Academic ace

MHT-CET

10 FULL MOCK TESTS

with Solutions

Physics | Chemistry | Biology

▶ 10 Full-length practice papers

▶ Smart keys:
- Smart Code
- Thinking Hatke
- Smart tip
- Caution

▶ Self-Assessment Score Card

For **MHT-CET EXAM 2025**

Based on latest paper pattern

Target Publications® Pvt. Ltd.

Academicace

MHT-CET

10 FULL MOCK TESTS
with Solutions

PHYSICS | CHEMISTRY | BIOLOGY

Salient Features

- **10 Full-Length Practice Papers**
  - A complete set of 10 question papers covering Physics, Chemistry and Biology
  - Designed in line with the latest MHT-CET exam pattern

- **Comprehensive Solutions**
  - Detailed solutions are provided for challenging Multiple Choice Questions (MCQs)
  - Solutions are crafted to ensure easy comprehension, with special focus on complex questions

- **Smart Keys to Enhance Learning and Problem-Solving Skills**
  - *Smart Code*   - *Caution*   - *Thinking Hatke*   - *Smart Tip*

- **Self-Assessment Score Card**
  - Scorecards for tracking progress with each paper
  - Enables self-evaluation after every paper to identify areas needing improvement

PREFACE

In the ever-evolving journey of education, where curiosity shapes dreams and knowledge paves the way, we are excited to introduce **'MHT-CET: Full Mock Tests with Solutions (PCB)'** - a gateway to testing your readiness. This book is thoughtfully curated to evaluate the depth of understanding accumulated by students over two years of junior college.

Designed to reflect the rigor and scope of the MHT-CET examination, this collection of Mock Tests is your essential companion. Each test is crafted in harmony with the official exam pattern, ensuring comprehensive coverage of the core concepts in **Physics, Chemistry** and **Biology.**

To aid students, detailed solutions are provided to difficult MCQs. **Smart Keys** (Smart Code, Caution, Thinking Hatke and Smart Tip) are provided, which offer supplemental explanations for the tricky questions and are intended to help students approaching problems in novel ways in the shortest possible time with accuracy.

Smart Keys

♦ **Smart Code** showcases simple and smart mnemonic.
♦ **Caution** apprises students about mistakes often made while solving MCQs.
♦ **Thinking Hatke** reveals quick witted approach to crack the specific question.
♦ **Smart Tip** comprises of short tricks designed to effectively tackle MCQs.

The book features a **Self-Assessment Score Card** at the end, thoughtfully designed to help you collectively record and evaluate your scores across all 10 mock tests for comprehensive self-evaluation.

We hope that this book will enable students to optimize their time-management abilities to achieve high scores in the examination.

They say, *'With the right tools, even ordinary men achieve extraordinary results'*. This book is designed to be the perfect tool that will help students to launch their careers in the most extraordinary way possible.

Publisher
Edition: First

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

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MHT-CET PAPER PATTERN

- There will be three papers of Multiple Choice Questions (MCQs) in 'Mathematics', 'Physics and Chemistry' and 'Biology' of 100 marks each.
- Duration of each paper will be 90 minutes.
- Questions will be based on Syllabus of State Council of Educational Research and Training, Maharashtra with approximately 20% weightage given to Std. XI and 80% weightage will be given to Std. XII curriculum.
- Difficulty level of questions will be at par with JEE (Main) for Mathematics, Physics, Chemistry and at par with NEET for Biology.
- There will be no negative marking.
- Questions will be mainly application based.
- Details of the papers are as given below:

Paper	Subject(s)	No. of MCQs based on		Mark(s) Per Question	Total Marks	Duration in Minutes
		Std XI	**Std XII**			
Paper I	Mathematics	10	40	2	100	90
Paper II	Physics	10	40	1	100	90
	Chemistry	10	40			
Paper III	Biology	20	80	1	100	90

- Questions will be set on
  i. the entire syllabus of Std. XII of Physics, Chemistry, Mathematics and Biology subjects prescribed by State Council of Educational Research and Training, Maharashtra and
  ii. chapters / units from Std. XI curriculum as mentioned below:

Sr.no	Subject	Chapters/Units of Std. XI
1	Physics	Motion in a Plane, Laws of Motion, Gravitation, Thermal Properties of Matter, Sound, Optics, Electrostatics, Semiconductors
2	Chemistry	Some Basic Concepts of Chemistry, Structure of Atom, Chemical Bonding, Redox Reactions, Elements of Group 1 and Group 2, States of Matter (Gaseous and Liquid States), Adsorption and Colloids (Surface Chemistry), Hydrocarbons, Basic Principles of Organic Chemistry
3	Mathematics	Trigonometry II, Straight Line, Circle, Measures of Dispersion, Probability, Complex Numbers, Permutations and Combinations, Functions, Limits, Continuity
4	Biology	Biomolecules, Respiration and Energy Transfer, Human Nutrition, Excretion and Osmoregulation

- **Language of Question Paper:**
  The medium for examination shall be English / Marathi / Urdu for Physics, Chemistry and Biology. Mathematics paper shall be in English only.

- **Duration of Online Computer Based Test (CBT):**
  The duration of the examination for PCB is 180 minutes and PCM is 180 minutes.
  a. **For PCM** - This paper is having 2 Groups of Physics-Chemistry and Mathematics with total 180 Minutes Duration, first 90 minutes Physics and Chemistry will be enabled and only after completion of first 90 minutes' time Physics-Chemistry group will be auto submitted and Mathematics group will be enabled with 90 minutes' duration.
  b. **For PCB** - This paper is having 2 Groups of Physics-Chemistry and Biology with total 180 Minutes Duration, first 90 minutes Physics and Chemistry will be enabled and only after completion of time response for Physics-Chemistry group will be auto submitted and Biology group will be enabled with 90 minutes' duration.
  [**Note :** Candidate should note that if he/she appearing for both the groups i.e. PCM and PCB, the Percentile / Percentage score of Physics or Chemistry will not be interchanged among the groups.]
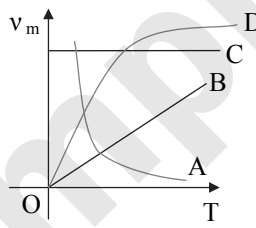
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Physics and Chemistry

Time: 90 Minutes   Total Marks: 100

PHYSICS

1. Most excited states of an atom have life times of about
(A) 10^{-8} s   (B) 10^{-3} s
(C) 1 s   (D) 10 s

2. The speed of sound in ideal gas at a given temperature 'T' is 'V'. The r.m.s. speed of gas molecules at that temperature is 'V_{rms}'. The ratio of velocities 'V' and 'V_{rms}' for helium and oxygen gases are 'X' and 'X_1' respectively. Then $\dfrac{X}{X_1}$ is $\left(\gamma_{He} = \dfrac{5}{3}, \gamma_{O_2} = \dfrac{7}{5} \right)$

(A) $\sqrt{\dfrac{5}{21}}$ (B) $\dfrac{21}{5}$

(C) $\dfrac{21}{\sqrt{5}}$ (D) $\dfrac{5}{\sqrt{21}}$

3. For a perfectly black body, the graph is plotted between the frequency of radiation with maximum intensity (v_m) and the absolute temperature 'T'. Out of the following which is the correct graph?

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

4. The magnetic field (B) inside a long solenoid having 'n', turns per unit length and carrying current 'I' when iron core is kept in it is (μ_0 = permeability of vacuum, χ = magnetic susceptibility)
(A) $\mu_0 nI (1- \chi)$ (B) $\mu_0 nI\chi$
(C) $\mu_0 nI^2 (1 + \chi)$ (D) $\mu_0 nI (1 + \chi)$

5. In Fraunhofer diffraction pattern, slit width is 0.2 mm and screen is at 4 m away from the lens. If wavelength of light used is 5500 Å, then the distance between the first minimum on either side of the central maximum is (θ is small and measured in radian)
(A) 10^{-1} m   (B) 10^{-2} m
(C) 2×10^{-2} m   (D) 2×10^{-1} m

6. What is the output Y in the following circuit, when all the three inputs A, B, C are first 0 and then 1?
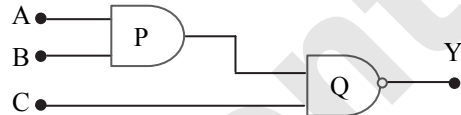
(A) 1, 1   (B) 0, 1   (C) 0, 0   (D) 1, 0

7. A series R-C circuit is connected to an alternating voltage source. Consider two situations:
(i) When capacitor is air filled.
(ii) When capacitor is mica filled.
Current through resistor is i and voltage across capacitor is V then:
(A) $V_a = V_b$ (B) $V_a < V_b$
(C) $V_a > V_b$ (D) $i_a > i_b$

8. A metal sphere of radius 1 cm is given a charge of 3.14 μC. Find the electric intensity at a distance of 1 m from the centre of sphere. [$\varepsilon_0 = 8.85 \times 10^{-12}$ F/m]
(A) 3.32×10^4 N/C   (B) 2.83×10^4 N/C
(C) 2.5×10^4 N/C   (D) 2.14×10^4 N/C

9. A mass 'm' attached to a spring oscillates with a period of 3 second. If the mass is increased by 0.6 kg, the period increases by 3 second. The initial mass 'm' is equal to
(A) 0.1 kg   (B) 0.2 kg
(C) 0.3 kg   (D) 0.4 kg

10. If m is mass of electron, v its velocity, r the radius of stationary circular orbit around a nucleus with charge Ze, then from Bohr's second postulate, the kinetic energy K.E. = $\dfrac{1}{2}mv^2$ of the electron in C.G.S. system is equal to

(A) $\dfrac{1}{2} \dfrac{Ze^2}{r}$ (B) $\dfrac{1}{2} \dfrac{Ze^2}{r^2}$

(C) $\dfrac{Ze^2}{r}$ (D) $\dfrac{Ze}{r^2}$

11. **Assertion:** The average velocity of the object over an interval of time is either smaller than or equal to the average speed of the object over the same interval.
Reason: Velocity is a vector quantity and speed is a scalar quantity.

(A) Assertion is True, Reason is True; Reason is a correct explanation for Assertion
(B) Assertion is True, Reason is True; Reason is not a correct explanation for Assertion
(C) Assertion is True, Reason is False
(D) Assertion is False, Reason is True.

12. Two small spherical metal balls, having equal masses, are made from materials of densities ρ_1 and ρ_2 ($\rho_1 = 8\rho_2$) and have radii of 1 mm and 2 mm, respectively, they are made to fall vertically (from rest) in a viscous medium whose coefficient of viscosity equals η and whose density is $0.1\rho_2$. The ratio of their terminal velocities would be,
(A) $\dfrac{79}{36}$ (B) $\dfrac{79}{72}$ (C) $\dfrac{19}{36}$ (D) $\dfrac{39}{72}$

13. With same initial conditions, an ideal gas expands from volume V_1 to V_2 in three different ways. The work done by the gas is W_1, if the process is isothermal, W_2 if isobaric and W_3 if adiabatic, then
(A) $W_2 > W_1 > W_3$ (B) $W_2 > W_3 > W_1$
(C) $W_1 > W_2 > W_3$ (D) $W_1 > W_3 > W_2$

14. If in a moving coil galvanometer, a current I produces a deflection θ, then
(A) $I \propto \tan \theta$ (B) $I \propto \theta$
(C) $I \propto \theta^2$ (D) $I \propto \sqrt{\theta}$

15. In a series A.C. circuit, $R = 200\ \Omega$, $X_L = 400\ \Omega$ and $X_C = 200\ \Omega$. The phase difference between the applied e.m.f. and the current will be
(A) 0 (B) 37° (C) 45° (D) 90°

16. Reason of weightlessness in a satellite is
(A) zero gravity.
(B) centre of mass.
(C) zero reaction force by satellite surface.
(D) None of these.

17. In a resonance tube, first and second resonance positions occur respectively at 28 cm and 88 cm. If the frequency of the fork is 300 Hz, then the speed of sound is
(A) 300 m/s (B) 360 m/s
(C) 696 m/s (D) 480 m/s

18. Two spheres of equal masses, one of which is a thin spherical shell and then other a solid, have the same moment of inertia about their respective diameters. The ratio of their radii will be,
(A) 5 : 7 (B) 3 : 5
(C) $\sqrt{3} : \sqrt{5}$ (D) $\sqrt{3} : \sqrt{7}$

19. Two charges $+5\ \mu C$ and $+10\ \mu C$ are placed 20 cm apart. The net electric field at the mid-point between the two charges is
(A) 4.5×10^6 N/C directed towards $+5\ \mu C$
(B) 4.5×10^6 N/C directed towards $+10\ \mu C$
(C) 13.5×10^6 N/C directed towards $+5\ \mu C$
(D) 13.5×10^6 N/C directed towards $+10\ \mu C$

20. The moment of inertia of uniform circular disc is maximum about an axis perpendicular to the disc and passing through point
(A) A
(B) B
(C) C
(D) D
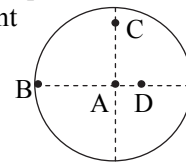
21. In photoelectric effect, for a light of different intensities but of same frequency, the stopping potential for a given metal is
(A) different (B) zero
(C) infinity (D) same

22. A bomb of mass 9 kg explodes into two pieces of mass 3 kg and 6 kg. The velocity of mass 3 kg is 16 m/s, The kinetic energy of mass 6 kg is
(A) 96 J (B) 192 J (C) 384 J (D) 768 J

23. When a solid ball of volume V is released in a viscous liquid it experiences a viscous force F. If the solid ball of the same material of volume V/2 is released in the liquid then the viscous force will be (where η = coefficient of viscosity)
(A) $\eta F/2$ (B) $F/2$ (C) $2F$ (D) $2\eta F$

24. In Young's double slit experiment with a source of light of wavelength 5860 Å, the first maxima will occur when
(A) path difference is 9480 Å.
(B) phase difference is 2π radian.
(C) path difference is 5860 Å.
(D) phase difference is π radian.

