



Aakash

Medical | IIT-JEE | Foundations

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MM : 720

Final Test Series(P2)-2024-25_Test-06D

Time : 180 Min.

Topics Covered:**Physics:** Thermal Properties of Matter, Thermodynamics, Kinetic Theory, Oscillations, Waves**Chemistry:** Solutions, Electrochemistry, Chemical Kinetics**Botany:** Respiration in Plants, Plant Growth and Development, Sexual Reproduction in Flowering Plants**Zoology:** Locomotion and Movement, Neural Control and Coordination, Chemical Coordination and Integration

CC-005

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.

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PHYSICS

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- A spherical object, having radius 10 cm, radiates 600 W of power at 300 K. If the radius of the sphere is reduced to half of its initial value and temperature is made double of its initial value, then the final power emitted will be
 - 2400 W
 - 600 W
 - 1200 W
 - 1800 W
- A particle is executing SHM with an amplitude of 50 cm. If velocity of particle while passing through the mean position is 8 m/s, then its frequency will be
 - $\frac{16}{\pi}$ Hz
 - $\frac{2}{\pi}$ Hz
 - $\frac{9}{\pi}$ Hz
 - $\frac{8}{\pi}$ Hz
- Statement A :** A process in which the temperature of the system is kept fixed throughout is called an isobaric process.

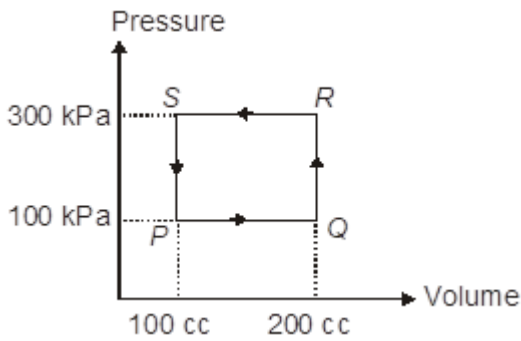
Statement B : If the system is insulated from the surroundings and no heat flows between the system and the surroundings, the process is adiabatic.

Statement C : Internal energy of a system is the sum of kinetic energies and potential energies of the molecular constituents of the system.

In light of above statements, choose the correct option:

 - Only statement A is true
 - Only statement B is true
 - Both statements B and C are true
 - Only statement C is true

4. A thermodynamic system is taken through the cyclic process $PQRSP$. The net work done by the system during $PQRSP$ is

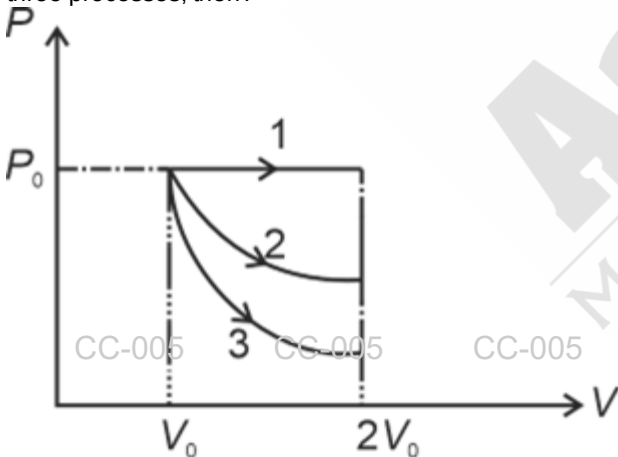


- (1) -20 J
 (2) 10 J
 (3) -10 J
 (4) 20 J

5. An ideal heat engine rejecting heat at 77°C is to have 30% efficiency. It must accept heat at temperature

- (1) 500 K
 (2) 400 K
 (3) 600 K
 (4) 300 K

6. A gas is expanded from volume V_0 to $2V_0$ under three different processes. Process 1 is isobaric, Process 2 is isothermal and process 3 is adiabatic. Let ΔU_1 , ΔU_2 and ΔU_3 be the change in internal energy of the gas in these three processes, then?



- (1) $\Delta U_1 > \Delta U_2 > \Delta U_3$
 (2) $\Delta U_1 < \Delta U_2 < \Delta U_3$
 (3) $\Delta U_2 < \Delta U_1 < \Delta U_3$
 (4) $\Delta U_2 < \Delta U_3 < \Delta U_1$

7. For an adiabatic expansion of an ideal gas, the value of $\frac{dP}{P}$ is equal to (Symbols have their usual meanings)

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

8. The kinetic energy of one mole of a gas at temperature 200 K is E . If at 400 K its kinetic energy is E' , then the value of E'/E is

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

9. 1 mole of monoatomic gas ($\gamma = \frac{5}{3}$) is mixed with 3 moles of diatomic gas ($\gamma = \frac{7}{5}$). The value of adiabatic index for the mixture will be

- (1) $\frac{12}{11}$
 (2) $\frac{15}{12}$
 (3) $\frac{13}{9}$
 (4) $\frac{4}{3}$

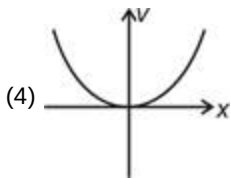
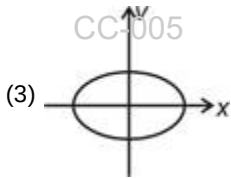
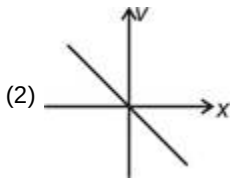
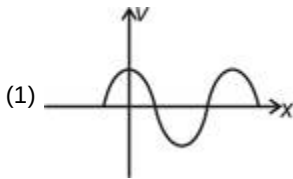
10. An ideal gas at 300 K temperature and 20 atmospheric pressure is allowed to expand till its final pressure reaches atmospheric pressure. If the volume becomes 20 times of its initial volume, then the final temperature will be

- (1) 300 K
 (2) 200 K
 (3) 100 K
 (4) 400 K

11. Specific heat of a gas during an isothermal change is

- (1) Positive
 (2) Negative
 (3) Zero
 (4) Infinite

12. The velocity-position ($v - x$) graph of a simple harmonic oscillator is



13. The displacement y of a particle is given by $y = 4 \cos^2\left(\frac{t}{2}\right) \sin(1000t)$. This expression may be considered to be a result of the superposition of how many simple harmonic motion?

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

14. A particle is fastened at one end of a string and is whirled in a horizontal circle with constant speed with other end of the string fixed. The motion of the particle is

- (1) Periodic but not oscillatory
(2) Oscillatory but not periodic
(3) Oscillatory and periodic
(4) Simple harmonic motion

15. A particle of mass 2 g is executing S.H.M which is given by displacement equation $x = 5.0 \cos\left[100t + \frac{\pi}{4}\right]$ cm where t is time in second. The maximum kinetic energy of particle is

- (1) 20 mJ
(2) 10 mJ
(3) 25 mJ
(4) 18 mJ

16. The frequency of tuning fork A and B are 2% more and 2% less than the frequency of tuning fork C respectively. When A and B are simultaneously excited, 8 beats per second are produced, then the frequency of B will be

- (1) 196 Hz
(2) 204 Hz
(3) 192 Hz
(4) 208 Hz

17. The speed of longitudinal wave in a metal rod having Young's modulus 1×10^{10} N/m² and density as 2.5×10^3 kg/m³ is

- (1) 1000 m/s
(2) 2000 m/s
(3) 3000 m/s
(4) 4000 m/s

18. Which of the following phenomenon are not shown by sound waves?

- (1) Interference
(2) Beats
(3) Diffraction
(4) Polarization

19. The equation of a progressive wave is $y = A \sin(kx - \omega t)$. If maximum velocity of particle is two times the velocity of wave, then wavelength of wave is

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

20. If speed of sound in air at 27°C is v then at what temperature speed of sound becomes $2v$?

- (1) 1200°C
(2) 927 K
(3) 52°C
(4) 927°C

21. The fundamental frequency produced by a closed organ pipe is 50 Hz, then 5th overtone frequency is

- (1) 250 Hz
(2) 300 Hz
(3) 1250 Hz
(4) 550 Hz

22. Statement A : Two bodies are said to be in thermal equilibrium when no (net) heat flows from one body to other.
Statement B: At thermal equilibrium, two bodies can be at different temperature.

