III),(b)-(I),(c)-(IV),(d)-(II)

(2) (a)-(III),(b)-(IV),(c)-(I),(d)-(II)

(3) (a)-(II),(b)-(I),(c)-(IV),(d)-(III)

(4) (a)-(III),(b)-(IV),(c)-(II),(d)-(I)

81. Consider the following statements for given cell reaction.
$Cu(s) + 2Ag^{+}(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$ at 298 K
$E^{o}_{Cu^{2+}/Cu} = 0.34\ V$
$E^{\circ}_{Ag^{+}/Ag} = 0.8\ V$
(a) E^{o}_{Cell} is $1.14\ V$
(b) ΔG^{o} for reaction will be nearly $-88.78\ KJ\ mol^{-1}$
(c) Equilibrium constant for the reaction is nearly 3.62×10^{15}
Correct statement(s) is/are

(1) (a) only

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

(3) (b) and (c) only

(4) (b) only

82. Given below are two statements
Statement (I): Electrode potential is an intensive property.
Statement (II): Electrode potential changes with change in concentration of electrolyte.
In the light of above statements, choose the **correct** option.

(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

83. Given below are two statements : one labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): On electrolysis of aq $NaCl$ using Hg cathode, $Na^{+}(aq)$ gets reduced at cathode.
Reason (R): $Na^{+}(aq)$ has higher standard reduction potential than H_2O.
In the light of above statements, choose the **correct** answer from the options given below:

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

84. Given below are two statements : one labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): $0.01\ M$ solution of C_6H_5COOH in benzene will have less boiling point than $0.01\ M$ solution of glucose in benzene.
Reason (R): C_6H_5COOH undergoes dimerisation in benzene.
In the light of the above statements, choose the correct answer from the options given below:

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

85. Given below are two statements
Statement (I): Mixture of nitric acid and water can form maximum boiling azeotrope.
Statement (II): Aqueous solution of HNO_3 shows negative deviation from Raoult's law.
In the light of above statements, choose the **correct** option.

(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

86. Correct relationship for molal elevation constant (K_b) is

(1) $K_b \propto \frac{\text{BP of solvent}}{\text{Enthalpy of vapourisation of solvent}}$

(2) $K_b \propto \frac{(\text{BP of solvent})^2}{\text{Enthalpy of vapourisation of solvent}}$

(3) $K_b \propto \frac{\text{Enthalpy of vapourisation of solvent}}{(\text{BP of solvent})^2}$

(4) $K_b \propto \frac{\text{Enthalpy of vapourisation of solvent}}{(\text{BP of solvent})}$

87. Order for inversion of cane sugar in acidic medium is

(1) Pseudo zero order

(2) Pseudo first order

(3) Second order

(4) Third order

88. For a reaction rate constant is $0.02\ s^{-1}$. How much time does it take for $6\ M$ concentration of reactant to get reduced to $0.3\ M$.

(1) $149.7\ s$

(2) $74.9\ s$

(3) $300\ s$

(4) $100\ s$

89. For given reaction activation energy of forward direction is $40\ kJ\ mol^{-1}$ and for backward direction is $60\ kJ\ mol^{-1}$ then $\Delta_r H$ for reaction A $\rightarrow$B will be

(1) $-20\ kJ\ mol^{-1}$

(2) $20\ kJ\ mol^{-1}$

(3) $100\ kJ\ mol^{-1}$

(4) $-100\ kJ\ mol^{-1}$

90. Activation energy of any chemical reaction can be calculated by knowing the value of

(1) Rate constant at two different temperature

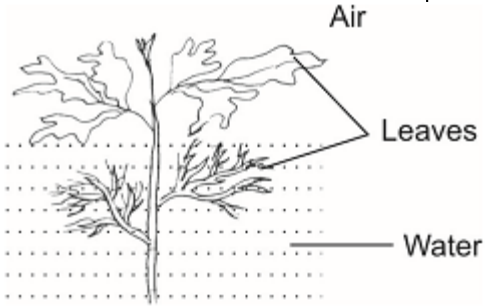
(2) Probability of collision

(3) Rate constant at standard temperature

(4) Orientation of reactant molecules during collision

BOTANY

91. Consider the following diagram of a plant and select the statement which **cannot** be true for this plant.



(1) Leaves which are underwater have less number of stomata to reduce transpiration

(2) This plant is showing plasticity

(3) In this plant heterophylly is due to environment

(4) Buttercup can be an example of such type of plants

92. Two leaves A and B with surface areas 5 cm^2 and 10 cm^2 respectively, increase their surface areas by 5 cm^2 each in one day.
Select the **correct** statement regarding the growth of these leaves.