25. The angle made by orbital angular momentum of electron with the direction of the orbital magnetic moment is _____.
(A) 180° (B) 90° (C) 120° (D) 60°

26. A series LCR circuit containing a resistance 'R' has angular frequency 'ω'. At resonance the voltage across resistance and inductor are 'V_R' and 'V_L' respectively, then value of inductance 'L' will be
(A) $\dfrac{V_R R}{V_L \omega}$ (B) $\dfrac{V_L}{V_R R \omega}$
(C) $\dfrac{V_R \omega}{V_L R}$ (D) $\dfrac{V_L R}{V_R \omega}$

27. Electronic configuration of germanium is 2, 8, 18 and 4. To make it extrinsic semiconductor small quantity of antimony is added. The correct statement is
(A) The material obtained will be n-type germanium in which electrons and holes are equal in number.
(B) The material obtained will be p-type germanium.
(C) The material obtained will be n-type germanium which has more electrons than holes at room temperature.
(D) The material obtained will be n-type germanium which has less electrons than holes at room temperature.

28. A pipe closed at one end produces a fundamental note of 412 Hz. It is cut into two pieces of equal length. The fundamental notes produced by the two pieces are
(A) 206 Hz, 412 Hz (B) 412 Hz, 824 Hz
(C) 206 Hz, 824 Hz (D) 824 Hz, 1648 Hz

29. The moment of inertia of a disc of radius R, thickness t and density ρ about its diameter is
(A) $\dfrac{t\rho\pi R^2}{4}$ (B) $\dfrac{3t\rho\pi R^4}{2}$
(C) $\dfrac{\rho t\pi R^4}{4}$ (D) $\dfrac{5t\rho\pi R^4}{4}$

30. A charge Q is divided into two charges q and $(Q - q)$. What should be the relation between Q and q so that force between q and $(Q - q)$ is maximum?
(A) $Q = \dfrac{1}{2}q$ (B) $Q = 2q$
(C) $Q = q$ (D) $Q = \dfrac{3}{2}q$

31. A body of mass m is attached to the lower end of a spring whose upper end is fixed. The spring has negligible mass. When the mass m is slightly pulled down and released, it oscillates with a time period of 3 s. When the mass m is increased by 1 kg, the time period of oscillations becomes 5 s. The value of m in kg is
(A) $\dfrac{9}{16}$ (B) $\dfrac{3}{4}$ (C) $\dfrac{4}{3}$ (D) $\dfrac{16}{9}$

32. Which one of the following properties is not possessed by a photon?
(A) energy (B) rest mass
(C) momentum (D) frequency

33. For a ray of light, the critical angle is minimum, when it travels from
(A) glass to air (B) air to glass
(C) glass to water (D) water to glass

34. An ideal gas is made to go from a state A to state B in the given two different ways (see figure) (i) an isobaric and then an isochoric process and (ii) an isochoric and then an isobaric process. The work done by gas in the two processes is W_1 and W_2 respectively. Then,
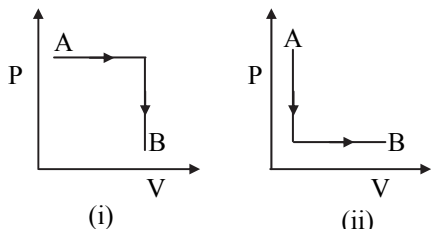
(i)   (ii)
(A) $W_1 = W_2$ (B) $W_1 > W_2$
(C) $W_1 < W_2$ (D) $W_1 = W_2/2$

35. A horizontal rod of mass 20 g and length 40 cm is placed on a smooth plane inclined at an angle of 60° with the horizontal, with the length of the rod parallel to the edge of the inclined plane. A uniform magnetic field of induction B is applied vertically downwards. If the current through the rod is 1.73 ampere, then the value of B for which the rod remains stationary on the inclined plane is
(A) 0.5 T (B) $(1.73)^{-1}$ T
(C) 1 T (D) $\sqrt{2}$ (1.73) T

36. A coil having effective area A, is held with its plane normal to a magnetic field of induction B. The magnetic induction is quickly reduced to 25% of its initial value in 4 s. Then e.m.f. induced across the coil will be
(A) $\dfrac{3AB}{16}$ (B) $\dfrac{3AB}{4}$ (C) $\dfrac{AB}{4}$ (D) $\dfrac{AB}{2}$

37. A geostationary satellite is orbiting the earth at the height of 6R above the surface of earth. R being radius of earth. The time period of another satellite at a height of 2.5 R from the surface of earth is
(A) 10 hour (B) $\dfrac{6}{\sqrt{2}}$ hour
(C) 6 hour (D) $6\sqrt{2}$ hour

38. Two springs of spring constants 'K' and '2K' are stretched by same force. If 'E_1' and 'E_2' are the potential energies stored in them respectively, then
(A) $E_1 = \dfrac{1}{4}E_2$ (B) $E_1 = 2E_2$
(C) $E_2 = 2E_1$ (D) $E_1 = E_2$

39. The reverse breakdown voltage of a Zener diode is 5.6 V in the given circuit.
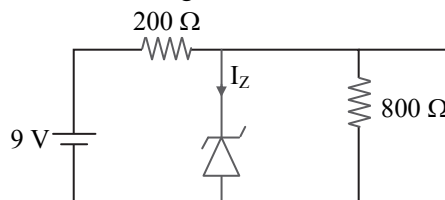
The current I_z through the Zener is:
(A) 10 mA (B) 17 mA
(C) 15 mA (D) 7 mA

40. Figure shows plot of charge versus potential difference for four parallel plate capacitors, which have same plate area, dielectric medium but different distance between the plates. Which one of them has the smallest plate distance?
(A) 1
(B) 2
(C) 3
(D) 4

3
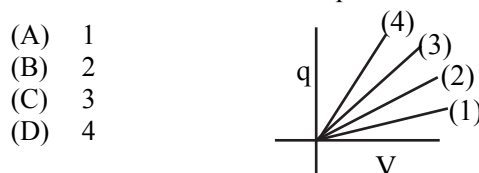
41. In the Wheatstone bridge, (shown in the figure) $X = Y$ and $A > B$. The direction of the current between a and b will be

(A) from a to b.
(B) from b to a.
(C) from b to a through c.
(D) from a to b through c.

42. Water is flowing through a tube of diameter 1 cm at 6 cm/s. Taking $\eta = 10^{-2}$ poise, the flow of the liquid and Reynold's number are
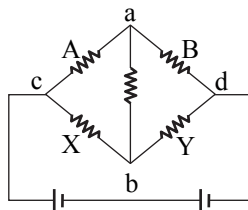(A) streamline, 60   (B) streamline, 600
(C) turbulent, 6000   (D) turbulent, 9000

43. Two springs are of different spring constants. On hanging equal masses at their free ends,
(A) the potential energies for both the springs are same.
(B) the potential energy for the spring with lesser spring constant is more.
(C) the potential energy for the spring with higher spring constant is more.
(D) the spring constant becomes equal.

44. Heat energy is incident on the surface at the rate of 2000 J/min. If coefficient of absorption is 0.8 and coefficient of reflection is 0.1 then heat energy transmitted by the surface in 10 minutes is
(A) 2000 J   (B) 500 J
(C) 700 J   (D) 1000 J

45. The thermal conductivity of a material in CGS system is 0.8. In steady state, the rate of flow of heat 20 cal/s-cm^2, then the thermal gradient will be
(A) 10 °C/cm   (B) 12 °C/cm
(C) 25 °C/cm   (D) 20 °C/cm

46. An e.m.f. of 10 volt is produced by a self inductance when the current changes at a steady rate from 6 A to 4 A in 1 millisecond. The value of self inductance is
(A) zero   (B) 5 H
(C) 5000 H   (D) 5 mH

47. An open pipe of certain length produces fundamental frequency f_1. A closed pipe of some other length produces fundamental frequency f_2. When the two are joined to form a longer close tube, its fundamental frequency will be

(A) $\dfrac{f_1 f_2}{f_1 + f_2}$ (B) $\dfrac{2f_1 f_2}{f_1 + f_2}$

(C) $\dfrac{f_1 f_2}{f_1 + 2f_2}$ (D) $\dfrac{f_1 f_2}{2f_1 + f_2}$

48. Work done during the process of charging a conductor is stored in the form of electrostatic energy and is given by

(A) $E^2 dV$ (B) $\dfrac{1}{2}\varepsilon_0 E^2$

(C) $\dfrac{1}{2}\varepsilon_0 E$ (D) $\dfrac{1}{2}\varepsilon_0 E^2 dV$

49. Two students X and Y perform potentiometer experiment separately and null point was obtained as shown in diagram. During the experiment,
(i) X increases the value of R (resistance)
(ii) Y decreases the value of S (resistance)
The position of null point obtained by students X and Y respectively
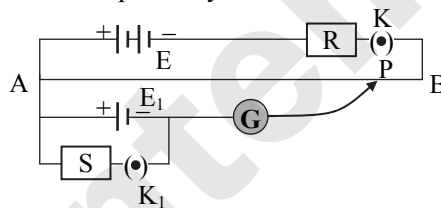
(A) would shift towards point B, would shift towards A
(B) would shift towards B by both X and Y
(C) would shift towards point A, would shift towards B
(D) would shift towards A by both X and Y

50. A small sphere is attached to a cord and rotates in a vertical circle about a point O. If the average speed of the sphere is increased, the cord is most likely to break at the orientation when the mass is at
(A) bottom point B.
(B) the point C.
(C) the point D.
(D) top point A.
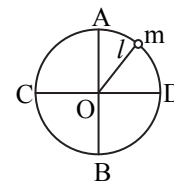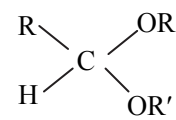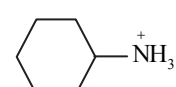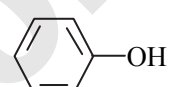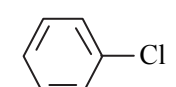
CHEMISTRY

1. Which of the following is a redox reaction?
(A) $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$
(B) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
(C) $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$
(D) $MgCO_3 \rightarrow MgO + CO_2$

2. What amount of dinitrogen contains 3.6×10^{18} molecules?
(A) 0.167 mg   (B) 0.280 mg
(C) 1.67 mg   (D) 2.80 mg

3. Which form following is a use of polyester fibres?
(A) Making bristles of brushes.
(B) To obtain orlon.
(C) To obtain electric insulators.
(D) To obtain terywool.

4. The formula of sodium hexanitrocobaltate(III) is, _____.
(A) $Na_3[Co(NO_2)_6]$ (B) $Na_3[Co(NO_2)_4]$
(C) $Na[Co(NO_2)_6]$ (D) $Na_3[Co(ONO)_6]$

5. Consider the cell $Al \mid Al^{3+}(1M) \parallel Sn^{2+}(1M) \mid Sn$, $E_{Al}^{\circ} = -1.66\ V;\ E_{Sn}^{\circ} = -0.136\ V$, ΔG° for the above cell is _____.
(A) $-882\ kJ$ (B) $-441\ kJ$
(C) $-147\ kJ$ (D) $-588\ kJ$

6. Henry's law constant for a gas CH_3Br is 0.159 mol dm^{-3} atm^{-1} at $25\ °C$. If the partial pressure is 0.164 atm, the solubility of CH_3Br in water at $25\ °C$ is _____.
(A) 0.0159 mol dm^{-3} (B) 0.164 mol dm^{-3}
(C) 0.026 mol dm^{-3} (D) 0.042 mol dm^{-3}

7. In the electrolysis of brine solution, the reaction which occurs at anode is_____.
(A) $4OH^- \longrightarrow 2H_2O + O_2 + 4e^-$
(B) $2Cl^- \longrightarrow Cl_2 + 2e^-$
(C) $Na^+ + e^- \longrightarrow Na$
(D) $2H^+ + 2e^- \longrightarrow H_2$

8. Which of the following exhibits positive electron gain enthalpy?
(A) Oxygen   (B) Fluorine
(C) Chlorine   (D) Argon

9. Choose the INCORRECT statement about $C_2H_5{-}O{-}C_2H_5$ from the following.
(A) It is more soluble in fatty acids than in water.
(B) Earlier it was used as a general anaesthetic in surgical operations.
(C) It is more toxic than $CHCl_3$.
(D) It is used as a solvent for Grignard reagents.