- (1) Statement A is true but statement B is false
- (2) Statement A is false but statement B is true
- (3) Both statements A and B are true
- (4) Both statements A and B are false

23. At constant pressure, air thermometer gave a reading of 40 units of volume when immersed in ice cold water and 60 units in boiling water. If it gives 67 units in a boiling liquid, then the boiling point of liquid will be

- (1) 135°C
- (2) 125°C
- (3) 112°C
- (4) 100°C

24. The length of a metallic rod is 5 m at 0°C and becomes 5.01 m, on heating upto 100°C. The linear expansion coefficient of the metal will be

- (1) $3.33 \times 10^{-5} / ^\circ\text{C}$
- (2) $6.0 \times 10^{-5} / ^\circ\text{C}$
- (3) $4.0 \times 10^{-5} / ^\circ\text{C}$
- (4) $2.0 \times 10^{-5} / ^\circ\text{C}$

25. Consider a steel rail of length 5 m and area of cross-section 40 cm² that is prevented from expanding while the temperature rises by 10°C.

The external force corresponding to thermal stress is ($\alpha_{\text{steel}} = 1.2 \times 10^{-5} \text{ K}^{-1}$, $\gamma_{\text{steel}} = 2 \times 10^{11} \text{ N/m}^2$)

- (1) $2.4 \times 10^3 \text{ N}$
- (2) 10^3 N
- (3) Zero
- (4) $9.6 \times 10^4 \text{ N}$

26. A : For an isochoric process, slope of P - V graph is infinite, where pressure (P) is plotted on y -axis and volume (V) is plotted on x -axis

R : For an isochoric process, the pressure remain constant.

- (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

27. For 2 moles of an ideal gas at a temperature of 300 K, calculate the work done in an isothermal expansion if the volume changes from 2 L to 4 L.

($R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$, $\ln 2 = 0.693$)

- (1) 3457 J
- (2) 4500 J
- (3) 4896 J
- (4) 2453 J

28. Some thermodynamics process given in List-I and their respective properties is given in List-II. Match the process with their properties and choose the correct option. (Symbols have their usual meanings)

	List-I		List-II
a.	Isothermal	(i)	$W = 0$
b.	Adiabatic	(ii)	$\gamma V^{-1} = \text{constant}$
c.	Isochoric	(iii)	$PV = \text{constant}$
d.	Isobaric	(iv)	$\Delta U = -W$

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

29. The pressure of an ideal gas is due to

- (1) Repulsion between gas molecules
- (2) Collision of gas molecules with the container walls
- (3) Vibration of gas molecules
- (4) Weight of the gas molecules

30. If two monoatomic gases have the same temperature, which of the following statements is true?

- (1) Both gases have the same total kinetic energy
- (2) Both gases have the same root mean square speed
- (3) Both gases have equal density
- (4) Lighter gas molecule move faster than heavier gas molecule

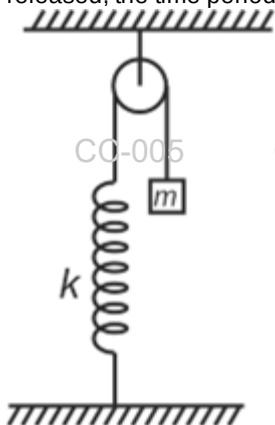
31. An ideal gas at 27°C is heated at constant pressure, so as to double its volume. The final temperature of the gas will be

- (1) 600°C
- (2) 600 K
- (3) 54°C
- (4) 623 K

32. The speeds of ten particles (in m/s) are 2, 3, 3, 4, 5, 5, 5, 8, 9, 9. The most probable speed is

- (1) 9 m/s
- (2) 3 m/s
- (3) 5 m/s
- (4) 8 m/s

33. In the following arrangement, block is slightly displaced vertically downwards from its equilibrium position and released, the time period of oscillations is



- (1) $2\pi\sqrt{\frac{m}{2k}}$
- (2) $2\pi\sqrt{\frac{2m}{k}}$
- (3) $2\pi\sqrt{\frac{m}{k}}$
- (4) $2\pi\sqrt{\frac{3m}{k}}$

34. The displacement of a particle undergoing SHM along x-axis is given by $x = a \cos(\omega t + \frac{\pi}{2})$. At $t = 0$,

- (1) Particle is at mean position and moving towards positive x axis
- (2) Particle is at mean position and moving towards negative x axis
- (3) Particle is at extreme position and moving towards positive x axis
- (4) Particle is at extreme position and moving towards negative x axis

35. The phase difference between two points separated by 0.3 m in a wave of frequency 150 Hz is 0.5π . The velocity of the wave is

- (1) 150 m/s
- (2) 210 m/s
- (3) 198 m/s
- (4) 180 m/s

36. Two coherent waves of intensities I_1 and I_2 pass through a region at the same time in the same direction, the difference in the maximum and minimum intensities is

- (1) $4\sqrt{I_1 I_2}$
- (2) $2(I_1 + I_2)$
- (3) $2(I_1 - I_2)$
- (4) $I_1 - I_2$

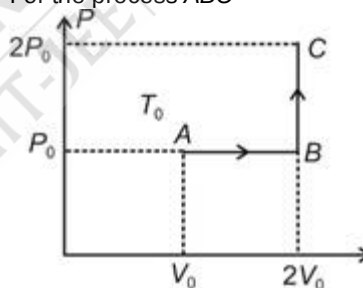
37. If a closed organ pipe and an open organ pipe have the same frequency in third overtone, then their lengths are in the ratio

- (1) 3 : 4
- (2) 7 : 8
- (3) 2 : 1
- (4) 7 : 4

38. The speed of sound wave in air in adiabatic condition is given by (symbols have their usual meanings)

- (1) $v = \sqrt{\frac{\gamma P}{M}}$
- (2) $v = \sqrt{\frac{\gamma P}{\rho}}$
- (3) $v = \sqrt{\frac{\gamma R}{P}}$
- (4) $v = \sqrt{\frac{\gamma P}{\rho}}$

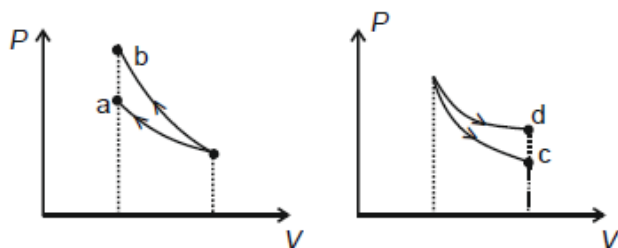
39. One mole of an ideal monatomic gas is taken from A to C along the path ABC. The temperature of the gas at A is T_0 . For the process ABC



- (1) Work done by the gas is RT_0
- (2) Change in internal energy of the gas is $11RT_0/2$
- (3) Heat absorbed by the gas is $21RT_0/2$
- (4) Heat absorbed by the gas is $13RT_0/2$

40. Read the assertion and reason carefully to mark the correct option out of the options given below

A : In the following P - V graphs, a and d represents isothermal process while b & c represents adiabatic process