(1) Relative growth rate of leaf A is more than that of leaf B

(2) Absolute growth rates of both the leaves are not same

(3) Absolute growth rate of leaf A is equal to the relative growth rate of leaf B

(4) Growth in leaf B is much faster than that in leaf A

93. Match the following columns and select the **correct** option.

	Column I		**Column II**
a.	Auxin	(i)	Used to increase the length of grapes stalks
b.	Gibberellin	(ii)	Promotes female flowers in cucumbers
c.	Cytokinin	(iii)	Prevents fruit drop at early stage
d.	Ethylene	(iv)	Helps in lateral shoot growth

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

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

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

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

94. The phytohormone that plays an important role in seed development, maturation and dormancy is also responsible
(a) For causing fruits like apple to elongate and improve its shape.
(b) To stimulate the closure of stomata in the epidermis.
(c) To act as antagonist to GAs.
(d) For promoting rapid internode elongation in deep water rice plants.
(e) To promote nutrient mobilisation.

(1) a, d

(2) b, d, e

(3) b, c

(4) d, e

95. To boost the production of tea leaves, apical buds are removed. This is because

(1) Ethylene induces swelling of the axis and thus, apical hook formation takes place

(2) Gibberellins delay senescence of leaves

(3) Effect of auxin is suppressed and growth of lateral bud is enhanced

(4) Auxin prevents abscission of mature leaves

96. Consider the following Assertion (A) and Reason (R) and choose the **correct** option.
Assertion (A) : Development in plants is considered as the sum of growth and differentiation
Reason (R) : Development in plants is under the control of intrinsic factors only.

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

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

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

97. The simplest expression of arithmetic growth is exemplified by

(1) All cells of a plant

(2) Bacterial cell in a culture medium

(3) Root elongating at a constant rate

(4) Initial divisions of a zygote

98. Three independent researchers reported the purification and chemical characterisation of three different kinds of inhibitors inhibitor-B, abscission-II and dormin. Later all three were proved to be chemically identical and named

(1) Kinetin

(2) Zeatin

(3) Abscisic Acid

(4) Gibberellins

99. Floral rewards are required for pollination in _____ flowers.

(1) Wind pollinated

(2) Cleistogamous

(3) Water pollinated

(4) Insect pollinated

100. Thinning of fruits in cotton, cherry and walnut is done by using

(1) ABA

(2) Auxin

(3) Ethylene

(4) Cytokinin

101. A monoecious plant is showing only xenogamy. Which of the following conditions is **true** about this plant?

(1) It has cleistogamous flowers

(2) It has only pistillate flowers

(3) It has only staminate flowers

(4) Self incompatiblility for pollen germination is shown by this plant

102. Select the **incorrect** match from the following.

(1) *Oxalis* – Has both open and closed flowers

(2) Bud pollination – Occurs in pea

(3) Cross pollination – Occurs only in dioecious species

(4) Geitonogamy – Functionally cross pollination

103. Select the **incorrect** statement w.r.t. apomixis.

(1) It is a form of asexual reproduction that mimics sexual reproduction

(2) By this process, seeds are produced without fertilization

(3) Segregation of characters can be observed during the production of apomictic seeds

(4) This process can be seen in some species of Asteraceae and grasses

104. Which of the following events is **not** associated with pollen-pistil interaction?

(1) Pollen deposition on the stigma

(2) Entry of pollen tube into the ovule

(3) Transfer of pollen-grain to the stigma

(4) Pollen germination on stigma

105. Which one is **odd** w.r.t. post fertilization development events?

(1) Maturation of ovule into seed

(2) Maturation of ovary into fruit

(3) Embryo development

(4) Formation of primary endosperm cell (PEC)

106. Select the **odd** one w.r.t. ploidy level of given structures/cells regarding ovule of flowering plants.

(1) MMC

(2) Integument

(3) Nucellus

(4) Megaspore

107. Proximal end of the filament of stamen is attached to the

(1) Placenta

(2) Thalamus or petal

(3) Anther

(4) Connective

108. Which of the given steps of artificial hybridisation is not required if a breeder is interested in crossing maize plants?