10. The compound which does NOT undergo haloform reaction is _____.
(A) ethanol   (B) butanal
(C) pentan-2-one   (D) acetaldehyde

11. The rate of disappearance of SO_2 in the reaction $2SO_2 + O_2 \longrightarrow 2SO_3$ is 1.28×10^{-3} mol dm^{-3} s^{-1}. Then the rate of formation of SO_3 is _____ mol dm^{-3} s^{-1}.
(A) 0.64×10^{-3} (B) 0.80×10^{-3}
(C) 1.28×10^{-3} (D) 1.60×10^{-3}

12. Addition of HCl to _____ mainly gives 2-chloro-2-methylbutane.
(A) n-pentene   (B) 2-methylbut-2-ene
(C) but-2-ene   (D) 1-Chlorobutane

13. What is the number of electrons present in sub d energy level in +2 state if its atomic number is 30?
(A) 5   (B) 10   (C) 9   (D) 4

14. Find the CORRECT match.
(A) KCN: Salt of weak acid and weak base
(B) $CuCl_2$: Salt of weak acid and strong base
(C) $NaNO_3$: Salt of strong acid and strong base
(D) NH_4CN: Salt of strong acid and weak base

15. Calculate the half life of a first order reaction if rate constant is 5.0×10^{-2} per hour.
(A) 832 min   (B) 945 min
(C) 1248 min   (D) 1663 min

16. Which from following properties of lanthanoids is NOT true?
(A) These are bad conductors of heat and electricity.
(B) These are soft metals.
(C) Coordination number is usually greater than six.
(D) These are strongly paramagnetic.

17.

Identify reagents X, Y and Z.
(A) $X \Rightarrow$ Moist Ag_2O
    $Y \Rightarrow$ alcoholic KCN
    $Z \Rightarrow CH_3COOAg$
(B) $X \Rightarrow CH_3 - O - Na$
    $Y \Rightarrow$ alcoholic NH_3
    $Z \Rightarrow CH_3COOAg$
(C) $X \Rightarrow CH_3 - O - Na$
    $Y \Rightarrow$ alcoholic KOH
    $Z \Rightarrow CH_3CH_2COOAg$
(D) $X \Rightarrow CH_3COOAg$
    $Y \Rightarrow$ alcoholic NH_3
    $Z \Rightarrow CH_3 - O - Na$

18. The IUPAC name of

$$CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - \overset{CH_3}{\overset{|}{CH}} - \overset{O}{\overset{\|}{C}} - H \quad \text{is _____.}$$

(A) 4-Methyl-2-oxohexanal
(B) 2-Methyl-3-oxohexanal
(C) 2-Methyl-4-oxohexanal
(D) 2-Methyl-3-oxopentanal

19. How many moles of iodomethane are consumed in the following conversion?
$$CH_3NH_2 \xrightarrow[\Delta]{CH_3I} (CH_3)_4\, N^+I^-$$
(A) Four   (B) Three
(C) Two   (D) One

20. Which element among the following lanthanoids has the smallest atomic radius?
(A) Cerium   (B) Erbium
(C) Europium   (D) Gadolinium

21. Calculate the amount of reactant in percent that remains after 90 minutes involved in first order reaction. ($k = 0.02303$ minute^{-1})
(A) 25%   (B) 50%
(C) 75%   (D) 12.5%

22. The atoms of element 'Y' form hexagonal close packing and the atoms of element X occupies $\frac{3}{4}$ th portion of the number of tetrahedral voids. The formula of the compound formed by X and Y is _____.
(A) X_2Y_2 (B) X_2Y
(C) X_3Y_2 (D) X_4Y_3

23. Which of the following statements is INCORRECT for liquid?
(A) Molecules in the bulk of liquid experience balanced forces and the resultant net force is zero.
(B) Molecules on the surface of liquid experience repulsive forces in the downward direction.
(C) The cleansing action of soaps and detergents is because of the lowering of interfacial tension between water and oily substances.
(D) Liquid droplets always tend to be spherical to reduce surface tension.

24. Of the ions Ti^{4+}, Co^{2+} and Cr^{3+}, _____.
(A) Ti^{4+} is colourless and Co^{2+} and Cr^{3+} are coloured
(B) all three are coloured
(C) all three are colourless
(D) Co^{2+} is coloured and Ti^{4+} and Cr^{3+} are colourless

25. Resorcinol on distillation with zinc dust gives _____.
(A) cyclohexane (B) benzene
(C) phenol (D) benzene-1,4-diol

26. What is the purpose of the hydrolysis step in the sol-gel process of synthesis of nanoparticles?
(A) To form different stable solutions of the alkoxide or solvated metal precursor.
(B) To facilitate gelation and the formation of an oxide or alcohol-bridged network.
(C) To remove water and other volatile liquids from the gel network.
(D) To heat the material at temperatures up to 800°C.

27. In which of the following reactions, ΔH is greater than ΔU?
(A) $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$
(B) $PCl_{5(g)} \longrightarrow PCl_{3(g)} + Cl_{2(g)}$
(C) $CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)}$
(D) $HCl_{(aq)} + NaOH_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(aq)}$

28. The hybridization of N-atom in NH_3 molecule and of O-atom in H_2O molecule are respectively _____.
(A) sp, sp^2 (B) sp^2, sp^2
(C) sp^2, sp^3 (D) sp^3, sp^3

29. Which of the following materials exhibits ferromagnetic behavior?
(A) NaCl (B) H_2O
(C) Ni (D) F_2

30. Compounds of general formula,

are called _____.
(A) diketones (B) ketals
(C) hemiketals (D) acetals

31. Calculate the conductivity of 0.01 M electrolyte solution if its molar conductivity is 121.4 Ω^{-1} cm^2 mol^{-1}.
(A) 0.8×10^{-3} Ω^{-1} cm^{-1}
(B) 1.2×10^{-3} Ω^{-1} cm^{-1}
(C) 1.9×10^{-3} Ω^{-1} cm^{-1}
(D) 2.4×10^{-3} Ω^{-1} cm^{-1}

32. In which of the following molecules or ions, the resonance effect is NOT present?

(A) (B)

(C) (D)

33. Colloids are classified as lyophilic and lyophobic colloids based on the _____.
(A) method of preparation
(B) size of their particles
(C) physical state of phases
(D) interaction or affinity of phases

34. $MnO_2 + HCl \xrightarrow{\Delta} A_{(g)}$
$A_{(g)} + F_{2(excess)} \longrightarrow B_{(g)}$
The gases A and B are respectively _____.
(A) Cl_2, ClF (B) Cl_2, ClF_3
(C) O_2, OF_2 (D) O_2, O_2F_2

35. $(CH_3)_2CH - O - CH_3 \xrightarrow{Cold\ HI} X + Y$
$X \xrightarrow[\text{dil. } H_2SO_4]{K_2Cr_2O_7} Z$
$Y \xrightarrow[\Delta]{NaOH(aq)} CH_3OH$
Identify X, Y and Z.
(A) X ⟹ Propan-2-ol
   Y ⟹ Iodomethane
   Z ⟹ Propanone
(B) X ⟹ Propan-1-ol
   Y ⟹ Iodomethane
   Z ⟹ Propanal
(C) X ⟹ 2-Iodopropane
   Y ⟹ Iodomethane
   Z ⟹ Propanone
(D) X ⟹ Propan-2-ol
   Y ⟹ Methanol
   Z ⟹ Propanone

36. Calculate the volume of unit cell having edge length 450 pm.
(A) 8.5×10^{-23} cm^3
(B) 9.1×10^{-23} cm^3
(C) 2.0×10^{-23} cm^3
(D) 6.4×10^{-23} cm^3

37. Which from following ligands is able to form linkage isomers?
(A) Aqua
(B) Ammine
(C) Iodo
(D) Nitro

38. The degree of ionization of 0.10 M solution of a weak monobasic acid is 4%. Find the value of K_a.
(A) 1.6×10^{-3}
(B) 1.6×10^{-4}
(C) 1.6×10^{-2}
(D) 1.6×10^{-5}

39. The freezing point depression is:
(A) directly proportional to molality of solution
(B) inversely proportional to molality of solution
(C) directly proportional to molarity of solution
(D) inversely proportional to molarity of solution

40. The heat evolved in the combustion of benzene is given by

$$C_6H_6 + 7\frac{1}{2}O_2 \longrightarrow 6CO_{2(g)} + 3H_2O_{(l)};$$

$$\Delta H = -3264.6 \text{ kJ}$$

Which of the following quantities of heat energy will be evolved when 39 g C_6H_6 are burnt?
(A) -816.15 kJ
(B) 1632.3 kJ
(C) 6528.2 kJ
(D) 2448.45 kJ

41. What is molecular formula of undecane?
(A) $C_{11}H_{24}$
(B) C_9H_{18}
(C) $C_{12}H_{26}$
(D) $C_{20}H_{42}$

42. Which among following statements is TRUE about $Na_4[Fe(CN)_6]$?
(A) It is a neutral complex.
(B) The complex ion carries -4 charge.
(C) The oxidation state of Fe in this complex is $+6$.
(D) The C.N. of Fe in this complex is 10.

43. Identify the CORRECT statements.
(I) Aniline reacts with bromine water at room temperature to give o-bromoaniline.
(II) Aniline undergoes Friedel Craft's reaction using aluminium chloride.
(III) Direct nitration of aniline yields, a mixture of ortho, meta and para nitroanilines.
(IV) Amino group is ortho and para directing and powerful ring activating group.
(A) I, II
(B) II, III
(C) I, IV
(D) III, IV

44. The enthalpy change for the transition of liquid water to steam, $\Delta_{vap}H = 37.3$ kJ mol^{-1} at 373 K. The entropy change for the process is _____.
(A) 111.9 J mol^{-1} K^{-1}
(B) 37.3 J mol^{-1} K^{-1}
(C) 100 J mol^{-1} K^{-1}
(D) 74.6 J mol^{-1} K^{-1}

45. When zinc sulfide is roasted, gas 'A' is formed. Which of the following is INCORRECT about gas 'A'?
(A) It acts as a reducing agent in the presence of moisture.
(B) It is insoluble in water.
(C) It is a resonance hybrid of two canonical forms.
(D) It is used in refining of petroleum and sugar.

46. The most resistant alcohol towards oxidation reaction is _____.
(A) $CH_3 - OH$
(B) $(CH_3)_2CH - OH$
(C) $(CH_3)_3C - OH$
(D) $C_2H_5CH - OH$ | CH_3

47. **Assertion (A):** Cellulose cannot be digested by human beings.
Reason (R): β-1,4-Glycosidic bonds present in cellulose is very strong and difficult to hydrolyse.
In the light of the above statements, choose the most appropriate answer from the options given below.
(A) Assertion is True, Reason is True; Reason is a correct explanation for Assertion.
(B) Assertion is True, Reason is True; Reason is not a correct explanation for Assertion.
(C) Assertion is True, Reason is False.
(D) Assertion is False, Reason is True.

48. What is osmotic pressure of solution of 1.5 g $CaCl_2$ in 1.5 dm^3 water at 300 K if van't Hoff factor and molar mass of $CaCl_2$, are 2.47 and 111 g mol^{-1} respectively?
[R= 0.082 dm^3 atm mol^{-1} K^{-1}]
(A) 0.273 atm
(B) 0.744 atm
(C) 0.547 atm
(D) 0.936 atm

49. The molecular formula of freon-12 is:
(A) $CHClF_2$
(B) CCl_2F_2
(C) CH_2Cl_2
(D) $CHCl_3$

50. The most suitable reagent(s) required to prepare 1-iodobutane from but-1-ene is/are _____.
(A) Raney Ni, Δ
(B) HI in the presence of $(C_6H_5CO)_2O_2$
(C) I_2 in HIO_3
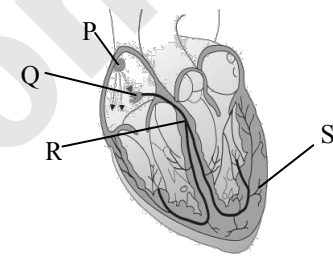(D) HBr in the presence of $(C_6H_5CO)_2O_2$ and NaI in dry acetone

Biology

Time: 90 Minutes

Total Marks: 100

1. In which of the following process blood neutrophils play an important role?
   (A) Cell division (mitosis)
   (B) Production of antibodies
   (C) Phagocytosis
   (D) Formation of clot

2. During which of the following process oxidative phosphorylation occurs in eukaryotes?
   (A) Lipid synthesis   (B) Protein synthesis
   (C) Photosynthesis   (D) Respiration

3. _____ refers to the formation of seeds without fertilization.
   (A) Parthenocarpy   (B) Amphimixis
   (C) Apomixis   (D) Polyembryony

4. **Assertion:** Angiotensin II reduces blood flow and increases blood pressure.
   Reason: Angiotensin II constricts arterioles in the kidney.
   (A) Both assertion and reason are true and reason is the correct explanation of assertion.
   (B) Both assertion and reason are true and reason is not the correct explanation of assertion.
   (C) Assertion is true and reason is false.
   (D) Both assertion and reason are false.