R : $\frac{dP}{dV} = -\gamma P$ for adiabatic and $\frac{dP}{dV} = -\frac{P}{\gamma}$ for isothermal process

- (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
41. If pressure becomes double keeping temperature constant then mean free path will be

- (1) Doubled
 (2) Halved
 (3) Same
 (4) $\sqrt{2}$ times

42. Two particles executing SHM about same mean position having same amplitude A_0 and same time period T passes through mean position moving in opposite directions at any instant. Maximum separation between the particles is

- (1) A_0
 (2) $\sqrt{3}A_0$
 (3) $2A_0$
 (4) $\frac{A_0}{\sqrt{3}}$

43. A simple pendulum with a metallic bob has a time period T . The bob is now immersed in a non-viscous liquid and oscillated. If the density of the liquid is one-third to that of the metal, then the time period of the pendulum will be

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

44. Consecutive frequencies emitted from an organ pipe are 910 Hz, 1274 Hz & 1638 Hz. The 6th overtone is

- (1) 2366 Hz
 (2) 2002 Hz
 (3) 1820 Hz
 (4) 2548 Hz

45. Two wires are in unison. If the tension in one of the wires is increased by 2%, 5 beats are produced per second. The initial frequency of each wire is

- (1) 400 Hz
 (2) 1000 Hz
 (3) 500 Hz
 (4) 200 Hz

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46. If molality of NaOH in an aqueous solution is 8 m and the density of the solution is 1.32 g mL^{-1} then the molarity of NaOH solution will be

- (1) 7.5 M
 (2) 7.0 M
 (3) 9.1 M
 (4) 8 M

47. Select the incorrect statement about an ideal solution?

- (1) A-A and B-B interactions are as strong as A-B interactions
 (2) $\Delta H_{\text{mix}} = 0$
 (3) $\Delta V_{\text{mix}} = 0$
 (4) $\Delta S_{\text{mix}} = 0$

48. 1 molal aqueous solution of which of the following compound have maximum freezing point (assuming complete ionisation of each salt)?
- $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_3$
 - $[\text{Co}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$
 - $[\text{Co}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$
 - $[\text{Co}(\text{H}_2\text{O})_3\text{Cl}_3] \cdot 3\text{H}_2\text{O}$
49. Which one of the following is not an ideal solution?
- $\text{C}_2\text{H}_5\text{Br}$ and $\text{C}_2\text{H}_5\text{I}$ mixture
 - $\text{C}_6\text{H}_5\text{Cl}$ and $\text{C}_6\text{H}_5\text{Br}$ mixture
 - C_6H_6 and $\text{C}_6\text{H}_5\text{CH}_3$ mixture
 - $\text{C}_2\text{H}_5\text{Cl}$ and $\text{C}_2\text{H}_5\text{OH}$ mixture
50. Arrange the following aqueous dilute solution in the increasing order of vapour pressure
- 10% (w/v) glucose
 - 10% (w/v) sucrose
 - 10% (w/v) urea
- (a) < (b) < (c)
 - (a) < (c) < (b)
 - (c) < (b) < (a)
 - (c) < (a) < (b)
51. If 0.1 m aqueous solution of calcium phosphate is 80% dissociated then the freezing point of the solution will be (K_f of water = $1.86 \text{ K kg mol}^{-1}$)
- -0.78°C
 - -1.25°C
 - -1.75°C
 - -2.5°C
52. Given below are two statements.
- Statement I:** For aqueous solution with density of 1 g cm^{-3} , 1 molal NaCl solution will be more concentrated than 1 molar NaCl solution.
- Statement II:** Mole fraction of solute is temperature independent.
- In the light of above statements, choose the most appropriate option from the options given below.
- Both statement I and statement II are incorrect
 - Both statement I and statement II are correct
 - Statement I is correct but statement II is incorrect
 - Statement I is incorrect but statement II is correct
53. A 0.2 molal aqueous solution of electrolyte AB_2 freezes at -0.88°C . If K_f for H_2O is $1.86 \text{ K kg mol}^{-1}$, then degree of dissociation of AB_2 is
- 0.52
 - 0.68
 - 0.76
 - 0.84
54. 200 ml of an aqueous solution contains 18 g of glucose. The osmotic pressure of the solution at 27°C will be (Molar mass of glucose = 180 g mol^{-1})
- 6.12 atm
 - 8.25 atm
 - 12.3 atm
 - 10.5 atm
55. Choose the incorrect statement
- Chloroform molecule is able to form hydrogen bond with acetone molecule
 - Phenol and aniline mixture shows negative deviation from Raoult's law
 - 60% aqueous ethanol solution forms minimum boiling azeotrope at one atm pressure
 - Mixture of ethanol and acetone shows positive deviation from Raoult's law
56. The empirical formula of a non-electrolyte/non-associating solute is CH_2O . A solution containing 3 g of the solute in 1 L water exerts the same osmotic pressure as that of 0.05 M glucose solution. The molecular formula of the compound is
- $\text{C}_2\text{H}_4\text{O}_2$
 - CH_2O
 - $\text{C}_4\text{H}_8\text{O}_4$
 - $\text{C}_3\text{H}_6\text{O}_3$
57. If two volatile liquids A ($P_A^\circ = 540 \text{ torr}$) and B ($P_B^\circ = 420 \text{ torr}$) are mixed in the molar ratio of 2 : 1 respectively, then total vapour pressure of solution is
- 100 torr
 - 200 torr
 - 600 torr
 - 500 torr

58. Which among of the following gases is least soluble in water at 298 K?

Gases	K_H /kbar
Argon	40.3
Carbon dioxide	1.67
Formaldehyde	1.83×10^{-5}
Methane	0.413

The correct answer is

- (1) Argon
 (2) Carbon dioxide
 (3) Formaldehyde
 (4) Methane
59. Vapour pressure of carbon tetrachloride at a particular temperature is 400 mm of Hg. A non-volatile, non-electrolyte solid weighing 0.8 g when added to 77 g of carbon tetrachloride the vapour pressure of the solution becomes 390 mm of Hg. The molar mass of solute is (Molar mass of CCl_4 is 154 g mol^{-1} . Assume solution to be dilute.)
- (1) 120 g mol^{-1}
 (2) 64 g mol^{-1}
 (3) 50 g mol^{-1}
 (4) 32 g mol^{-1}
60. 0.1 mole of sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) is dissolved in 500 g of water. If K_b of water is $0.52 \text{ K kg mol}^{-1}$, then the boiling point of the solution will be nearly
- (1) 98.5°C
 (2) 101.5°C
 (3) 100.1°C
 (4) 102.2°C
61. In the electrolysis of aqueous NaCl solution the products obtained at anode and cathode respectively are
- (1) O_2 and H_2
 (2) Cl_2 and H_2
 (3) H_2 and O_2
 (4) HCl and O_2
62. How long (approximately) water should be electrolyzed by passing through 100 amperes current so that the oxygen released can completely burn 12 g carbon? (Atomic weight of C = 12u)
- (1) 6.4 hours
 (2) 0.8 hour
 (3) 3.2 hours
 (4) 1.07 hours
63. If $E_{\text{Fe}^{2+}|\text{Fe}}^0$ is x_1 , $E_{\text{Fe}^{3+}|\text{Fe}^{2+}}^0$ is Y and $E_{\text{Fe}^{3+}|\text{Fe}}^0$ is x_2 , then the value of Y will be
- (1) $3x_2 - 2x_1$
 (2) $x_2 - x_1$
 (3) $x_2 + x_1$
 (4) $2x_2 + 3x_1$
64. If for the electrochemical cell $\text{A(s)}|\text{A}^{2+} (0.1 \text{ M}) || \text{B}^+ (0.1 \text{ M}) | \text{B(s)}$ the emf is 5 V, then E_{cell}^0 of the reaction is
- (1) 6.78 V
 (2) 5.03 V
 (3) 2.18 V
 (4) 10.07 V
65. If the molar conductance of 0.04 M solution of weak monobasic acid is $10 \text{ S cm}^2 \text{ mol}^{-1}$ and at infinite dilution is $500 \text{ S cm}^2 \text{ mol}^{-1}$ then the dissociation constant of the acid will be
- (1) 8×10^{-4}
 (2) 1.6×10^{-5}
 (3) 2.4×10^{-6}
 (4) 4.0×10^{-4}
66. If limiting molar conductivity (Λ_m^∞) of a weak electrolyte (AB) is $400 \text{ S cm}^2 \text{ mol}^{-1}$ and molar conductivity of the electrolyte at a given concentration is $25 \text{ S cm}^2 \text{ mol}^{-1}$ then the percentage degree of dissociation of the electrolyte at the given concentration will be
- (1) 12.5%
 (2) 6.25%
 (3) 18.25%
 (4) 25%
67. The molar conductance at infinite dilution of AlCl_3 , BOH and BCl are 200, 100 and $50 \text{ S cm}^2 \text{ mol}^{-1}$ respectively then the molar conductance of A(OH)_2 at infinite dilution will be
- (1) $250 \text{ S cm}^2 \text{ mol}^{-1}$
 (2) $350 \text{ S cm}^2 \text{ mol}^{-1}$
 (3) $300 \text{ S cm}^2 \text{ mol}^{-1}$
 (4) $150 \text{ S cm}^2 \text{ mol}^{-1}$