(1) Bagging

(2) Emasculation of parent flower

(3) Rebagging

(4) Collection of pollen

109. Epiblast is

(1) The smaller cotyledon in dicot seeds

(2) Remains of second cotyledon in some grasses

(3) The cylindrical portion below the level of cotyledons

(4) An undifferentiated sheath that encloses the root cap

110. Maximum genetic variation in a plant from its parent plants will be seen when it is developed from

(1) Zygotic embryo

(2) Nucellar embryo

(3) Embryo formed by diploid egg

(4) Integumentary embryo

111. Which of the following features are **correct** w.r.t. the plants that adopt abiotic pollination?
(a) Light weight and sticky pollens
(b) Well exposed stamens
(c) Presence of a mucilaginous covering
(d) Large often-feathery stigma
(e) Presence of single ovule in each ovary
Select the **correct** answer among the following options.

(1) (a), (c) and (d) only

(2) (b), (c), (d) and (e) only

(3) (a), (b), (c) and (d) only

(4) (b), (c) and (e) only

112. Which of the following statements are **correct** w.r.t. development of embryo sac in majority of angiosperms?
a. Occurence of asymmetric meiotic divisions.
b. Organisation of three nuclei to form egg apparatus.
c. Organisation of diploid antipodal cells at chalazal end.
d. Occurence of free-nuclear mitotic division to form 8-nucleated stage.

(1) a & b

(2) b & c

(3) a & c

(4) b & d

113. Which of the following is the most important advantage that seeds provide to angiosperms?

(1) Being products of sexual reproduction they generate new genetic combinations leading to variations

(2) Seed is the basis of our agriculture

(3) They can be stored and used as food throughout the year

(4) Dehydration and dormancy of mature seeds are crucial for farmers to raise the crop in the next season

114. Choose the **incorrect** statement for a typical anther.

(1) The mature anther is bilobed and tetrasporangiate.

(2) Each lobe encloses two pollen sacs.

(3) All cells present within the anther directly participate in microspore formation.

(4) It is a tetragonal structure.

115. In *Michelia*,

(1) Ovary is multicarpellary syncarpous

(2) The female reproductive part has single carpel

(3) Basal bulged part of the gynoecium is absent

(4) Carpels are not fused together

116. Which among the following options, most accurately characterizes the process in angiosperms, that forms the male gametophyte?

(1) It takes place in a band of vasculated tissue called connective.

(2) It involves the cell division that reduces the chromosome number by half

(3) It occurs in megaspore mother cell

(4) It occurs in group of cells that are found in the outer most layer of anther

117. The embryo sac in the group of plant, having seeds enclosed within fruit, represents

(1) Female gamete

(2) Functional microspore

(3) Female gametophyte

(4) Megasporangium

118. Polar nuclei in the embryo sac are

(1) Two distinct structures which are separated from each other by their wall

(2) Situated inside the antipodal cells

(3) Also called as generative cells

(4) Present in the largest cell of the sac

119. The inner wall of the pollen grain is made up of

(1) Cellulose and pectin

(2) Glycogen and pectin

(3) Sporopollenin

(4) Alpha-cellulosic fibrous bands

120. Read the following **Assertion (A)** and **Reason (R)** and select the **correct** option.
Assertion (A): Endosperm development precedes embryo development.
Reason (R): The cells of endosperm are filled with reserve food materials and are used for the nutrition of the developing embryo.

(1) Both (A) and (R) are false statements

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are true statements and (R) is the correct explanation of (A)

121. Read the following statements and choose the option accordingly
Statement P: Application of gibberellins on sugarcane crop can enhance its yield by as much as twenty tonnes per acre.
Statement Q: Gibberellins increase the stem length and thereby, increase sugar content.
Statement R: Gibberellins cause quicker early growth, so that maturity is reached early.

(1) Statements P, Q and R are true and both Q and R together explains P

(2) Statement P is false but Q and R are true

(3) Statements P and Q are correct and Q correctly explains the P

(4) All statements P, Q and R are true and only statement R is the correct explanation of P.