5. Given below are two statements:
   Statement-I: Lycopods and ferns first appeared in the Ordovician period.
   Statement-II: The period of dominance of algae was 345 - 400 MYA.
   In the light of above statements, choose the most appropriate answer from the options given below
   (A) Both Statement-I and Statement-II are correct.
   (B) Both Statement-I and Statement-II are incorrect.
   (C) Statement-I is correct but Statement-II is incorrect.
   (D) Statement-I is incorrect but Statement-II is correct.

6. Loss of function in which nerve would result in paralysis of muscles of mastication?
   (A) IX   (B) V   (C) III   (D) XI

7. Which of the following is the causative agent of severe form of malaria?
   (A) *Plasmodium malariae*
   (B) *Plasmodium vivax*
   (C) *Plasmodium falciparum*
   (D) *Plasmodium ovale*

8. Match column I with column II.

	Column I		Column II
i.	Levitt	a.	Root pressure
ii.	Ernst Munch	b.	Photosynthetic cell synthesizes glucose
iii.	S. Hales	c.	Theory of proton transport
iv.	J. Pristley	d.	Vital Theory

   (A) i - a, ii - b, iii - c, iv - d
   (B) i - b, ii - a, iii - c, iv - d
   (C) i - d, ii - a, iii - c, iv - b
   (D) i - c, ii - b, iii - a, iv - d

9. Observe the diagram, Identify the parts labelled as P, Q, R, S. choose the correct option for the conduction of cardiac impulse.

   (A) P - AV node, Q - SA node, R - Bundle of His, S - Purkinje fibers
   (B) P - SA node, Q - AV node, R - Bundle of His, S - Purkinje fibers
   (C) P - Purkinje fibers, Q - Bundle of His, R - AV node, S - SA node
   (D) P - Bundle of His, Q - Purkinje fibers, R - SA node, S - AV node

10. Progesterone peaks during which phase of the menstrual cycle?
    (A) Luteal phase
    (B) Ovulatory phase
    (C) Proliferative phase
    (D) Follicular phase

11. B-cell lymphomas are clones of _____ expressing on their surface a unique antibody molecule.
    (A) malignant T cells   (B) malignant B cells
    (C) normal RBC   (D) normal B cells

12. Maltose is made up of monomers _____ and _____.
    (A) fructose   galactose
    (B) glucose   glucose
    (C) glucose   galactose
    (D) glucose   xylose

13. What should be in place of A, B and C respectively in the following digestion process along with its corresponding digestive juice?

$$A \xrightarrow{\text{lipases}} B + C$$
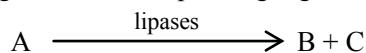
	A	B	C	D
(A)	Starch	Maltose	Glucose	Saliva
(B)	Lipids	Fatty acids	Mono-unsaturated fatty acids	Pancreatic juice
(C)	Fats	Saturated Fatty acid	Dipeptides	Bile juice
(D)	Emulsified fats	Fatty acids	Monoglycerides	Intestinal juice

14. Identify the CORRECT term for the following:
The thick, highly resistant outer layer of pollen wall.
(A) Exine (B) Endothecium
(C) Intine (D) Tapetum

15. Given below are two statements:
Statement I: Average capacity of urinary bladder is 400 ml.
Statement II: The blood (plasma) flowing through kidney (glomeruli) is filtered at a rate of 125 ml/min.
In the light of the above two statements, choose the most appropriate answer from the options given below.
(A) Both statement I and statement II are correct.
(B) Both statement I and statement II are incorrect.
(C) Statement I is correct but statement II is incorrect.
(D) Statement I is incorrect but statement II is correct.

16. Vestibular glands in females are homologous to _____ in males.
(A) seminal vesicle
(B) prostate gland
(C) bulbourethral gland
(D) mammary gland

17. Which of the following statements is TRUE for Grave's disease?
(A) It results in decreased heartbeat, increased BP, lower body temperature
(B) It is also known as exophthalmic goitre
(C) It is characterised by decreased BMR and weight gain
(D) It is caused due to deficiency of thyroid hormones

18. All are symptoms of amoebic dysentery, EXCEPT
(A) Stools with excess mucous
(B) Dry and scaly lesion
(C) Cramps
(D) Abdominal pain

19. Match the columns.

	Column I		Column II
i.	Commensalism	a.	Ticks on dogs
ii.	Parasitism	b.	Lion and leopard
iii.	Competition	c.	Tiger and deer
iv.	Predation	d.	Epiphyte on a mango branch

	i.	ii.	iii.	iv.
(A)	a	b	d	c
(B)	b	a	c	d
(C)	c	b	a	d
(D)	d	a	b	c

20. Which of the following term refers to the study of genomes through analysis, sequencing and mapping of genes along with the study of their functions?
(A) Histology (B) Genomics
(C) Biochemistry (D) Anatomy

21. Due to which of the following reason root cap has no function in water absorption?
(A) Its cells are loosely placed.
(B) Its vascular system is not directly connected.
(C) It has cells without chloroplast.
(D) It has no root hair.

22. Abscissic acid is called antitranspirant as it _____.
(A) accelerates abscission activity in leaves
(B) promotes ripening of fruit
(C) induces RNA synthesis and formation of interfascicular cambium
(D) can cause efflux of K^+ ions from the guard cells resulting in closure of stomata

23. _____ valve is present at the opening of coronary sinus.
(A) Eustachian (B) Tricuspid
(C) Thebesian (D) Mitral

24. Which of the following is a good producer of citric acid?
(A) *Aspergillus* (B) *Clostridium*
(C) *Pseudomonas* (D) *Saccharomyces*

25. Which of the following is an INCORRECT match?
(A) Plasmid – pBR322
(B) MAC – Mammalian Artificial Chromosome
(C) BAC – Baculovirus Artificial Chromosome
(D) YAC – Yeast Artificial Chromosome

26. In 1924, Feulgen showed that _____ contain DNA.
(A) chromophores (B) chromosomes
(C) nucleosomes (D) histones

27. _____ glucose molecules are required for the formation of 52 pyruvic acid molecules at the end of glycolysis.
(A) 32 (B) 42 (C) 52 (D) 26

28. Identify the function/s of integuments.
(A) Protection to nucellus and embryo sac
(B) After fertilization converted into seed coats
(C) Providing nutrition to the embryo sac
(D) Both (A) and (B)

29. All are proenzymes, EXCEPT
(A) Trypsinogen   (B) Salivary amylase
(C) Chymotrypsinogen (D) Pepsinogen

30. Match the Column I with Column II and select the correct option.

Column I (Cells)		Column II (Secretion)	
i.	α-cells	a.	Nucleases
ii.	Goblet cells	b.	Glucagon
iii.	Oxyntic cells	c.	Mucus
iv.	Acinar cells	d.	HCl

(A) i - b, ii - c, iii - d, iv - a
(B) i - b, ii - c, iii - a, iv - d
(C) i - c, ii - b, iii - a, iv - d
(D) i - c, ii - b, iii - d, iv - a

31. Which of the following causes decrease in blood pressure?
(A) Inelasticity of blood vessels
(B) Blood loss in accident
(C) Increase in peripheral resistance
(D) Increase in secretion of ADH

32. Identify the layer that makes up the corona radiata.
(A) Vitelline membrane.
(B) Zona pellucida around the oocyte.
(C) Innermost layer of granulosa cells
(D) Perineum

33. _____ had cranial capacity almost equal to modern man.
(A) Neanderthal man   (B) *Homo erectus*
(C) *Homo habilis*   (D) *Australopithecus*

34. Which is the largest part of the brain?
(A) Cerebrum
(B) Diencephalon
(C) Cerebellum
(D) Medulla oblongata

35. Primary ecological succession differs from secondary succession in the following EXCEPT
(A) primary succession occurs where no living organisms were present before.
(B) primary succession is slow.
(C) secondary succession is quicker.
(D) climax community is forest.

36. Which one of the following pair shows co-evolution?
(A) Flamingoes and resident fish
(B) Indian crow and asian koel
(C) Humming bird and plants
(D) Leopards and Lions in a forest

37. During successive seral stages in ecological succession, there is _____.
(A) No change in diversity of species
(B) Decrease in number of species
(C) Decrease in total biomass
(D) Increase in the number of species, organisms and total biomass

38. With reference to species diversity, identify the CORRECT statement.
(A) Tropic forests have lesser species richness than monoculture plantation of timber plant
(B) All areas or regions have equal species richness
(C) Amphibian species diversity is more in Eastern Ghats than in Western Ghats
(D) India is amongst the 15 nations that are rich in species diversity

39. Girl of normal vision whose father was colour blind marries a man of normal vision whose father was also colour blind. The sons of this marriage would be
(A) all normal   (B) all colour blind
(C) 50% colour blind   (D) 25% colour blind

40. Which one of the following correctly represents the manner of replication of DNA?
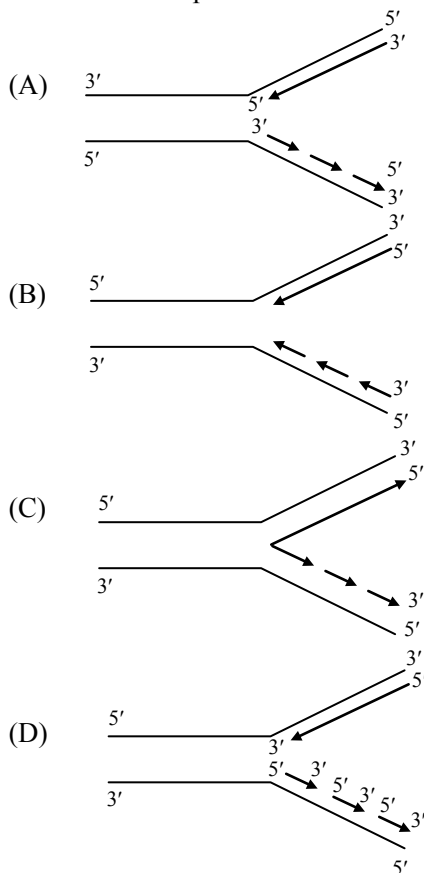
41. Which of the following hormone is also called Collip's hormone?
(A) TCT
(B) Insulin
(C) PTH
(D) Glucagon

42. For which of the following reasons genetic code is universal?
(A) It is same for all living organisms.
(B) It is same for only certain organisms.
(C) It is same for specific protein.
(D) None of these

43. Identify the INCORRECT match.
(A) Neutrophils – Phagocytic and eat foreign pathogens
(B) Basophils – Secrete histamine and serotonin
(C) Eosinophils – Allergic response
(D) Monocytes – Secrete heparin

44. The life of corpus luteum is generally about _____ days in the absence of fertilization.
(A) 5
(B) 28
(C) 14
(D) 10

45. Identify the correct path of transmission of nerve impulse.
(A) Dendrite → Axon → Axon end → Cell body
(B) Axon end → Axon → Cell body → Dendrite
(C) Cell body → Dendrite → Axon → Axon end
(D) Dendrite → Cell body → Axon → Axon end

46. In genetically modified Flavr savr tomato shelf life is increased by inhibiting the production of _i_ which breaks down the cell wall constituent _ii_ .

	i	ii
(A)	polygalacturonase	cellulose
(B)	polygalacturonase	pectin
(C)	lysozyme	cellulose
(D)	alkaline phosphatase	pectin

47. Histones are involved in packaging of DNA into structural units called _____.
(A) chromatin
(B) nucleosides
(C) nucleosomes
(D) nucleotides

48. In _____ steps CO_2 is released in aerobic respiration.
(A) Two
(B) Three
(C) Six
(D) Twelve

49. Given below are two statements:
Statement I: In chiropterophily, the pollinating agents are insects.
Statement II: *Callistemon* is an example of chiropterophilous plants.
In the light of the above two statements, choose the most appropriate answer from the options given below.

(A) Both statement I and statement II are correct.
(B) Both statement I and statement II are incorrect.
(C) Statement I is correct but statement II is incorrect.
(D) Statement I is incorrect but statement II is correct.

50. Identify the enzyme that initiates the process of digestion of proteins.
(A) Pepsin
(B) Trypsin
(C) Dipeptidase
(D) Disaccharidases

51. The property of nerve fiber - 'Summation effect' is _____.
(A) Total value of potential difference in resting nerve and depolarized nerve fiber
(B) Addition of subliminal and supraliminal stimuli
(C) When many weak stimuli are given in quick succession they may produce an impulse due to addition or summation of stimuli
(D) Addition of rate of transmission in thick and thin nerves

52. _____ types of gametes will be formed by a pea plant with genotype TtYy.
(A) 6
(B) 16
(C) 8
(D) 4

53. Given below are two statements:
Statement I: Melcher in 1939 found out that vernalin can be transferred through grafting.
Statement II: Vernalization is effective at any stage of growth in annual plants.
In the light of the above two statements, choose the most appropriate answer from the options given below.