68. E_{cell} of the cell $\text{Mg}|\text{Mg}^{2+}(0.1 \text{ M})||\text{Ag}^+(0.001 \text{ M})|\text{Ag}$ at 25°C is nearly ($E_{\text{cell}}^\circ = 3.17 \text{ V}$)
- 1.5 V
 - 3 V
 - 3.5 V
 - 4 V
69. Select the incorrect statement regarding lead storage battery.
- During discharging, Pb is anode
 - 38% solution of sulphuric acid is used as electrolyte
 - Cell reaction during recharging is a disproportionation reaction
 - pH of solution decreases during discharging
70. Consider the following two statements.
Statement (I): Galvanic cells that are designed to convert the energy of combustion of fuels like hydrogen, methane, etc directly into electrical energy are called fuel cells.
Statement (II): A secondary cell after use can be recharged by passing current through it in the opposite direction. In the light of above two statements, choose the correct option.
- Both statement (I) and statement (II) are correct
 - Statement (I) is correct and statement (II) is incorrect
 - Statement (I) is incorrect and statement (II) is correct
 - Both statement (I) and statement (II) are incorrect
71. Match list-I with list-II
- | | List-I
(Half reaction) | | List-II
(Standard reduction potential) |
|----|--|-------|---|
| a. | $\text{Mg}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Mg}(\text{s})$ | (i) | 0 V |
| b. | $\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu}(\text{s})$ | (ii) | -2.36 V |
| c. | $\text{Ni}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Ni}(\text{s})$ | (iii) | 0.34 V |
| d. | $\text{H}^+(\text{aq}) + \text{e}^- \rightarrow \frac{1}{2}\text{H}_2(\text{s})$ | (iv) | -0.25 V |
- Correct match is
- a(ii), b(iii), c(iv), d(i)
 - a(iii), b(ii), c(iv), d(i)
 - a(ii), b(iii), c(i), d(iv)
 - a(ii), b(iv), c(iii), d(i)
72. Correct order of reactivity of given metal in aqueous medium is
- $\text{Li} > \text{Na} > \text{K} > \text{Ca}$
 - $\text{Li} > \text{K} > \text{Ca} > \text{Na}$
 - $\text{Na} > \text{Ca} > \text{K} > \text{Li}$
 - $\text{K} > \text{Na} > \text{Li} > \text{Ca}$
73. Consider the following statements
- Iron can be prevented from corrosion by covering it with paint.
 - Cu can be used as sacrificial electrode to prevent corrosion of iron.
 - Surface of iron can be covered by metal like Zn to prevent corrosion.
- Correct statements are
- (a) and (b) only
 - (b) and (c) only
 - (a) and (c) only
 - (a), (b) and (c)
74. The number of Faradays required to produce 4.8 g of Mg from electrolysis of molten MgO is
- 0.2 F
 - 0.4 F
 - 0.6 F
 - 0.1 F
75. Reaction that takes place at anode during discharge of lead storage battery is
- $\text{Pb}(\text{s}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4 + 2\text{e}^-$
 - $\text{PbSO}_4(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{PbO}_2(\text{s}) + (\text{aq}) + 4\text{H}^+(\text{aq}) + 2\text{e}^-$
 - $\text{PbSO}_4(\text{s}) + 2\text{e}^- \rightarrow \text{Pb}(\text{s}) + \text{SO}_4^{2-}(\text{aq})$
 - $\text{PbO}_2(\text{s}) + \text{SO}_4^{2-}(\text{aq}) + 4\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{PbSO}_4 + \text{H}_2\text{O}$
76. Incorrect statement(s) about molecularity of reaction is/are
- Molecularity can be fractional
 - Molecularity can be zero
 - It is applicable to elementary reaction only
- (a) and (c) only
 - (b) and (c) only
 - (a) and (b) only
 - (a) only

77. Time required for 100% completion of a zero order reaction is (a_0 is initial concentration)

- (1) $\frac{a_0}{2k}$
- (2) $\frac{2a_0}{k}$
- (3) $\frac{3a_0}{k}$
- (4) $\frac{a_0}{k}$

78. Given below are two statements.

Statement I: Hydrolysis of cane sugar in acidic medium is a zero order reaction.

Statement II: Rate of reaction is temperature independent for zero order reaction.

In the light of 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

79. For chemical reaction rate of reaction doubles on increasing temperature from 300 K to 310 K, then activation energy for the reaction will be

- (1) 18.4 kJ
- (2) 106.8 kJ
- (3) 24.44 kJ
- (4) 53.42 kJ

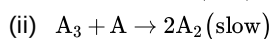
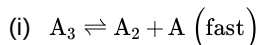
80. Given below are two statements.

Statement I: Decomposition of N_2O_5 is a first order reaction.

Statement II: Half life of a first order reaction is inversely proportional to the rate constant of the reaction. In the light of 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

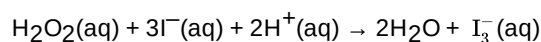
81. Mechanism of a hypothetical reaction, $2A_3 \rightarrow 3A_2$ is given below as



Rate law for the above reaction will be

- (1) $r = K[A_3]^2[A_2]^{-1}$
- (2) $r = K[A_3][A_2]$
- (3) $r = K[A_3]^2[A_2]$
- (4) $r = K[A_3]^2$

82. For a chemical reaction



If rate of disappearance of $I^-(aq)$ is $x \text{ mol l}^{-1}\text{s}^{-1}$ then rate of appearance of $I_3^-(aq)$ will be

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

83. Match order of reaction in list-I with units of rate constant in list-II

	List-I		List-II
a.	Zero order	(i)	$\text{Mol}^{-1} \text{L s}^{-1}$
b.	First order	(ii)	$\text{mol L}^{-1} \text{s}^{-1}$
c.	Second order	(iii)	$\text{mol}^{-2} \text{L}^2 \text{s}^{-1}$
d.	Third order	(iv)	s^{-1}

Correct match is

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

84. Following data is recorded for a reaction between A and B.

[A](M)	[B](M)	Rate ($\text{mol L}^{-1} \text{s}^{-1}$)
0.1	0.1	2×10^{-3}
0.2	0.1	4×10^{-3}
0.2	0.2	8×10^{-3}

Rate law for the reaction will be

- (1) $r = k[A][B]$
- (2) $r = k[A]^2[B]$
- (3) $r = k[A][B]^2$
- (4) $r = k[A]^2[B]^2$

85. If rate of reaction gets thrice for every 10°C rise of temperature then by what factor rate of reaction will change on raising temperature from 290 K to 320 K.