122. Consider the following statements regarding the physiological roles and site of action of cytokinins in plants.
I. Cytokinins are preferentially synthesised in tissues which are characterised by the active mitotic division and then, they are subsequently transported to the region of utilisation.
II. Cytokinins were discovered as zeatin from the autoclaved herring sperm DNA.
III. Cytokinins regulate lateral growth in root of plant and this function cannot be performed by any other plant growth regulator.
IV. Mobilisation of nutrients towards leaves and other organs is facilitated by it.
V. It increases the shelf-life of fruits by delaying ageing process in gymnosperms.
The correct statements are

(1) II and III only

(2) III,IV and V

(3) I, II and III

(4) I and IV

123. The PGR which can function as an antitranspirant can also act as an inhibitor of all of the following, **except**

(1) Seed germination

(2) Plant metabolism

(3) Plant growth

(4) Stomatal closure

124. Select the **incorrectly** matched pair from the following.

(1) Interfascicular cambium –Dedifferentiated tissue

(2) Tracheary element in primary xylem –Differentiated tissue

(3) Parenchyma –Differentiated tissue

(4) Cork cambium –Redifferentiated tissue

125. Consider the following environmental and cellular parameter, influencing the growth and survival in the higher plants.
(i) Water helps in cell enlargement and extension growth of a cell.
(ii) Micronutrients do not participate in the synthesis of protoplasm.
(iii) The amount of oxygen available to the plants determines the amount of respiratory energy that can be utilised for biosynthetic activity.
(iv) During germination and seedling development in bean, hypocotyl comes out of the soil and epicotyl remains underground.
State the above statements as **True (T)** or **False (F)** and choose the **correct** option.

	(i)	(ii)	(iii)	(iv)
(1)	F	T	T	F
(2)	T	F	T	F
(3)	T	F	F	T
(4)	F	T	T	T

(1) (1)

(2) (2)

(3) (3)

(4) (4)

126. Which of the following is **not** the external factor, affecting growth and development in plants?

(1) Light

(2) Oxygen concentration

(3) Plant growth regulators

(4) Temperature

127. Consider the following statements and choose the **correct** option accordingly.
Assertion (A): Certain accessory pigments lead to synthesis of a PGR that influences seed maturation and the establishment of the dormancy.
Reason (R): These pigments serve as biochemical precursors for a hormone that can help the plant to withstand dessication.

(1) Both (A) and (R) are true and (R) is the correct explanation (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

128. Which of the following options **correctly** mentions a natural auxin (A) and a synthetic auxin (B)?

	(A)	(B)
(1)	IAA	IBA
(2)	IAA	2,4-D
(3)	2,4-D	IBA
(4)	NAA	2,4-D

(1) (1)

(2) (2)

(3) (3)

(4) (4)

129. Which one of the following statements is **incorrect** w.r.t. geometrical growth?

(1) In this type of growth, every cell divides with all the daughters growing and dividing again.

(2) This type of growth cannot be observed if growth of microorganisms are studied in a culture dish.

(3) In this type of growth, initial growth is slow and it increases rapidly thereafter.

(4) The curve obtained in this growth is S-shaped.

130. Coconut milk can be used to

(1) Promote root growth and root hair formation

(2) Promote senescence

(3) Induce formation of male flower

(4) Counteract apical dominance

131. Which one of the following plants does not show heterophylly?

(1) Cotton

(2) Larkspur

(3) Maize

(4) Coriander

132. Tracheids do not collapse under extreme tension due to the presence of

(1) Strong, elastic lignocellulosic secondary cell wall

(2) Thick, cellulosic primary cell wall

(3) Thin, elastic, cellulosic primary cell wall

(4) Thick, hard suberised secondary cell wall

133. A typical anther consists of four pollen sacs (All the microspore formed are viable). In each pollen sac, 'x' numbers of sporogenous cells undergo meiosis, and it shows that the total number of male gametes produced from the given anther is 800. Then the value of x is

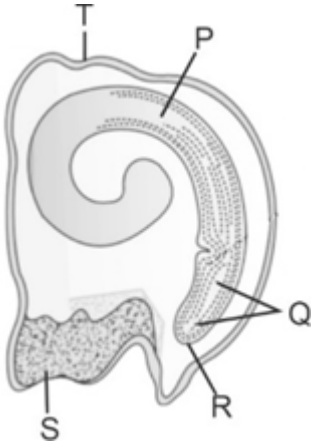
(1) 100

(2) 200

(3) 25

(4) 50

134. Examine the figure and select the option with all the **correct** statement.



A. Label P is a part of the embryo and functions primarily as the food storing structure.
B. Label Q represents the cylindrical portion below the level of the cotyledons that terminates its lower end in the radicle.
C. Label S differentiates into the primary root system upon germination.
D. Label R originates as a result of triple fusion, and it is genetically similar to the product of syngamy.
E. Label T is fused with the ovary wall in gymnosperms.
The **correct** ones are