(A) Both statement I and statement II are correct.
(B) Both statement I and statement II are incorrect.
(C) Statement I is correct but statement II is incorrect.
(D) Statement I is incorrect but statement II is correct.

54. Identify the CORRECT statement.
(A) Expiration is initiated due to contraction of diaphragm.
(B) Expiration occurs due to contraction of external intercostal muscles.
(C) Intrapulmonary pressure is lower than the atmospheric pressure during inspiration.
(D) Thoracic volume increases during expiration.

55. What is the role of acidogenic bacteria in biogas plant?
(A) Conversion of monomers to organic acids
(B) Digesting fungi in the sludge
(C) Transforming acetic acid to biogas
(D) Conversion of monomers to complex polymers

56. If a red flowered *Mirabilis jalapa* plant is crossed with a white flowered plant. Out of 440 offsprings, approximately how many will be red flowered in F_2 generation?
(A) 330 (B) 220 (C) 55 (D) 110

57. Identify the CORRECT description of DNA fingerprinting.
(A) It is technique used for identification of fingerprints of individuals.
(B) It is a technique used for molecular analysis of different specimens of RNA.
(C) It is molecular analysis of profiles of DNA samples.
(D) It is analysis of DNA samples using imprinting devices.

58. Cell wall of root hair is formed by _____.
(A) starch
(B) pectic compounds and cellulose
(C) acidic compounds
(D) proteins

59. Match elements given in Column I with their functions given in Column II.

	Column I		Column II
i.	Sulphur	a.	Activates carboxylases
ii.	Manganese	b.	Utilized for pollen germination
iii.	Boron	c.	Required for development of middle lamella
iv.	Calcium	d.	Constituent of Ferredoxin

(A) i - d   ii - a   iii - b   iv - c
(B) i - d   ii - b   iii - a   iv - c
(C) i - b   ii - a   iii - c   iv - d
(D) i - c   ii - d   iii - a   iv - b

60. Given below is diagram of blood smear. Select the correct option which mentions the functions of x and name of y.
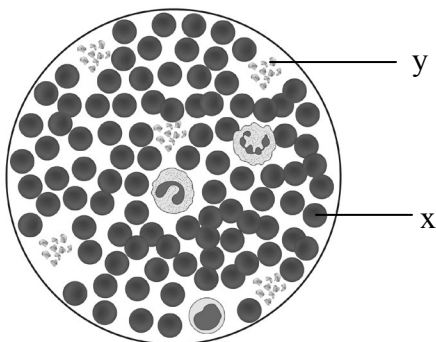
(A) x–Secretion of heparin; y–Thrombocyte
(B) x–Transport of respiratory gases; y–Thrombocyte
(C) x–Phagocytosis of antigen-antibody complex; y–Red blood cells
(D) x–Transport of respiratory gases; y–Leucocyte

61. Identify the common feature of *Eichhornia, Parthenium* and *Clarias gariepinus*:
(A) Examples of near threatened species
(B) Key species in the ecosystem
(C) Invasive species causing harm
(D) Critically endangered species

62. The behaviour of some desert animals to burrow into the sand to hide and escape from the heat is a type of
(A) physiological adaptation
(B) morphological adaptation
(C) behavioural adaptation
(D) none of these

63. Identify the stage that immediately precedes the marsh meadow stage in hydroseric succession.
(A) Climax stage
(B) Phytoplankton stage
(C) Reed swamp stage
(D) Rooted submerged stage

64. _____ of the total land area of the world is occupied by India.
(A) 2.4% (B) 3.0%
(C) 1.5% (D) 0.5%

65. Study the following statements with respect to widow's peak and select the correct option.
i. Individuals with homozygous recessive (ww) genotype have a straight hair line (no widows peak).
ii. It occurs in only in homozygous dominant (WW) individuals.
iii. It is determined by autosomal dominant gene.
(A) Statement iii is correct whereas statements i and ii are incorrect.
(B) Statement ii is correct whereas statements i and iii are incorrect.
(C) Statement ii is incorrect whereas statements i and iii are correct.
(D) Statement i is correct whereas statements ii and iii are incorrect.

66. Given below are two statements:
Statement I: Elongation of root at a constant rate shows geometric growth.
Statement II: Geometric growth can be expressed mathematically by the equation $W_0 = W_1 e^{rt}$.
In the light of the above two statements, choose the most appropriate answer from the options given below.

(A) Both statement I and statement II are correct.
(B) Both statement I and statement II are incorrect.
(C) Statement I is correct but statement II is incorrect.
(D) Statement I is incorrect but statement II is correct.

67. Following diagram shows internal structure of root hair. Identify the parts labelled as 'X' and 'Y'.
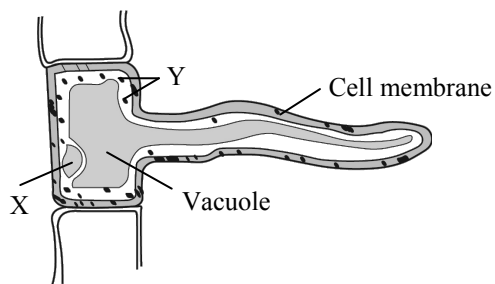
(A) X - Nucleus, Y - cell wall
(B) X - Root epithelial cell, Y - Nucleus
(C) X - Cytoplasm, Y - Root epithelial cell
(D) X - Nucleus, Y – Mitochondria

68. Formation of inter-fascicular cambium during secondary growth of plants is facilitated by ____.
(A) ethylene   (B) gibberellin
(C) cytokinin   (D) ABA

69. Calculate the heart rate of a person if the cardiac output is 5L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50mL.
(A) 100 beats per minute
(B) 50 beats per minute
(C) 75 beats per minute
(D) 25 beats per minute

70. Match the crop name given in Column I with respective improved variety of crop developed by mutation breeding given in Column II

	Column I		Column II
i.	Indore - 2	a.	Cabbage
ii.	Jagannath	b.	Wheat
iii.	Regina - II	c.	Rice
iv.	NP 836	d.	Cotton

Select the correct option from the following
(A) i - c   ii - d   iii - a   iv - b
(B) i - c   ii - a   iii - d   iv - b
(C) i - d   ii - c   iii - b   iv - a
(D) i - d   ii - c   iii - a   iv – b

71. _____ develops from endoderm.
(A) Glands of stomach and intestine
(B) Conjunctiva
(C) Lacrimal glands
(D) Muscles

72. Select the correct chronological order of human evolution.
(A) *Ramapithecus → Homo habilis → Australopithecus → Homo erectus*
(B) *Australopithecus → Ramapithecus → Homo habilis → Homo erectus*
(C) *Ramapithecus → Australopithecus → Homo habilis → Homo erectus*
(D) *Australopithecus → Homo habilis → Ramapithecus → Homo erectus*

73. What are the parts of the brain stem?
(A) Midbrain, pons and medulla oblongata
(B) Forebrain, cerebrum and pons varolii
(C) Midbrain, cerebellum and medulla oblongata
(D) Forebrain, midbrain and hindbrain

74. Which of the following statements are correct regarding vaccination?
(i) Vaccination is the administration of particular living, active pathogen, to protect against diseases like measles.
(ii) It is an important form of primary prevention that can protect people from getting sick.
(iii) Vaccine introduced into the human body contains readymade antibodies obtained from hyper immunized horses.
(iv) Extensive research and evidence shows that vaccines are safe and their side effects are rare or very mild in nature.
(v) Vaccination is a way to "teach" our immune system for recognizing and eliminating pathogenic organisms when exposed to them.
(A) (i) and (ii) only
(B) (i), (ii) and (iii) only
(C) (i) and (iii) only
(D) (ii), (iv) and (v) only

75. Identify the correct pair that exhibits commensalism.
(A) Cuckoo and crow
(B) Wasps and fig tree
(C) Orchid and mango tree
(D) Cattle or sheep and grass

76. Which are the pioneer species in xerarch and hydrarch succession respectively?
(A) Lichens and phytoplankton
(B) Lichens and rooted hydrophytes
(C) Phytoplankton and lichens
(D) Lichens and sedges

77. **Statement I:** If one or two species are lost, it may not affect proper functioning of ecosystem.
Statement II: Loss of key species causes serious threat to functioning of ecosystem.
Choose the correct alternative with reference to the above statements

(A) Only Statement II is correct
(B) Statement I and statement II both are incorrect
(C) Statement I and statement II both are correct
(D) Only Statement I is correct.

78. Two alternative forms of a gene or alleles are located on _____
(A) non-identical loci of homologous chromosomes
(B) non-identical loci of the same chromosome
(C) identical loci of homologous chromosomes
(D) identical loci of the same chromosome

79. Which of the following results prominently proved that DNA is the transforming material from the experiments carried out by Avery, Macleod and McCarty by using various enzymes?
(A) DNA of heat killed 'S' + 'R' type + DNase $\longrightarrow$ avirulent strain
(B) DNA of heat killed 'S' + 'R' type + Protease $\longrightarrow$ virulent strain
(C) DNA of heat killed 'S' + 'R' type $\longrightarrow$ virulent strain
(D) DNA of heat killed 'S' + 'R' type + RNase $\longrightarrow$ virulent strain

80. _____ is freely permeable but plasma membrane is selectively permeable.
(A) Cell membrane
(B) Tonoplast
(C) Parchment paper
(D) Cell wall

81. Which of the following is the INCORRECT statement with respect to biocontrol agents?
(A) They do not affect non-target pests.
(B) They help to increase the use of synthetic pesticides.
(C) They are significant in treating ecologically sensitive area.
(D) They do not show any negative impact on crop plants.

82. Which of the following was developed and then established by Stanley Cohen and Herbert Boyer?
(A) cDNA technology
(B) Recombinant DNA technology
(C) Transformation process
(D) Fermentation technology

83. In an experiment, DNA was found to have 31% adenine and 19% guanine. Identify the percentage of cytosine in the given molecule of DNA.
(A) 62% (B) 31%
(C) 19% (D) 38%

84. Which of the following is TRUE with respect to ATP?
(A) Chemically ATP is a pentose sugar called ribose.
(B) Chemically ATP is a diphosphate ester of purine.
(C) Chemically ATP is a triphosphate ester of thymine ribonucleoside.
(D) Chemically ATP is a triphosphate ester of adenosine ribonucleoside.

85. Given below are two statements:
Statement I: After a successful germination, the tip of the pollen tube enters in one of the synergids and then ruptures to release the contents.
Statement II: Sucrose induces pollen germination and tube growth in vitro.
In the light of the above two statements, choose the most appropriate answer from the options given below.
(A) Both statement I and statement II are correct.
(B) Both statement I and statement II are incorrect.
(C) Statement I is correct but statement II is incorrect.
(D) Statement I is incorrect but statement II is correct.

86. ____(i)___ and ___(ii)____ form the common bile duct.
(A) i - hepatic duct, ii - duct of gall bladder
(B) i - hepatic duct, ii - pancreatic duct
(C) i - duct of gall bladder, ii - pancreatic duct
(D) i - pancreatic duct, ii - salivary duct

87. In order to maintain homeostasis or constant internal environment _____ is essential.
(A) excretion (B) osmoregulation
(C) respiration (D) circulation

88. Which one of the following is correct regarding mechanism of organic evolution?
i. Mutations, gene recombination, gene flow (migration), genetic drift, natural selection, isolation and speciation are the processes that bring about evolution.
ii. Emigration and immigration bring about changes in the allele frequency and has no effect on gene flow.
iii. Dispersal of pollen grains is an example of gene flow.
iv. Severe reduction in the size of the population due to some natural disaster causes bottleneck effect.
v. Larger populations have greater chances for genetic drift.
(A) i and ii only
(B) i, ii, iii and iv only
(C) i, iii and iv only
(D) ii, iii, iv and v only

89. After the industrial revolution in Great Britain in 1845 which of the following occurred?
(A) Population of light coloured moth decreased.
(B) Light coloured tree trunks changed to black
(C) Black moth population increased.
(D) All of these

90. Select a correct pair of glial cells present in the PNS of man.
(A) Astrocyte and Schwann cell
(B) Ependymal cell and astrocyte
(C) Oligodendrocyte and satellite cell
(D) Schwann cell and satellite cell

91. Reduction in number of _____ can cause clotting disorder, leading to excessive loss of blood from the body.
(A) thrombocytes (B) leucocytes
(C) erythrocytes (D) neutrophils

92. Identify the type of microorganisms involved in floc formation during sewage treatment.
(A) Fungus and algae
(B) Aerobic bacteria and fungus
(C) Autotrophic bacteria and yeast
(D) Anaerobic bacteria and fungus

93. Given below are two statements:
Statement I: Transfer of phytoene gene improves the oil content and oil quality of oil crops like soybean, oil palm, rapeseed and sunflower.
Statement II: The genes for ferritin protein isolated from soybean and *Phaseolus* have been transferred to rice.
In the light of the above two statements, choose the most appropriate answer from the options given below.
(A) Both statement I and statement II are correct.
(B) Both statement I and statement II are incorrect.
(C) Statement I is correct but statement II is incorrect.
(D) Statement I is incorrect but statement II is correct.