- (1) 9 times
- (2) $\frac{1}{9}$ times
- (3) 27 times
- (4) $\frac{1}{27}$ times

86. If half life of a first order reaction is 24 min, then time required to consume 93.75% reactant will be

- (1) 48 min
- (2) 72 min
- (3) 120 min
- (4) 96 min

87. For a first order reaction drop of concentration of reactant from 1 M to 0.6 M takes place in 10 min. Time required to drop concentration from 0.6 M to 0.36 M will be

- (1) 20 min
- (2) 10 min
- (3) 8 min
- (4) 12 min

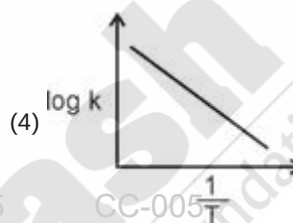
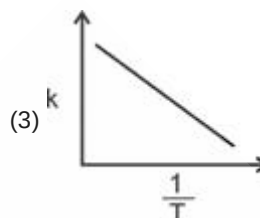
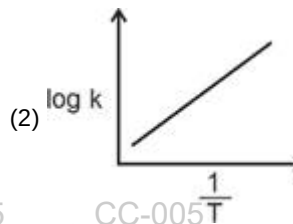
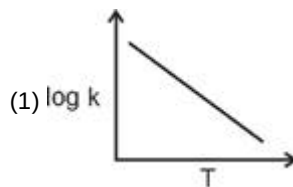
88. For a first order reaction
 $A(g) \rightarrow B(g) + C(g)$
 Following data is collected

Time	Total pressure
0 min	60 mmHg
20 min	105 mmHg

The half life of reaction will be

- (1) 10 min
- (2) 5 min
- (3) 40 min
- (4) 20 min

89. Which of the following graphs is correct for Arrhenius equation?



90. Given below are two statements.

Statement I: For exothermic reaction rate of reaction decreases with increase in temperature.

Statement II: For endothermic reaction rate of reaction increases with increase in temperature.

In the light of 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

91. A phytohormone, which is responsible for apical hook formation in dicot seedlings, also plays a role in

- (1) Increasing the bunch length in grapes and size of the apples.
- (2) Enhancing the rate of respiration during fruit ripening
- (3) Helps the plants to decrease their absorption surface
- (4) Promoting the seed and bud dormancy in peanuts seeds

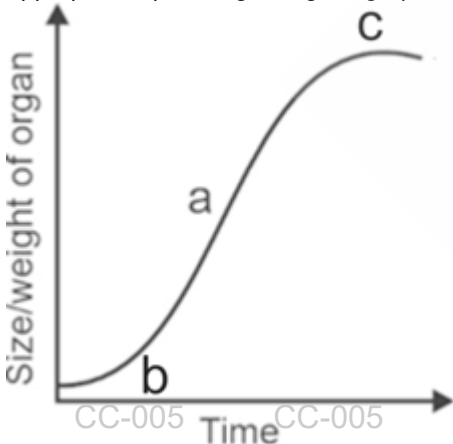
92. Select the **mismatched** pair

- (1) Invertase – Catalyses the conversion of sucrose into glucose and fructose
- (2) Alcohol dehydrogenase – Catalyses the conversion of 2-phosphoglycerate to phosphoenolpyruvate
- (3) Hexokinase – Catalyses the first irreversible reaction of glycolytic pathway
- (4) Pyruvate dehydrogenase – Catalyses the oxidative decarboxylation reaction of aerobic respiration

93. Single ovule in each ovary, and light, non-sticky pollen grains are commonly found in the flowers of

- (1) *Yucca*
- (2) Maize
- (3) *Salvia*
- (4) *Calotropis*

94. Observe the graph given below showing the growth curve that is characteristic of living organisms. Select the most appropriate option regarding the graph shown below.



A tree showing seasonal activities does not show a

- (1) typical S-shaped curve represented above, for its whole life time
- (2) This curve depicts the arithmetic growth pattern
- (3) In 'b' and 'c' phases, growth slows down due to space-food shortage and accumulation of toxins
- (4) This type of growth can be expressed as $W_0 = W_1 + e^{rt}$, where 'e' represents the efficiency index

95. Glycolysis does **not** involve

- (1) Substrate level phosphorylation
- (2) Formation of NADH
- (3) Oxidative decarboxylation reaction
- (4) Activity of isomerase enzyme

96. Read the following statements.

Statement A. Ethephon is used as aqueous solutions from which a volatile plant hormone is released slowly

Statement B. The gaseous hormone is used for artificial ripening of mango.

Select **correct** option w.r.t above A and B statements.

- (1) Both statements A and B are true
- (2) Only statement B is true
- (3) Only statement A is true
- (4) Both statements A and B are false

97. Select the **correct** statement about the mass of cells that are enclosed within the integuments of a megasporangium.

- (a) Has abundant reserve food materials
 - (b) Has the same ploidy as that of aleurone layer
 - (c) It is persistent in seeds of black pepper
 - (d) It is the central tissue from which archesporium differentiates
 - (e) It can participate in the polyembryony in Mango
- How many of the given are **correct**?

- (1) Two
- (2) One
- (3) Four
- (4) Three

98. Choose the **correct** set of dedifferentiated tissues.

- (1) Secondary xylem and phloem
- (2) Interfascicular vascular cambium and secondary phloem
- (3) Cork cambium and secondary xylem
- (4) Wound cambium and cork cambium

99. Select the **odd** one out w.r.t albuminous seeds

- (1) Wheat
- (2) Groundnut
- (3) Castor
- (4) Barley

100. Match column I with column II w.r.t. electron transport system.

	Column I		Column II
a.	Complex I	(i)	Ubiquinone receives reducing equivalents via this complex, generated during succinate oxidation
b.	Complex II	(ii)	Contains cytochromes a and a ₃ and two copper centres
c.	Complex III	(iii)	Oxidizes the electrons from NADH produced during TCA
d.	Complex IV	(iv)	Ubiquinol is oxidized with the transfer of electrons to cytochrome c via this complex

Choose the **correct** option

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

101. Read the given statements of assertion (A) and reason (R) and choose the **correct** option.

Assertion (A) : Pollen grains coming in contact with stigma is a chance factor in both wind and water pollination.

Reason (R) : The flowers produce enormous amount of pollens, as compared to number of ovules available for pollination.

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

102. Which of the following plant hormones show synergistic effect on cell division?

- (1) Auxin and ethylene
- (2) Gibberellin and abscisic acid
- (3) Auxin and cytokinin
- (4) Cytokinin and ethylene

103. Which of the given changes **does not** occur in embryo sac after fertilization?

- (1) Central cell – Forms primary endosperm cell
- (2) Antipodal cells – Degenerate
- (3) Secondary nucleus – Forms primary endosperm nucleus
- (4) Generative cell – Forms 4 male gametes

104. A typical dicotyledonous embryo does not have

- (1) Epicotyl
- (2) Hypocotyl
- (3) Epiblast
- (4) Embryonal axis

105. Oxidation of one molecule of NADH gives rise to 'A' of ATP, while that of one molecule of FADH₂ produces 'B' of ATP.