(1) B and C

(2) A, D and E

(3) A, B and E

(4) A and B

135. During post-fertilization events in angiosperms, seeds show structural differences due to variable utilisation of endosperm.
A. The fate of the endosperm during embryonic development is the primary factor determining whether a seed is classified as endospermic or non-endospermic at maturity.
B. In perispermic seeds the perisperm serves the purpose of endosperm.
C. In pea, endosperm is utilised during seed germination.
D. Endosperm is formed as a result of triple fusion and functions as the primary nutritive tissue during early embryogenesis.
Select the **correct** option.

(1) Only C and D are correct

(2) Only A and B are correct

(3) Only A and D are correct

(4) Only B and D are correct

ZOOLOGY

136. Match items in column I with those in column II and choose the option with the **correct** match.

	Column I		**Column II**
a.	Central neural system	(i)	Divided into somatic and autonomic neural system
b.	Peripheral neural system	(ii)	Comprises whole complexes of nerve fibres, ganglia and plexuses.
c.	Autonomic neural system	(iii)	Divided into sympathetic and parasympathetic neural system
d.	Visceral neural system	(iv)	Site of information processing and control.

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

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

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

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

137. Following are the statements about polarised state as well as process of impulse conduction through a nerve fibre.
a. Neurons are non-excitable cells because their membranes are in a polarised state.
b. Polarised state of a nerve fibre is due to the difference in permeability of Na^+ and K^+.
c. The electrical potential difference across the resting plasma membrane is called the action potential.
d. Resting potential of axolemma is restored at the site of excitation by rapid efflux of K^+.
Choose the **correct** answer from the options given below.

(1) a and b are correct

(2) b and c are correct

(3) c and d are correct

(4) b and d are correct

138. A muscle fibre is devoid of _____ while the Ca^{2+} in a muscle fibre, is stored in _____.
Fill in the respective blanks by selecting the **correct** option.

(1) Plasma membrane ; Mitochondria

(2) Cell wall ; Sarcoplasmic reticulum

(3) Plasma membrane ; Nucleus

(4) Cell wall ; Sarcolemma

139. The anatomical unit of muscle is 'X' whereas 'Y' is its functional unit. Identify 'X' and 'Y' and select the **correct** option.

(1) X- Sarcomere; Y- Muscle fibre

(2) X- Muscle fibre; Y- Sarcomere

(3) X- Myofibrils; Y- Muscle bundle

(4) X- Sarcomere; Y- Myofibril

140. Human brain is covered by three cranial meninges
(a) Pia mater
(b) Arachnoid
(c) Dura mater
Arrange them in their **correct** sequence from outer to inner side and select the correct option.

(1) a → b → c

(2) b → a → c

(3) c → b → a

(4) b → c → a

141. Select the **correct** statement w.r.t kidneys of humans.

(1) Kidneys are situated between the levels of last thoracic and third lumbar vertebrae close to the ventral inner wall of the abdominal cavity.

(2) Hilum is present towards the centre of convex surface of the kidney.

(3) Both kidneys have nearly one million complex tubular structures called nephrons.

(4) Each kidney of an adult human measures 0.10 to 0.12 m in length, 0.05-0.07 m in width, 0.02 to 0.03 m in thickness with an average weight of 0.12-0.17 kg.

142. Choose the **incorrect** statement w.r.t. human kidney.

(1) The cortex extends in between the medullary pyramids as renal columns called columns of Bertini.

(2) Vasa recta is highly developed in cortical nephrons

(3) The epithelial cells of visceral layer of Bowman's capsule are called podocytes

(4) Nephrons are the functional units of kidney

143. Read the statements A and B carefully w.r.t. nephrons and select the **correct** option.
Statement A : Reabsorption is minimum in ascending limb of loop of Henle.
Statement B : The descending limb of loop of Henle is completely permeable to electrolytes.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

144. Select the **incorrect** statement w.r.t. artificial kidney / haemodialysis.

(1) Artificial kidney is used in case of uremia.