94. Watson and Crick are known for their discovery of
(A) double stranded RNA helix
(B) triple stranded DNA helix
(C) double stranded DNA helix
(D) single stranded DNA

95. Identify the metabolite / biomolecule that is common to respiration mediated breakdown of fats, carbohydrates and proteins.
(A) Glucose-6-phosphate
(B) Pyruvic acid

(C) Acetyl-CoA
(D) Fructose-1, 6-bisphosphate

96. In some plants the nucellus in the ovule remain in the seed to form _____.
(A) epicarp (B) mesocarp
(C) endocarp (D) perisperm

97. The Malpighian bodies lies in the _____ of the kidney.
(A) medulla (B) pelvis
(C) cortex (D) none of these

98. All are internal genitalia in females, EXCEPT
(A) Oviduct (B) Ovaries
(C) Vagina (D) Mammary gland

99. All are peptide hormones, EXCEPT
(A) Oxytocin (B) ADH
(C) Oestrogen (D) GnRH

100. Aflatoxin and vinyl chloride stimulate cancer of _____.
(A) lung (B) stomach
(C) blood (D) liver

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To see complete chapter buy **Target Notes** or **Target E-Notes**

ANSWERS AND SOLUTIONS

Mock Test 01

PHYSICS

1. **(A)**

2. **(D)**

   Speed of sound in ideal gas, $V = \sqrt{\dfrac{\gamma RT}{M}}$

   $V_{rms} = \sqrt{\dfrac{3RT}{M}}$

   $\therefore \quad \dfrac{V}{V_{rms}} = \sqrt{\dfrac{\gamma}{3}}$

   $\therefore$ For helium gas, $X = \sqrt{\dfrac{\gamma_{He}}{3}} = \sqrt{\dfrac{5}{9}}$ and,

   For oxygen gas, $X_1 = \sqrt{\dfrac{\gamma_{O_2}}{3}} = \sqrt{\dfrac{7}{15}}$

   $\therefore \quad \dfrac{X}{X_1} = \sqrt{\dfrac{5}{9} \times \dfrac{15}{7}} = \dfrac{5}{\sqrt{21}}$

3. **(D)**

   By Wien's displacement law,
   $\lambda_m T = $ constant

   $\lambda_m = \dfrac{c}{\nu_m}$

   $\therefore \quad \dfrac{T}{\nu_m} = $ constant

   $\therefore \quad \nu_m \propto T$

   Hence graph of ν_m against T will be a straight line.

4. **(D)**

   Magnetic field inside a solenoid is given by,
   $B = \mu\, n\, I$
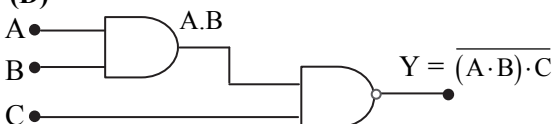 $\quad = \mu_0\, \mu_r\, n\, I = \mu_0\,(1 + \chi)\, n\, I.$

5. **(C)**

   Distance of 1st minima from central maxima

   $y_{1d} = \dfrac{\lambda D}{a}$

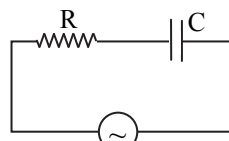   Distance between two minima on either side of the central maxima is

   $2y_{1d} = \dfrac{2\lambda D}{a}$

   $\quad\quad = \dfrac{2 \times 5500 \times 10^{-10} \times 4}{0.2 \times 10^{-3}} = 0.02$ m

6. **(D)**

A	B	(A·B)	C	$Y = \overline{(A \cdot B) \cdot C}$
0	0	0	0	1
1	1	1	1	0

7. **(C)**

   $X_c = \dfrac{1}{2\pi fC}$

   current in ciruit

   $I = \dfrac{V}{Z} = \dfrac{V}{\sqrt{R^2 + \left(\dfrac{1}{2\pi fC}\right)^2}}$

   Or $I = \dfrac{2\pi fC}{\sqrt{4\pi^2 f^2 C^2 R^2 + 1}} \times V$

   Voltage drop across capacitor

   $V_c = I \times X_c = \dfrac{2\pi fC}{\sqrt{4\pi^2 f^2 C^2 R^2 + 1}} \times \dfrac{1}{2\pi fC}$

   $V_c = \dfrac{V}{\sqrt{4\pi^2 f^2 C^2 R^2 + 1}}$

   When mica is introduced capacitance will increase, hence voltage across capacitor gets decreased.

8. **(B)**

   Electric field intensity, $E = \dfrac{q}{4\pi\varepsilon_0 r^2} \quad (r > R)$

   $\quad\quad = 2.825 \times 10^4$ N/C

   $\quad\quad \approx 2.83 \times 10^4$ N/C

9. **(B)**

   Time period,

   $T = 2\pi\sqrt{\dfrac{m}{k}} \quad\quad\quad \dots(i)$

   $\therefore \quad T_1 = 2\pi\sqrt{\dfrac{m}{k}} \quad\quad \dots[\text{From(i)}]$

   $\therefore \quad 3 = 2\pi\sqrt{\dfrac{m}{k}} \quad\quad \dots(\text{given, } T_1 = 3 \text{ s})$

   $\dfrac{9}{4\pi^2} = \dfrac{m}{k}$

   $\therefore \quad k = \dfrac{4\pi^2 m}{9} \quad\quad \dots(ii)$

   When mass is increased by 0.6 kg,

   $T_2 = 2\pi\sqrt{\dfrac{m + 0.6}{k}} \quad \dots[\text{From(i)}]$

   $6 = \sqrt{\dfrac{m + 0.6}{k}} \quad \dots(\text{given } T_2 = 3+3 = 6 \text{ s})$

   $\dfrac{36}{4\pi^2} = \dfrac{m + 0.6}{k}$

   $\dfrac{36}{4\pi^2} = (m + 0.6)\dfrac{9}{4\pi^2 m}$
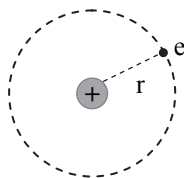
   $4m = m + 0.6$

   $m = 0.2$ kg

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10. (A)

In the revolution of electron, coulomb force provides the necessary centripetal force

$$\therefore \quad \frac{Ze^2}{r^2} = \frac{mv^2}{r}$$

$$\therefore \quad mv^2 = \frac{Ze^2}{r}$$

$$\therefore \quad K.E. = \frac{1}{2}mv^2 = \frac{Ze^2}{2r}$$

11. (A)

As displacement is either smaller or equal to distance but can never be greater than distance.

12. (A)

Terminal velocity, $v_T = \frac{2}{9}\frac{r^2}{\eta}(\rho - \sigma)g$

$$\therefore \quad v_{T_1} = \frac{2 \times 1^2}{9\eta}(\rho_1 - 0.01\,\rho_2)g$$

$$= \frac{2}{9\eta}(8\rho_2 - 0.1\,\rho_2)g$$

$$\therefore \quad v_{T_2} = \frac{2}{9\eta}(7.9)g \qquad ....(i)$$

$$v_{T_2} = \frac{2 \times 2^2}{9\eta}(\rho_2 - 0.1\rho_2)g$$

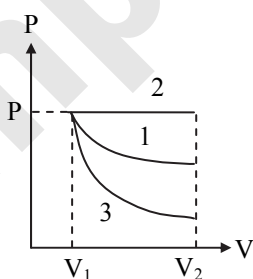$$\therefore \quad v_{T_2} = \frac{8}{9\eta}(0.9\rho)g \qquad ....(ii)$$

$$\therefore \quad \frac{v_{T_1}}{v_{T_2}} = \frac{7.9}{4(0.9)} = \frac{79}{36}$$

13. (A)

The work done is given by the area under the P-V curve. From figure, the work done for isobaric process is maximum while that for adiabatic is minimum.
i.e., $W_2 > W_1 > W_3$
Thus, the correct option is (A).

14. (B)

$$I = \frac{K\theta}{NAB} \implies I \propto \theta$$

15. (C)

$$\tan\phi = \frac{X_L - X_C}{R}$$

$$= \frac{400 - 200}{200} = \frac{200}{200}$$

$$\therefore \quad \tan\phi = 1 \implies \phi = 45°$$

16. (C)

When satellite is moving with constant speed along the orbit, the satellite as well as the person inside it, both fall towards the earth with acceleration 'g'. The force of reaction exerted by floor of satellite is N = mg − ma. But, a = g $\Rightarrow$ N = mg − mg = 0. Hence, the satellite does not provide normal reaction on the person. This is the reason the person experiences weightlessness inside satellite.

17. (B)

For 1st resonance, $L_1 + e = \frac{\lambda}{4}$

(e is the end correction)

For 2nd resonance, $L_2 + e = \frac{3\lambda}{4}$

$$\therefore \quad (L_2 - L_1) = \frac{\lambda}{2} \qquad ....(i)$$

Speed of sound, $v = n\lambda \qquad ....(ii)$

$\therefore$ From (i) and (ii),
$v = n\,2(L_2 - L_1)$
$= 300 \times 2 \times (88 - 28) \times 10^{-2} = 360$ m/s

18. (C)

Let the radii of the thin spherical shell and the solid sphere be R_1 and R_2, respectively. Then, the moment of inertia of the shell about its diameter is given by,

$$I_{shell} = \frac{2}{3}MR_1^2 \qquad ...(i)$$

And the moment of inertia of the solid sphere is given by,

$$I_{sphere} = \frac{2}{5}MR_2^2 \qquad ...(ii)$$

Given that, the masses and moment of inertia for both the bodies are equal, then from equations (i) and (ii),

$$\frac{2}{3}MR_1^2 = \frac{2}{5}MR_2^2$$

$$\therefore \quad \frac{R_1^2}{R_2^2} = \frac{3}{5}$$

$$\therefore \quad R_1 : R_2 = \sqrt{3} : \sqrt{5}$$

19. (A)
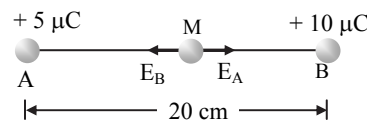
From figure,
E_A = Electric field at mid point M due to charge at A

$$\therefore \quad E_A = 9 \times 10^9 \times \frac{5 \times 10^{-6}}{(0.1)^2} = 45 \times 10^5 \,\text{N/C}$$

E_B = Electric field at M due to charge at B,

$\therefore \quad E_B = 9 \times 10^9 \times \dfrac{10 \times 10^{-6}}{(0.1)^2} = 90 \times 10^5$ N/C

Net electric field at M = $\left| \vec{E}_B \right| - \left| \vec{E}_A \right|$

$\qquad\qquad\qquad = 45 \times 10^5$ N/C

$\qquad\qquad\qquad = 4.5 \times 10^6$ N/C

in the direction of E_B i.e., towards + 5 μC charge.

20. (B)

Moment of Inertia (I) = $I_{CM} + Md^2$

where d is distance of axis from COM

The I_{CM} and M is same for all the points and only 'd' is varying

As axis B is having more distance from COM and thus will have more moment of inertia.

21. (D)

Stopping potential is independent of intensity.

22. (B)

From the law of conservation of momentum

$3 \times 16 = 6 \times v$

$\therefore \quad v = 8$ m/s

$\therefore \quad$ K.E. = $\dfrac{1}{2} \times 6 \times (8)^2 = 192$ J

23. (B)

$F \propto r^3 \propto V$

As volume becomes doubled, F changes to F/2.

24. (C)

For maxima, path difference, $\Delta l = n\lambda$

$\therefore \quad$ For n = 1, $\Delta l = \lambda = 5860$ Å

25. (A)

Orbital magnetic moment $\vec{M} = -\left(\dfrac{e}{2m_e} \right) \vec{L}$

Angle made by orbital angular momentum with direction of orbital magnetic moment is 180°.

26. (D)

At resonance,

Z = R

Voltage across resistance,

$V_R = I \times Z = I \times R \qquad \ldots$(i)

Voltage across inductor,

$V_L = I \times X_L = I \times \omega L \qquad \ldots$(ii)

Dividing (ii) by (i),

$\dfrac{V_L}{V_R} = \dfrac{\omega L}{R} \quad \Rightarrow L = \dfrac{V_L R}{V_R \omega}$

27. (C)

Antimony is a fifth group impurity and is therefore a donor of electrons.

28. (D)

$n = \dfrac{v}{4L} = 412$ Hz

Let it cut into two parts: One is closed and other is an open pipe.

Each pipe has a length equal to half the length of original pipe.