Choose the option that **correctly** fills in the blanks 'A' and 'B'

	A	B
(1)	3 molecules	2 molecules
(2)	2 molecules	1 molecule
(3)	4 molecules	3 molecules
(4)	1 molecule	3 molecules

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

106. The most resistant organic material, that is found in the exine layer of male gametophyte in angiosperms is

- (1) Cellulose and lignin
- (2) Sporopollenin
- (3) Chitin
- (4) Cellulose and pectin

107. In which of the following plant families, pollen grains of some members maintain viability for months?

- (a) Leguminosae
 - (b) Solanaceae
 - (c) Rosaceae
- The **correct** ones are

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

108. An enzyme of the TCA cycle, which is attached to the inner mitochondrial membrane, helps in the conversion of

- (1) Succinyl CoA into Succinic Acid
- (2) Fumaric Acid into Malic Acid
- (3) Succinic acid into Fumaric acid
- (4) α-Ketoglutaric acid into Succinyl CoA

109. Precursor of gibberellin is

- (1) Tryptophan
- (2) Methionine
- (3) Acetyl CoA
- (4) Violaxanthin

110. The phytohormone, responsible for xylem differentiation and cell division, is derivative of

- (1) A gaseous compound
- (2) An indole compound
- (3) Carotenoids
- (4) Terpenes

111. The activity of α -amylase in the endosperm of barley germinating seed is induced by

- (1) Ethylene
- (2) Cytokinin
- (3) IAA
- (4) Gibberellin

112. I. In pineapples, flowering and fruit set up are synchronised by A .

II. Ethylene increases number of B flowers and fruits in cucumber.

Complete the above statements by choosing correct option for A and B.

- (1) **A**– Gibberellins, **B**– Female
- (2) **A**– Ethylene, **B**– Female
- (3) **A**– Auxin, **B**– Male
- (4) **A**– Ethylene, **B**– Male

113. Find the **odd** one w.r.t. true fruits.

- (1) Strawberry
- (2) Groundnut
- (3) Mango
- (4) Orange

114. In both lactic acid and alcohol fermentation, what percent of the energy in glucose is released?

- (1) 80-90%
- (2) About 70%
- (3) Less than 7%
- (4) 13%

115. Glycerol would enter the respiratory pathway after being converted to

- (1) Phosphoenolpyruvate
- (2) Fatty acids
- (3) Acetyl CoA
- (4) Phosphoglyceraldehyde

116. Read the following statements and choose the **correct** option

Statement A : Fermentation takes place under anaerobic conditions in many prokaryotes and unicellular eukaryotes.

Statement B : The continued oxidation of two carbon molecule via TCA cycle requires the continued replenishment of oxaloacetic acid.

- (1) Only statement A is correct
- (2) Only statement B is correct
- (3) Both statements A and B are correct
- (4) Both statements A and B are incorrect

117. A plant hormone that promotes bolting in the rosette plants, is also responsible for

- (1) Inducing the seed development and dormancy
- (2) Hastening the maturity period in juvenile conifers
- (3) Promoting root growth and root hair formation
- (4) Promoting senescence and abscission of flowers and leaves

118. Select the **correct** option w.r.t. the phytohormones and their respective function

- (1) Auxins – Widely used to kill mature monocotyledonous weeds
- (2) Zeatin – Used to speed up the malting process in brewing industry
- (3) Ethylene – Used for thinning of fruits in cotton, cherry and walnut plants
- (4) ABA – Inhibits closure of stomata in plants

119. State true (T) or false (F) to the given statements.

(A) Differentiation results in development of structures that is commensurate with the function, the cells finally has to perform.

(B) Nutrients (macro and micro essential elements) are required by plants for the synthesis of protoplasm and act as source of energy.

(C) The rate of growth in bacteria, algae and yeast is measured by increase in number of cells.

(D) Kinetin, a naturally isolated cytokinin help to overcome the apical dominance.

Choose the **correct** option

	(A)	(B)	(C)	(D)
(1)	F	T	F	F
(2)	T	T	T	F
(3)	F	F	F	T
(4)	T	F	F	T

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

120. How many molecules of CO₂ are released during glycolysis of a molecule of glucose?

- (1) 6
- (2) 12
- (3) 3
- (4) Zero

121. What will be the number of chromosomes in the cells of synergid and nucellus respectively of a flowering plant if the megaspore mother cell contains 24 chromosomes?

- (1) 24 and 12
- (2) 24 and 36
- (3) 8 and 12
- (4) 12 and 24

122. Select the mismatched pair

(1)	Self-Incompatibility	Genetically controlled mechanism which discourage self-pollination
(2)	<i>Michelia</i>	Multicarpellary apocarpous gynoecium in the flower
(3)	Tapetum	Innermost layer of anther wall, helps in nourishment of pollen grains
(4)	Germ pore	Performs function like release of male gamete and absorption of water for seed germination

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

123. Which of the following statements is incorrect?

- (1) Pollen viability is highly variable and depends on prevailing temperature and humidity
- (2) Megasporangia generally differentiate a single megaspore mother cell in micropylar region of nucellus
- (3) Large animals like some primates or reptiles have been reported as pollinators in some species
- (4) In *Amorphophallus*, flowers have large feathery stigma to easily trap the pollen gains from air currents.

124. 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

125. Seeds provide advantage to angiosperms. Which of the following statements justify this?

- (a) Seeds generate new genetic recombination as these are product of sexual reproduction.
- (b) Protection is provided to young embryo by the hard seed coat.
- (c) Seeds have better adaptive strategies for dispersal to new habitat.
- (d) It has sufficient food reserves for nourishment of young seedling.

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

126. State True (T) or False (F) for the following statements.

- A. In a cell, usually protoplasmic respiration takes place to release energy.
- B. Facultative anaerobes can respire in presence of oxygen but normally they do not require oxygen.

	A	B
(1)	T	F
(2)	F	T
(3)	T	T
(4)	F	F

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

127. For a respiratory balance sheet, certain assumptions are made, these are given below. Identify the incorrect one.

- (1) NADH synthesised in EMP pathway is transferred into mitochondria
- (2) The intermediates in the pathway are utilized to synthesize other compounds
- (3) Only glucose is being respired no other alternative substrates are entering the pathway at any of the intermediary stages
- (4) There is a sequential orderly pathway functioning with one substrate forming the next

128. Consider the following statements and choose the correct option.

Statement A: In some species, embryo formation can occur from diploid egg cell that is formed without reduction division and leads to apomictic seed.

Statement B: Farmers have to buy hybrid seeds every year for agriculture if these seeds are made into apomictic.