(2) Anti-coagulant such as heparin is used in the process of haemodialysis.

(3) Dialysing fluid contains small solutes, minerals, ions urea and creatinine.

(4) After dialysis, the cleared blood is pumped back to the body through a vein, after adding anti-heparin to it.

145. Read the statements given below w.r.t. healthy humans
i. During urine formation, tubular cells secrete substances such as H^+, K^+ and NH_3 into the filtrate.
ii. Ultrafiltrate is plasma minus large proteins.
iii. Loop of Henle helps in conserving water.
iv. Nearly, all glucose and amino acids are reabsorbed in PCT.
How many of the above statements is/are **correct**?

(1) One

(2) Two

(3) Three

(4) Four

146. Substances like glucose, amino acids, Na^+, *etc*., in the filtrate are reabsorbed __a__ whereas the nitrogenous wastes are absorbed by __b__ transport. Reabsorption of water also occurs __c__ in the initial segments of nephron. Choose the option that correctly fills the blanks.

(1) a – actively, b – passive, c – passively

(2) a – passively, b – active, c – passively

(3) a – actively, b – passive, c – actively

(4) a – passively, b – passive, c – actively

147. Read the given statements and select the **correct** option.
Statement A : As the urinary bladder gets filled with urine, the stretch receptors present on the walls of bladder send signals to the CNS which passes on sensory messages to the smooth muscle and urethral sphincter, causing urine release.
Statement B : JGA is a sensitive region formed by cellular modifications in the proximal convoluted tubule and afferent arteriole at the location of their contact.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

148. How many of the adult organisms mentioned in the box given below have protonephridia as their primary excretory structure?

Amphioxus, Rotifers, Prawns, Earthworms, *Planaria*, *Hydra*, Spiders

Choose the **correct** option.

(1) Three

(2) Four

(3) Five

(4) Six

149. Evaluate the statements given below w.r.t. the structure of skeletal muscles.
A. Each organised skeletal muscle is made of a number of muscle bundles held together by a common collagenous connective tissue layer called fascia.
B. Muscle fibre is a syncytium.
C. In the center of each 'I' band, an inelastic fibre *i.e.*, 'Z' line is present
D. The thick filaments in 'A' band are held together in the middle by a thin fibrous 'M' line
Select the option which represents only the **correct** statements.

(1) A and B only

(2) B and C

(3) A, B and D

(4) A, B and C only

150. Which of the following **cannot** activate the JG cells to release renin?

(1) A fall in glomerular blood flow

(2) A fall in glomerular blood pressure

(3) A fall in glomerular filtration rate

(4) A rise in glomerular blood pressure

151. All of the following events occur after the release of Ca^{2+} into the sarcoplasm of skeletal muscle fibres, **except**

(1) Utilization of ATP for power stroke

(2) Release of neuro-transmitter at neuromuscular junction

(3) Binding of myosin head to the exposed myosin binding sites on actin

(4) Sliding of actin filaments over myosin filaments

152. In meromyosin, the globular head is/has
A. A component of heavy meromyosin
B. An active ATPase enzyme
C. Binding sites for ATP
D. Active sites for actin
E. A component of the light meromyosin
Choose the **correct** option.

(1) A, B and C only

(2) A, B, C and D

(3) B, C, D and E

(4) B, C and D only

153. Read the following statements regarding the Rib cage and its components.
(a) Formed by ribs, sternum and thoracic vertebrae
(b) Ribs articulate with sternum on dorsal side and thoracic vertebrae on ventral side.
(c) Vertebral ribs articulate with thoracic vertebrae only.
(d) First 8 pairs of ribs directly articulate with strenum.
Choose the option which includes only the **incorrect** statement(s).

(1) (a) & (b)

(2) (a) only

(3) (b) & (d)

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

154. In the following given figure, identify A, B and C and choose the option which **correctly** represents them.

	A	B	C
(1)	F-actin	Tropomyosin	Troponin
(2)	Troponin	Tropomyosin	F-actin
(3)	Tropomyosin	Troponin	F-actin
(4)	Troponin	F-actin	Tropomyosin

(1) (1)

(2) (2)

(3) (3)

(4) (4)

155. **Assertion(A) :** In humans, the inner part of the cerebral hemisphere is called the white matter.
Reason(R) : Nerve fibre tracts covered with myelin sheath constitute the inner part of the cerebral hemispheres and give an opaque white appearance.
In the light of above statements, select the correct option.