$n_c = \dfrac{v}{4L'} = \dfrac{v}{4(4/2)} = \dfrac{2v}{4L} = 2 \times 412 = 824$ Hz

$n_o = \dfrac{v}{2L'} = \dfrac{v}{2\left(\dfrac{L}{2}\right)} = \dfrac{4v}{4L} = 4\left(\dfrac{v}{4L}\right)$

$\qquad = 4 \times 412 = 1648$ Hz

29. (C)

$I = \dfrac{MR^2}{4} = \dfrac{\rho \pi R^2 t R^2}{4} = \dfrac{\rho \pi R^4 t}{4}$

30. (B)

q ●————————————● Q – q

|←———— r ————→|
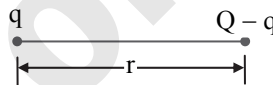
$F = 9 \times 10^9 \times \dfrac{q(Q-q)}{r^2}$

F will be maximum if product q(Q – q) is Maximum.

q(Q – q) will be maximum if q = Q – q

$\therefore \quad Q = 2q$

31. (A)

$T = 2\pi \sqrt{\dfrac{m}{k}}$

$\therefore \quad T \propto \sqrt{m}$

i.e., $\dfrac{T_1}{T_2} = \sqrt{\dfrac{m_1}{m_2}}$

$m_1 = m, \ m_2 = m + 1$

$\therefore \quad \dfrac{3}{5} = \sqrt{\dfrac{m}{m+1}}$

$\therefore \quad \dfrac{m}{m+1} = \dfrac{9}{25}$

$\therefore \quad 25m = 9m + 9$

$m = \dfrac{9}{16}$

32. (B)   **33. (A)**

34. (B)

As work done is area under PV curve,

$W_1 > W_2$.

35. (A)

Let F_m be the force arising due to magnetic field, then the given situation can be drawn as follows

$F_m = BIl \Rightarrow mg\sin 60^\circ = BIl\cos 60^\circ$

$\Rightarrow B = \dfrac{0.02 \times 10 \times \sqrt{3}}{0.4 \times 1.73} = 0.5$ T

36. (A)

$|e| = \dfrac{d\phi}{dt} = A\dfrac{dB}{dt}$

$\therefore \quad |e| = A\left(\dfrac{\dfrac{3}{4}B}{4}\right) = \dfrac{3AB}{16}$

37. (D)

From Kepler's IIIrd law, we have

$T^2 \propto R^3$

$\Rightarrow \left(\dfrac{T_2}{T_1}\right)^2 = \left(\dfrac{R_2}{R_1}\right)^3$

Here, $R_2 = 2.5R + R = 3.5R$, from the centre of earth

$R_1 = 6R + R = 7R$, from the centre of earth

Therefore, $\left(\dfrac{T_2}{T_1}\right)^2 = \left(\dfrac{3.5R}{7R}\right)^3 = \left(\dfrac{1}{2}\right)^3$

$\Rightarrow T_2 = \dfrac{T_1}{(2)^{\frac{3}{2}}}$

Time period for a geo-stationary satellite is,

$T_1 = 24$ hr.

Hence, $T_2 = \dfrac{24}{(2)^{\frac{3}{2}}} = \dfrac{24}{2\sqrt{2}} = 6\sqrt{2}$ hr.
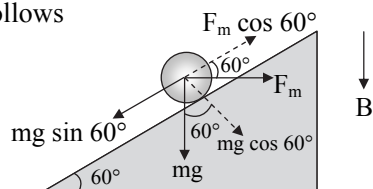
38. (B)

$F = kx_1 = (2k)x_2$

$\therefore \quad kx_1 = 2kx_2$

$x_1 = 2x_2$

$E_1 = \dfrac{1}{2}kx_1^2$

$E_2 = \dfrac{1}{2}(2k)x_2^2 = \dfrac{1}{2}(2k)\dfrac{x_1^2}{4}$

$\therefore \quad \dfrac{E_1}{E_2} = \dfrac{\dfrac{1}{2}kx_1^2}{\dfrac{1}{4}kx_1^2} = 2$

$E_1 = 2E_2$

39. (A)

Potential difference across 800 Ω resistor $V_{800\Omega} = 5.6$ V

$\therefore$ current across 800 Ω resistor,

$I_{800\Omega} = \dfrac{5.6}{800}$ A = 7 mA

Potential difference across 200 Ω resistor, $V_{200\Omega} = 9 - 5.6 = 3.4$ V

$\therefore$ current across 200 Ω resistor,

$I_{200\Omega} = \dfrac{3.4}{200}$ A = 17 mA

$\therefore$ Current through zener diode, $I_z = 17 - 7 = 10$ mA.

40. (D)

$q = CV$ where C is a slope

Let $C = \dfrac{k\varepsilon_0 A}{d} \Rightarrow C \propto \dfrac{1}{d}$

As slope is higher for line 4, it has higher value of capacitance and smallest plate distance

41. (B)

In the part c b d,

$V_c - V_b = V_b - V_d \Rightarrow V_b = \dfrac{V_c + V_d}{2}$

In the part c a d,

$V_c - V_a > V_a - V_d \Rightarrow \dfrac{V_c + V_d}{2} > V_a$

$\Rightarrow V_b > V_a$

42. (B)

$R_n = \dfrac{v_c \rho D}{\eta} = \dfrac{6 \times 1 \times 1}{10^{-2}} = 600$

Since 600 < 1000

$\therefore$ The flow is streamline.

43. (C)

P.E. $= \dfrac{1}{2}kx^2$

44. (A)

$r + a + t_r = 1$

$\therefore \quad t_r = 1 - r - a = 1 - 0.8 - 0.1 = 1 - 0.9 = 0.1$

$Q = 2000$ J/min

$\therefore$ Heat energy transmitted per minute $Q_t = Q \times t = 2000 \times 0.1 = 200$ J

$\therefore$ Heat energy transmitted in 5 minutes $= 200 \times 10 = 2000$ J

45. (C)

$\dfrac{\Delta Q}{t} = \dfrac{KA\Delta\theta}{\Delta x}$

Thermal gradient

$\dfrac{\Delta\theta}{\Delta x} = \dfrac{(\Delta Q / At)}{K} = \dfrac{20}{0.8} = 25$ °C/cm

46. (D)

$L = \dfrac{e}{\left(\dfrac{dI}{dt}\right)} = \dfrac{10}{\left(\dfrac{(6-4)}{10^{-3}}\right)} = \dfrac{5}{1} \times 10^{-3}$ H = 5 mH

47. (C)

For open pipe, $f_1 = \dfrac{v}{2L_1}$ or $L_1 = \dfrac{v}{2f_1}$

For closed pipe, $f_2 = \dfrac{v}{4L_2}$ or $L_2 = \dfrac{v}{4f_2}$

After joining the two pipes we get,

$L = L_1 + L_2$

Since it is a closed pipe,

$f = \dfrac{v}{4L} = \dfrac{v}{4(L_1 + L_2)} = \dfrac{v}{4\left(\dfrac{v}{2f_1} + \dfrac{v}{4f_2}\right)}$

$\qquad = \dfrac{8f_1 f_2}{4(4f_2 + 2f_1)} = \dfrac{f_1 f_2}{2f_2 + f_1}$

48. (D)

49. (A)

When R is increased, the current I will decrease, consequently the potential gradient will increase. Thus, a bigger length will be required for a null point. When S is decreased, the current drawn from E_1 increases.
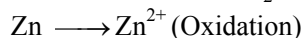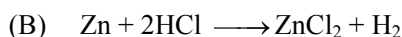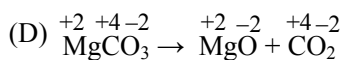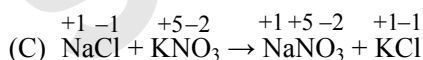
∴ $V = E_1 - Ir$, i.e., the potential difference across E_1 will decrease. This potential difference will be balanced by a smaller length of the potentiometer wire.

50. (A)

The tension in the string is largest and equal to $\dfrac{mv^2}{r}$ + mg at the bottom.

CHEMISTRY

1. (B)

(A) $\overset{+2\ -3\ -2}{CaC_2O_4} + \overset{+1-1}{2HCl} \rightarrow \overset{+2\ -1}{CaCl_2} + \overset{+1\ +3-2}{H_2C_2O_4}$

(C) $\overset{+1\ -1}{NaCl} + \overset{+5-2}{KNO_3} \rightarrow \overset{+1+5-2}{NaNO_3} + \overset{+1-1}{KCl}$

(D) $\overset{+2\ +4\ -2}{MgCO_3} \rightarrow \overset{+2\ -2}{MgO} + \overset{+4\ -2}{CO_2}$

(B) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

$\qquad Zn \longrightarrow Zn^{2+}$ (Oxidation)

$\qquad 2H^+ \longrightarrow H_2$ (Reduction)
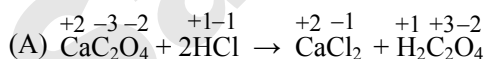
Hence, option (B) is the correct answer.

2. (A)

6.022×10^{23} molecules of dinitrogen ≡ 28 g of N_2

∴ 3.6×10^{18} molecules of dinitrogen

$= \dfrac{3.6 \times 10^{18} \times 28}{6.022 \times 10^{23}}$

$= 16.7 \times 10^{-5}$ g

$= 0.167$ mg

3. (D)   **4. (A)**

5. (A)

$Al \longrightarrow Al^{3+} + 3e^-$ …(i)

$Sn^{2+} + 2e^- \longrightarrow Sn$ …(ii)
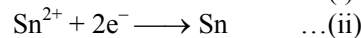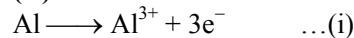
Multiply equation (i) by 2 and equation (ii) by 3

$2Al \longrightarrow 2Al^{3+} + 6e^-$

$3Sn^{2+} + 6e^- \longrightarrow 3Sn$
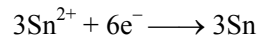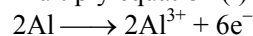
$E^o_{cell} = E^o_{Sn} - E^o_{Al}$

$\qquad = (-0.136) - (-1.66) = 1.524$ V

$\Delta G° = -n\,F\,E^o_{cell}$

$\qquad = -6 \times 96500 \times 1.524$

$\qquad = -882396$ J $= -882$ kJ

6. (C)

$S = K_H P = 0.159$ mol dm^{-3} atm$^{-1} \times 0.164$ atm

$\qquad = 0.026$ mol dm^{-3}

7. (B)

8. (D)

Argon is a group 18 element (noble gas). It has no tendency to accept electrons because of the stable electronic configuration and thus have large positive electron gain enthalpy.

9. (C)

10. (B)

Haloform reaction is given by acetaldehyde, all methyl ketones (CH_3–CO–R) and all alcohols containing CH_3(CHOH)– group.

11. (C)

$2SO_2 + O_2 \longrightarrow 2SO_3$
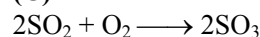
The average rate of disappearance of SO_2

$= -\dfrac{\Delta[SO_2]}{\Delta t} = 1.28 \times 10^{-3}$ mol dm^{-3} s^{-1}

The average rate of formation of SO_3

$= \dfrac{\Delta[SO_3]}{\Delta t}$

The average rate of reaction is

$-\dfrac{1}{2}\dfrac{\Delta[SO_2]}{\Delta t} = -\dfrac{\Delta[O_2]}{\Delta t} = \dfrac{1}{2}\dfrac{\Delta[SO_3]}{\Delta t}$

∴ $-\dfrac{\Delta[SO_2]}{\Delta t} = \dfrac{\Delta[SO_3]}{\Delta t} = 1.28 \times 10^{-3}$ mol dm^{-3} s^{-1}

12. (B)

$$CH_3 - C = CH - CH_3 + HCl \rightarrow$$
$$\underset{CH_3}{\overset{|}{\underset{\text{2-Methylbut-2-ene}}{}}}$$

$$\underset{CH_3}{\overset{Cl}{\underset{\text{2-Chloro-2-methylbutane}}{CH_3 - \overset{|}{C} - CH_2 - CH_3}}}$$

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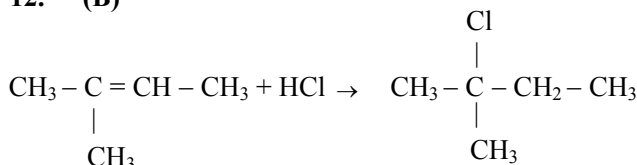
13. (B)
The element with atomic number 30 is zinc. Thus, the E.C of Zn^{2+} is $3d^{10}4s^0$.

14. (C)

15. (A)
For a first order reaction,
$$t_{1/2} = \frac{0.693}{k} = \frac{0.693}{5.0 \times 10^{-2}} = 13.86 \text{ h} = 832 \text{ min}$$

16. (A)

17. (B)

$$C_2H_5Br \xrightarrow[\text{Ethyl bromide}]{}$$

- $\xrightarrow[\Delta]{CH_3 - O - Na} C_2H_5 - O - CH_3$
- $\xrightarrow[\Delta, \text{ pressure}]{\text{alcoholic } NH_3} C_2H_5 - NH_2$
- $\xrightarrow[\Delta]{CH_3COOAg} C_2H_5 - O - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3$

18. (D)

$$\overset{5}{CH_3} - \overset{4}{CH_2} - \overset{3}{\overset{\displaystyle O}{\overset{\|}{C}}} - \overset{2}{\overset{\displaystyle CH_3}{\overset{|}{CH}}} - \overset{1}{\overset{\displaystyle O}{\overset{\|}{C}}} - H$$

2-Methyl-3-oxopentanal

19. (B)

$$CH_3NH_2 \xrightarrow[\Delta]{CH_3I} (CH_3)_2 NH \xrightarrow[\Delta]{CH_3I}$$
$$(CH_3)_3 N \xrightarrow[\Delta]{CH_3I} (CH_3)_4 N^+I^-$$
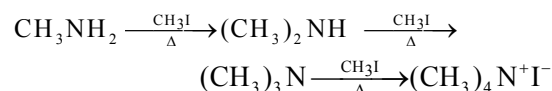
20. (B)

21. (D)
For a first order reaction,
$$k = \frac{0.693}{t_{1/2}}$$
$$t_{1/2} = \frac{0.693}{0.02303} = 30 \text{ min}$$
No. of $t_{1/2} = \frac{90}{30} = 3$

Therefore, percent of reactant that remains after $3t_{1/2} = 12.5\%$

22. (C)
Let the number of atoms of element Y in hcp unit cell be n.