- (1) Only statement A is correct
- (2) Only statement B is correct
- (3) Both statements A and B are correct
- (4) Both statements A and B are incorrect

129. In flowering plants, the stalk of the ovule by which it remains attached to placenta is called

- (1) Hilum
- (2) Funicle
- (3) Style
- (4) Filament

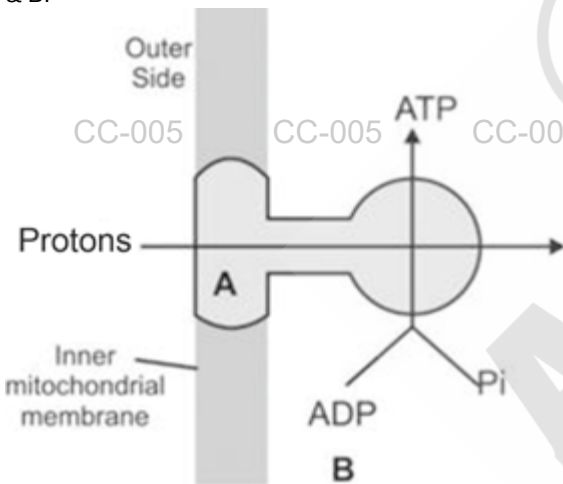
130. Female gametophyte of a typical angiosperm has

- (1) Two egg cells
- (2) Two synergids
- (3) Four antipodal cells
- (4) Seven polar nuclei

131. During artificial hybridisation, there is no need of emasculation when

- (1) Female parent produces unisexual flower
- (2) Female parent produces bisexual flower
- (3) There is a synchrony between maturation of stamen and pistil in a flower
- (4) Anthers and stigma lie close to each other in a flower

132. Consider the given figure and identify the part labelled as A & B.



- (1) A is a peripheral membrane protein, i.e., F_1
- (2) B is intermembrane space of mitochondria
- (3) B is the site of TCA cycle
- (4) A is head piece of an integral protein

133. Leaves of rice seedling remain out of water due to

- (1) Increase in indole compound that leads to rapid division of the cells
- (2) Increased ABA concentration that increases the length of the stem.
- (3) Gaseous phytohormone that induces rapid elongation of internode and petiole.
- (4) Increased concentration of cytokinin that inhibits the growth of lateral bud

134. Leaf 'A' with surface area 20 cm^2 grows 10 cm^2 in one day and leaf 'B' with surface area 30 cm^2 also grows 10 cm^2 in one day. The relative growth rates of leaves A and B, respectively are

- (1) 33% and 50%
- (2) 50% and 33.33%
- (3) 25% and 20%
- (4) 40% and 20%

135. Identify 6C intermediate utilised in dehydrogenation reaction during Krebs' cycle.

- (1) α -Ketoglutaric acid
- (2) Isocitric acid
- (3) Succinyl CoA
- (4) Oxalosuccinic acid

ZOOLOGY

- 136.** Passage of ova through the oviduct of humans is facilitated by
- (1) Amoeboid movement
 - (2) Flagellar movement
 - (3) Ciliary movement
 - (4) Pseudopodial movement
- 137.** The dorsal portion of the midbrain of humans consists of four round swellings called
- (1) Cerebral hemisphere
 - (2) Corpora quadrigemina
 - (3) Corpus callosum
 - (4) Cerebral aqueduct
- 138.** All of the following hormones are involved in carbohydrate metabolism, **except**
- (1) Cortisol
 - (2) Thyroxine
 - (3) Insulin
 - (4) Parathormone
- 139.** Among the following hormones, which one is released from neurohypophysis but secreted from another site?
- (1) Oxytocin
 - (2) Insulin
 - (3) Testosterone
 - (4) Somatostatin
- 140.** Which of the following is an example of cartilaginous joint in humans?
- (1) Joint present between humerus and pectoral girdle
 - (2) Knee joint
 - (3) Joint present between two coxal bones ventrally
 - (4) Joint present between carpals
- 141.** Which of the following is **incorrect** w.r.t number of bones in an adult man?
- (1) Collar bones – 2
 - (2) Floating ribs – 4
 - (3) Cranial bones – 20
 - (4) Ulna – 2
- 142.** GnRH is responsible to start and regulate sexual reproduction in human beings. It acts on
- (1) Hypothalamus
 - (2) Adenohypophysis
 - (3) Neurohypophysis
 - (4) Pars intermedia
- 143.** Bulb-like structures present at the terminals of an axon are called
- (1) Dendrites
 - (2) Nissl's granules
 - (3) Synaptic knobs
 - (4) Synaptic vesicles
- 144.** The potential developed in the post-synaptic neuron in response to a neurotransmitter is
- (1) Either excitatory or inhibitory
 - (2) Neither excitatory nor inhibitory
 - (3) Excitatory only
 - (4) Inhibitory only
- 145.** The greyish appearance of cerebral cortex is largely due to
- (1) Accumulation of myelin sheath
 - (2) Concentrated neuron cell bodies
 - (3) Presence of iron containing cytochrome pigment
 - (4) Presence of myelinated axon
- 146.** Bone is the hard tissue in the body that is known to perform different functions of body, **except**
- (1) Bones provide a framework for the attachment of muscles and other tissues.
 - (2) The bone marrow in some bones is the site of production of blood cells.
 - (3) Bones serve as a reservoir for calcium and phosphorus, essential minerals for various cellular activities throughout the body.
 - (4) Bones serve to store plenty of water for keeping body firm.
- 147.** In a skeletal muscle fibre, the 'M' line does not bisect the
- (1) 'I' band
 - (2) 'A' band
 - (3) 'H' zone
 - (4) Sarcomere
- 148.** How many of the following are correct statements?
1. All voluntary muscles are striated.
 2. All striated muscles are voluntary.
 3. All unstriated muscles are involuntary.
 4. All involuntary muscles are unstriated.
- Choose the **correct** option.
- (1) One
 - (2) Two
 - (3) Three
 - (4) Four

149. Choose the correct option with respect to the ribs of humans.

- (1) There are six pairs of true ribs.
- (2) They are bicephalic on their ventral end
- (3) Connected dorsally to sternum and ventrally to vertebral column
- (4) 8th, 9th and 10th pair of ribs join the seventh rib with the help of hyaline cartilage

150. Read the following statements.

- a. It maintains cardio-vascular system and kidney functions.
 - b. It is given to patients who have undergone transplantation to suppress their immune response.
 - c. It is the main glucocorticoid which also stimulates RBCs production.
- Select the option representing the hormone for which all of the above statements are true.

- (1) Cortisol
- (2) Aldosterone
- (3) Epinephrine
- (4) Thyroxine

151. Which of the following structures is formed by the fusion of four vertebrae and is found in adult humans?

- (1) Atlas
- (2) Axis
- (3) Coccyx
- (4) Lumbar

152. Choose the incorrect statement w.r.t. humans.

- (1) In the resting state, a subunit of meromyosin masks the active sites of actin filament.
- (2) Myoglobin content is higher in red muscle fibres as compared to white muscle fibres
- (3) Cranial bones form the hard protective covering for the brain.
- (4) Saddle joint is present between carpal and metacarpal of thumb.

153. Match Column I with Column II w.r.t. humans and select the correct option.

	Column I		Column II
a.	Mandible	(i)	Present at the base of buccal cavity
b.	Hyoid	(ii)	Triangular flat bone of pectoral girdle
c.	Scapula	(iii)	Movable bone of skull

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

154. Consider the following statements w.r.t. disorders of muscular and skeletal system.

Statement (A) : In myasthenia gravis, progressive degeneration of skeletal muscles occurs mostly due to genetic disorder.

Statement (B) : Osteoporosis is an age-related disorder characterised by decreased bone mass. Select the correct option.

- (1) Only statement (A) is correct
- (2) Only statement (B) is correct
- (3) Both statements (A) and (B) are correct
- (4) Both statements (A) and (B) are incorrect

155. Human neural system is divided into the central neural system and the peripheral neural system. The former division includes

- (1) Brain and cranial nerves
- (2) Brain and spinal cord
- (3) Spinal cord and spinal nerves
- (4) Cranial and spinal nerves

156. Motor end plate contains

- (i) A motor neuron
 - (ii) Sarcolemma of muscle fibres
 - (iii) A sensory neuron
- Choose the correct option.

- (1) (ii) only
- (2) (i), (ii) and (iii)
- (3) (ii) and (iii) only
- (4) (i) and (ii) only

157. Choose the **incorrect** statement w.r.t. neurons.

- (1) Neural membrane is polarized at rest.
- (2) Minimum strength of stimulus required to initiate depolarisation is called threshold stimulus.
- (3) Efflux of K⁺ from axoplasm causes repolarisation
- (4) The Na⁺ – K⁺ pump transports equal number of ions across the axonal membrane for maintaining the polarised state.