(1) Both (A) and (R) are true; (R) explains (A) correctly

(2) Both (A) and (R) are true; (R) does not explain (A) correctly

(3) (A) is true; (R) is false

(4) (A) is false; (R) is true

156. If Na^+/K^+ pumps stop functioning in a neuron, the immediate consequence will be

(1) Accumulation of Na^+ on the inner side of axolemma

(2) Sustained resting membrane potential, leading to quick impulse conduction

(3) Positive resting membrane potential, leading to depolarization

(4) Increased release of Ach across the synapse

157. Which of the following correctly distinguishes electrical synapses from chemical synapses?

(1) Use of neurotransmitter in former

(2) Presence of large-sized synaptic cleft in former as compared to the latter

(3) Bi-directional flow of impulse in latter

(4) Synaptic delay in latter as compared to former

158. A patient is not able to maintain his balance and posture. His affected brain region is most likely

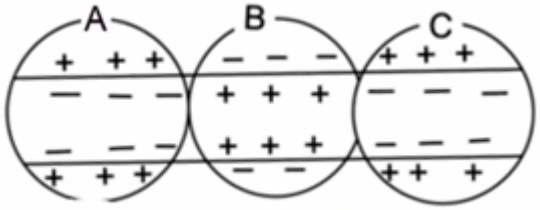
(1) The structure present at the base of thalamus

(2) The part of hind brain which has convoluted surface

(3) Cerebral aqueduct

(4) Only the part of hind brain that also controls gastric secretions

159. What will happen at point C, if impulse is travelling in a nerve fibre from A to C as shown in given figure?



(1) Permeability of axonal membrane for both Na^+ and K^+ will increase simultaneously

(2) Permeability of Na^+ will increase, as compared to K^+

(3) Inner side of axolemma will become more negative

(4) Outer side of axolemma will become more positive due to the efflux of K^+

160. How many components given in the box below are not included in CNS of humans?

Ganglia, Nerve plexuses, Schwann cells, Amygdala, Hippocampus, Thalamus, Nerves

Select the **correct** option.

(1) Four

(2) Two

(3) Three

(4) Five

161. The nitrogenous waste that requires the maximum amount of water for its excretion is

(1) Excreted by animals that possess Malpighian tubules

(2) Known as ammonia and it is only formed in our kidney

(3) The least toxic nitrogenous waste product

(4) Generally excreted by diffusion across body surface or through gill surfaces in fishes

162. Which of the following correctly describes the process of ultrafiltration in the nephrons?

(1) It occurs due to active transport of substances in PCT

(2) Pressure driven process in the glomerular capillaries that filters blood to form urine

(3) This process also occurs in the loop of Henle

(4) It selectively filters water along with albumin

163. In humans, the counter-current mechanism is established mainly due to the interaction between

(1) Loop of Henle and DCT

(2) Bowman's capsule and PCT

(3) Loop of Henle and vasa recta

(4) Collecting duct and renal pelvis

164. Which of the following conditions is correctly matching with its respective symptoms?

(1) Uremia - Presence of excess urea in urine

(2) Diabetes mellitus - Increased thirst and frequent urination

(3) Glycosuria - Presence of glucose in blood but not in urine

(4) Gout - Inflammation of glomeruli

165. Which of the following helps in maintaining the blood pH *via* tubular secretion?

(1) $\mathrm{HCO_3^-}$

(2) Glycine

(3) Glucose

(4) $\mathrm{H^+}$

166. Choose the correct option w.r.t. a condition that will increase the reabsorption of water in the latter part of the DCT and the collecting duct.

(1) Decreased renin secretion

(2) Increased amount of proteinaceous aldosterone in blood plasma

(3) Increased level of atrial natriuretic factor in blood plasma

(4) Increased concentration of vasopressin in blood plasma

167. **Assertion (A):** Drugs that block the production of angiotensin-II are widely used in the treatment of hypertension.
Reason(R): Angiotensin-II blocks narrowing of blood vessels, leading to excess salt/water retention that causes lowering of blood pressure.
In the light of above statements, choose the **correct** option.