158. Which of the following nerve fibres transmit impulses from tissues/organs to the CNS?

- (i) Afferent nerve fibres
 - (ii) Efferent nerve fibres
 - (iii) Motor nerve fibres
 - (iv) Sensory nerve fibres
- Choose the correct option.

- (1) Only (ii)
- (2) Only (iii)
- (3) Both (i) and (iv)
- (4) Both (ii) and (iv)

159. Which of the following is incorrectly paired w.r.t. to nerve fibres present in PNS?

- (1) Unmyelinated nerve fibre - Enclosed by Schwann cell
- (2) Synaptic knobs – Possess synaptic vesicles
- (3) Nodes of Ranvier–Gaps between two adjacent myelin sheaths
- (4) Multipolar neuron – With two axon and one dendrite

160. All of the following are the major/direct functions of hypothalamus, **except**

- (1) Controls the urge for eating
- (2) Secretes hormones
- (3) Regulates expression of emotional reactions along with the limbic lobe
- (4) Controls gastric secretions

161. Graves' disease is a form of hyperthyroidism characterised by all of the following, **except**

- (1) Weight loss
- (2) Protrusion of eye balls
- (3) High TSH in blood and decreased body temperature
- (4) Increased BMR

162. Mineralocorticoids are produced by the outermost layer of adrenal cortex called

- (1) Zona glomerulosa
- (2) Zona fasciculata
- (3) Zona reticularis
- (4) Adrenal medulla

163. Match the column I with column II w.r.t. glands and disorders related to them.

	Column I		Column II
a.	Adrenal gland	(i)	Acromegaly
b.	Parathyroid gland	(ii)	Cretinism
c.	Thyroid gland	(iii)	Tetany
d.	Pituitary gland	(iv)	Addison's disease

Choose the correct option.

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

164. Given below are two statements

Statement (I) : The Leydig cells, which are present in intertubular spaces, produce a group of hormones called androgens.

Statement (II) : Androgens act on CNS influence libido and also produce catabolic effects on protein and carbohydrate metabolism.

Select the **correct** option

- (1) Both statements (I) and (II) are correct
- (2) Both statements (I) and (II) are incorrect
- (3) Statement (I) is correct but statement (II) is incorrect
- (4) Statement (II) is correct but statement (I) is incorrect

165. How many of the function given in the box below is/are true for adrenal medullary hormones?

Increased alertness, Glycogenesis, Lipolysis, Piloerection, Proteolysis, Decrease in strength of heart contraction

Choose the correct option.

- (1) Two
- (2) Four
- (3) One
- (4) Three

166. Select the **incorrect** statement from the options given below.

- (1) The cells of the human body exhibit amoeboid, ciliary and muscular movements.
- (2) Muscle fibre is the anatomical unit of a muscle.
- (3) Sarcomere is the functional unit of myofibril.

Each sarcomere has one central 'A' band made of thick filaments and only one half 'I' band made of thin filaments.

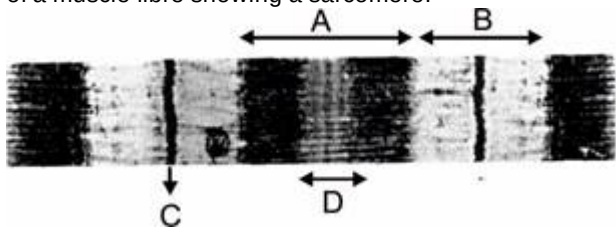
167. During muscle contraction, cross-bridge is broken between actin and myosin when

- (1) Ca^{+2} binds to tropomyosin
- (2) ATP binds with the head of myosin
- (3) There is hydrolysis of ATP into ADP and Pi
- (4) ATP binds with the actin filament

168. Hormone that works against diuresis is produced from

- (1) Posterior pituitary
- (2) Anterior pituitary
- (3) Hypothalamus
- (4) Thymus

169. Following is a diagrammatic representation of the anatomy of a muscle fibre showing a sarcomere.



Use the following terms to label the structures in the figure given above.

- A – band
- I – band
- H – zone
- Z – line

Choose the option with all correct labels.

	A	B	C	D
(1)	M-line	H-zone	A-band	I-band
(2)	Z-line	H-zone	A-band	I-band
(3)	Z-line	I-band	A-band	H-zone
(4)	A-band	I-band	Z-line	H-zone

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

170. Select the correct statement w.r.t. vertebral column in adult humans.

- (1) It is formed by 26 serially arranged units called vertebrae and is ventrally placed in the body.
- (2) Each vertebra except atlas has a central canal through which neural canal passes.
- (3) First vertebra is the axis and it articulates with the occipital condyles.
- (4) The number of cervical vertebrae are seven in almost all mammals including human beings.

171. How many of the given statements is/are correct w.r.t. anatomy of human brain?

- (a) Brain is in direct contact with the skull.
- (b) Both cerebellar hemispheres are connected by corpus callosum.
- (c) The cerebral cortex contains motor areas, sensory areas and large regions that are neither clearly sensory nor motor in function.
- (d) The inner parts of cerebral hemispheres and a group of associated deep structures like amygdala, hippocampus, etc., form the limbic lobe.

Choose the correct option.

- (1) One
- (2) Two
- (3) Three
- (4) Four

172. Which of the following is/are not under the control of thyroxine?

- A. Regulation of BMR
- B. Mental development
- C. Maintenance of water and electrolyte balance
- D. Regulation of blood calcium levels

Choose the correct answer from the options given below.

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

173. Given below are two statements. One is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A) : Thyroxine interacts with membrane-bound receptors.

Reason (R) : Thyroxine mostly regulates gene expression or chromosome functions by the interaction of hormone-receptor complex with the genome.

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

- (1) (A) is incorrect but (R) is correct
- (2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
- (3) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (4) (A) is correct but (R) is incorrect

174. Choose the incorrect match w.r.t parts of human brain and structure related to it.

- (1) Midbrain – Corpora quadrigemina
- (2) Hindbrain – Thalamus
- (3) Forebrain – Diencephalon
- (4) Brain stem – Medulla oblongata

175. Total number of bones present in the axial skeleton of adult human is

- (1) 60
- (2) 80
- (3) 120
- (4) 90

176.Assertion (A) : Impulse transmission across an electrical synapse is always faster than that across a chemical synapse.

Reason (R) : In electrical synapses, membranes of pre and post-synaptic neurons are in very close proximity and gap junctions facilitate quicker transmission of impulses as compared to chemical synapses.

In the light of above statements, choose the correct option.

- (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 statement but (R) is false.
- (4) Both (A) and (R) are false statements.

177.Source gland of androgenic steroids can be the same as that of

- (1) Cortisol and Aldosterone
- (2) Vasopressin and Oxytocin
- (3) PTH and Calcitriol
- (4) Somatotropin and Prolactin

178.A neuron, with a cell body and one axon only is mostly found in

- (1) Cerebral cortex of human
- (2) Retina of human eye
- (3) Embryonic stage of human
- (4) Dorsal root ganglion of spinal nerve of human

179.A 32 year old man suffers from impaired calcium and phosphorous metabolism in his body. Irregular secretions of which of the following glands can lead to this problem?

- (1) Adrenal medulla
- (2) Parathyroid
- (3) Pineal
- (4) Pancreas

180.How many bones given in the box below are not the part of cranium in humans?

Ethmoid, Temporal, Zygomatic, Maxilla, Frontal, Lacrimal

Select the **correct** option.

- (1) Four
- (2) Three
- (3) Five
- (4) Six

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