(1) Both (A) and (R) are true and (R) explains (A) correctly

(2) Both (A) and (R) are true but (R) does not explain (A) correctly

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

168. An auto-immune disease that causes destruction of receptors present on the sarcolemma of neuro-muscular junction is characterized by

(1) Inflammation of joints only

(2) Weakening and paralysis of skeletal muscles

(3) Increased chances of fractures due to low levels of progesterone

(4) Accumulation of uric acid crystals in gall bladder

169. A muscle cell differs from a nerve cell in

(1) Having a nucleus

(2) Possessing the ability to contract and generate force

(3) Exhibiting excitability

(4) Having the ability to respond to a stimulus

170. The red muscle fibres

(1) Are characterised by the absence of myoglobin as compared to the white muscle fibres

(2) Contain large amount of sarcoplasmic reticulum and glycogen

(3) Contract slowly because they perform anaerobic respiration

(4) Are characterized by the presence of large number of mitochondria as compared to the white muscle fibres

171. Read the given features :
(a) Fusiform shape
(b) Striations present
(c) Branched appearance
(d) Cylindrical shape
(e) Presence of intercalated discs
(f) Syncytial appearance
Choose the option that represents the **correct** number of features of muscle fibres that are present in the wall of aorta and atria, respectively.

(1) 4, 5

(2) 1, 4

(3) 2, 3

(4) 5, 5

172. Comprehend the given statements w.r.t. humans :
Statement A: There are two acetabulum cavities associated with the two pelvic girdles.
Statement B: Tetany is characterised by the wild contractions in muscles due to low $\mathrm{Ca^{2+}}$ in body fluid.
Statement C: Saddle joint is present between the carpal and metacarpal of thumb.
Choose the **correct** option

(1) Statements A and B are correct but statement C is incorrect

(2) Statements B and C are correct but statement A is incorrect

(3) Only statement B is correct and statements A and C are incorrect

(4) All statements A, B and C are correct

173. The total number of lumbar vertebrae in an adult human is numerically equal to the total number of

(1) Cervical vertebrae – Number of bones in pectoral girdle

(2) Carpals in left limb

(3) Thoracic vertebrae – Tarsals present in left limb

(4) Facial bones – Total number of ear ossicles

174. Match List I and List II w.r.t. the skeletal system of humans.

	List I		List II
(a)	Ear ossicle	(i)	Stapes
(b)	Coxal bone	(ii)	Ethmoid
(c)	Cranial bone	(iii)	Axis
(d)	Facial bone	(iv)	Pubis
(e)	Vertebra	(v)	Maxilla

Choose the **correct** option.

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

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

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

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

175. Select the odd one w.r.t. the cartilaginous joint present in an adult human

(1) Between sternum and 6^{th} rib

(2) Between pubis of two coxal bones

(3) Between thoracic vertebrae

(4) Between temporal and parietal bones

176. How many of the statements mentioned below are **incorrect**?

A. Head of humerus articulates with glenoid cavity present above acromion process

B. Patella covers the knee dorsally

C. Clavicle also articulates with sternum

D. Fibula is present on medial aspect of hind limb

Select the **correct** option.

(1) 1

(2) 2

(3) 3

(4) 4

177. Which of the following is **incorrect** w.r.t. muscles associated with facial bones of humans?

(1) Presence of parallely arranged myofilaments in the sarcolemma is a characteristic feature of muscle fibres

(2) Each myofibril has alternate anisotropic and isotropic bands on it.

(3) Both actin and myosin proteins are arranged parallel to the longitudinal axis of the myofibril

(4) Actin filaments are thinner as compared to the myosin filament

178. How many components/bones from the box given below are not the part of the axial skeleton?

Scapula, Patella, Coccyx, Intervertebral disc, Mandible, Hyoid, Sphenoid, Sternum, Frontal

Choose the **correct** option.

(1) Two

(2) Three

(3) Four

(4) Five

179. Select the **incorrect** statement w.r.t humans.

(1) Occipital bone is the posterior most part of the base of the cranium.

(2) Mandible forms the lower jaw and it is the largest and strongest facial bone.

(3) The type of nerve fibres that supply muscles used in walking are a part of autonomic nervous system.

(4) Cell body is the controlling part of the neuron.

180. Complete the analogy by selecting the correct option.

Flagellar movement : Human spermatozoa :: _____ : Macrophages

Select the **correct** option

(1) Flagellar movement

(2) Amoeboid movement

(3) Ciliary movement

(4) Muscular movement