∴ Number of tetrahedral voids = 2n
As $2/3^{rd}$ of the tetrahedral voids are occupied by atoms of element X,

Number of atoms of element $X = 2n \times \frac{3}{4} = \frac{3n}{2}$

∴ Ratio of atoms of element X : atoms of element $Y = \frac{3n}{2} : n = 3 : 2$

The formula of the compound is X_3Y_2.

23. (B)
Molecules on the surface of liquid experience attractive forces in the downward direction.

24. (A)
Co^{2+} and Cr^{3+} are coloured due to the presence of 3 unpaired electrons each. But Ti^{4+} is colourless because of absence of unpaired electrons.

25. (B)   **26. (A)**

27. (B)
In the reaction, $PCl_{5(g)} \longrightarrow PCl_{3(g)} + Cl_{2(g)}$;
$\Delta n = 2 - 1 = +1$
$\Delta H = \Delta U + \Delta n_g RT$
∴ $\Delta H > \Delta U$

28. (D)   **29. (C)**

30. (D)

Thinking Hatke – 30
To identify the structure, check the different groups bonded to the central carbon atom. Here, the central carbon atom is bonded to *one* −R group, *one* −H, and *two* −OR′ groups. This implies it is an acetal.

31. (B)
$$\wedge_m = \frac{1000 \, k}{c}$$
$$k = \frac{\Lambda_m \times c}{1000} = \frac{121.4 \times 0.01}{1000}$$
$$= 1.2 \times 10^{-3} \, \Omega^{-1} \text{cm}^{-1}$$

32. (B)
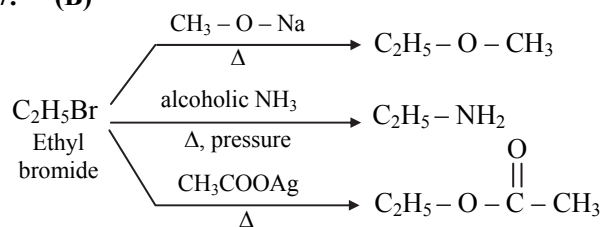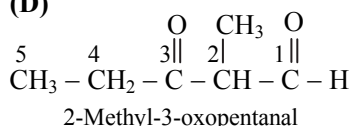The structure does not have lone pair of electrons or π electrons that are required for resonance. Hence, resonance effect is not present in this structure.

33. (D)

34. (B)
$$MnO_2 + 4HCl \xrightarrow{\Delta} MnCl_2 + Cl_2 + 2H_2O$$
Manganese dioxide   Hydrochloric acid   Manganese dichloride   Chlorine (A)   Water

$$Cl_2 + 3F_2 \longrightarrow 2ClF_3$$
Chlorine (A)   Fluorine (excess)   Chlorine trifluoride (colourless gas) (B)
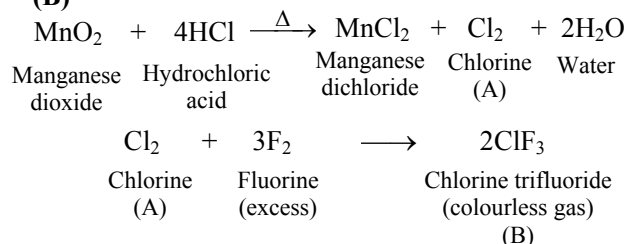
In the given series of reactions, the gases A and B are Cl_2 and ClF_3 respectively.

35. (A)
In cold, a mixed ether (except the one having a tertiary alkyl group) gives higher alcohol and lower alkyl iodide.
$$(CH_3)_2CH - O - CH_3 \xrightarrow{\text{Cold HI}} (CH_3)_2CHOH + CH_3I$$
Propan-2-ol (X)   Iodomethane (Y)

$$(CH_3)_2CHOH \xrightarrow[\text{dil. } H_2SO_4]{K_2Cr_2O_7} CH_3COCH_3$$
Propanone (Z)

$$CH_3I + NaOH \xrightarrow{\Delta} CH_3OH + NaI$$
(aq.)   Methanol
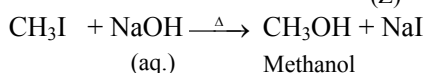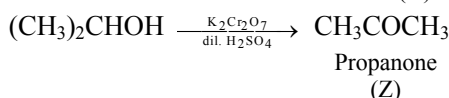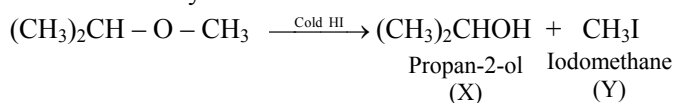
36. (B)
Edge length $(a) = 450$ pm $= 4.50 \times 10^{-8}$ cm
Volume of unit cell $= a^3 = (4.50 \times 10^{-8}$ cm$)^3$
$= 9.1 \times 10^{-23}$ cm^3

37. (D)
Linkage isomerism is exhibited by ambidentate ligands. Among the given options, only nitro is an ambidentate ligand which gets attached through two different donor atoms, whereas others are monodentate ligands.

38. (B)
$K_a = \alpha^2 c$
$= (0.04)^2 \times (0.10) = 1.6 \times 10^{-4}$

39. (A)
$\Delta T_f \propto m$
The freezing point depression is directly proportional to molality of solution.

40. (B)
78 g of benzene on combustion produces heat
$= 3264.6$ kJ

$\therefore$ 39 g of benzene will produce $= \dfrac{3264.6 \text{ kJ}}{2}$
$= 1632.3$ kJ

41. (A)
$CH_3–(CH_2)_9–CH_3$ (undecane)

42. (B)
$Na_4[Fe(CN)_6] \longrightarrow 4Na^+ + [Fe(CN)_6]^{4-}$
It is an anionic complex in which oxidation state of Fe is +2 and coordination number of Fe is 6.

43. (D)
Aniline reacts with bromine water at room temperature to give a white precipitate of 2,4,6-tribromoaniline.

Aniline does not undergo Friedel Craft's reaction using aluminium chloride because it reacts with the catalyst aluminium chloride (Lewis acid) to form a salt.

44. (C)
$\Delta_{vap}S = \dfrac{\Delta_{vap}H}{T} = \dfrac{37.3 \text{ kJ mol}^{-1}}{373 \text{ K}}$
$= 0.1$ kJ mol^{-1} K^{-1}
$= 100$ J mol^{-1} K^{-1}

45. (B)
$2ZnS_{(s)} + 3O_{2(g)} \xrightarrow{\Delta} 2ZnO_{(s)} + 2SO_{2(g)}$
SO_2 is highly soluble in water and its solution in water is called sulfurous acid.

46. (D)   **47. (A)**

48. (C)
$\pi = iMRT = \dfrac{i \times W_2 RT}{M_2 V}$

$= \dfrac{2.47 \times 1.5 \text{ g} \times 0.082 \text{ dm}^3 \text{ atm mol}^{-1} \text{ K}^{-1} \times 300 \text{ K}}{111 \text{ g mol}^{-1} \times 1.5 \text{ dm}^3}$
$= 0.547$ atm

49. (B)
Freon-12 is dichlorodiflouromethane (CCl_2F_2).

50. (D)
$H_2C = CH – CH_2 – CH_3 + HBr \xrightarrow{(C_6H_5CO)_2 O_2}$
But-1-ene

$Br – CH_2 – CH_2 – CH_2 – CH_3$
1-Bromobutane

$Br – CH_2 – CH_2 – CH_2 – CH_3 + NaI \xrightarrow{Dry acetone}$
1-Bromobutane

$I – CH_2 – CH_2 – CH_2 – CH_3 + NaBr$
1-Iodobutane

Biology

1. (C)   2. (D)

3. (C)
In apomixis, diploid egg cell is formed without reduction division (meiosis) and it develops into an embryo without fertilization.

Caution - 3
Apomixis – formation of seeds without fertilization.
Parthenocarpy – formation of seedless fruits without fertilization
Parthenogenesis – development of embryo directly from egg cell or a male gamete.

4. (A)

5. (B)
Lycopods and ferns first appeared in the Silurian period.

Dominance of algae was also during Silurian period which is 400-440 MYA.

6. (B)
The V cranial (Dentist nerve) is responsible for mastication.

7. (C)

8. (D)

Thinking Hatke - 8
We know that Levitt proposed the theory of proton transport. This combination (i - c) is mentioned only in the option (D). Therefore, the probability of having answer from other options is eliminated and option (D) is the correct answer.

9. (B)   10. (A)

11. **(B)**   **12.** **(B)**   **13.** **(D)**

14. **(A)**

15. **(D)**
Average capacity of urinary bladder is 700 ml.

16. **(C)**
Vestibular glands in females are homologous to Bulbourethral or Cowper's glands of the male

17. **(B)**
Graves' disease is characterised by increased heartbeat, increased BMR, weight loss and higher body temperature.

18. **(B)**   **19.** **(D)**   **20.** **(B)**

21. **(D)**
Root cap has no function in water absorption because it has no root hair and it is mainly for protection of root tip against any injury.

22. **(D)**   **23.** **(C)**   **24.** **(A)**

25. **(C)**
BAC– Bacterial Artificial Chromosome

26. **(B)**   **27.** **(D)**   **28.** **(D)**

29 **(B)**

30. **(A)**

Caution - 30
Goblet cells and **mucus neck cells** have the same function i.e., secretion of mucus in the alimentary canal. However, mucus neck cells are located in the stomach and goblet cells are located in the small intestine.

31. **(B)**
Blood loss in accidents decreases blood volume and thus leads to decrease in blood pressure.

32. **(C)**   **33.** **(A)**   **34.** **(A)**

35. **(D)**
Climax community is forest in both primary as well as secondary succession.

36. **(C)**   **37.** **(D)**

38. **(D)**
Tropic forests have greater species richness than monoculture plantation of timber plant
Some areas or regions are richer in species than the other regions.
Amphibian species diversity is more in Western Ghats than in Eastern Ghats

39. **(C)**

Parents: Carrier Girl   ×   Normal Boy
             X^cX^C X^CY

Gametes: X^c X^C X^C Y

F_1: X^CX^C X^CY X^cX^C X^cY
        Normal   Normal   Carrier   Colour blind
        daughter   son   daughter   son
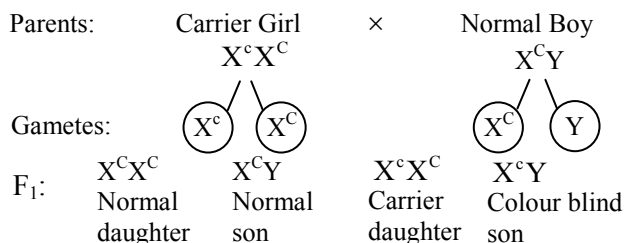
40. **(D)**   **41.** **(C)**   **42.** **(A)**

43. **(D)**
Basophils – Secrete heparin
Monocytes – Phagocytosis

44. **(C)**
In the absence of fertilization, corpus luteum can survive for only two weeks and then degenerate into a white scar called corpus albicans.

45. **(D)**

46. **(B)**
In the tomato the enzyme polygalacturonase breaks down the cell wall constituent- pectin, leading to softening of fruit during ripening. Genetically modified tomatoes are called "Flavr savr" tomatoes that can remain on the vine until mature with long shelf life and be transported in a firm solid state.

47. **(C)**

48. **(B)**

i.   Pyruvic acid $\longrightarrow$ Acetyl-CoA
     $\searrow$
     CO_2

ii. Oxalosuccinic $\longrightarrow$ α-Ketoglutaric
     acid   acid
           $\searrow$
           CO_2
     Succinyl-CoA $\longleftarrow$
           $\downarrow$
           CO_2
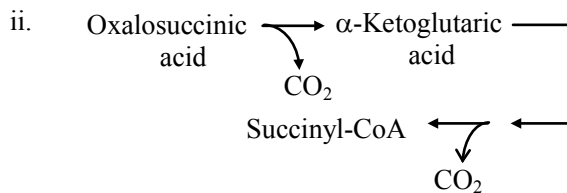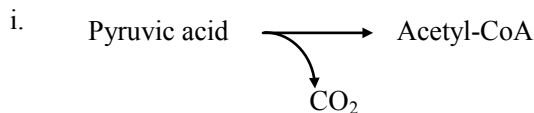
49. **(B)**
In chiropterophily, bats are the pollinating agents.
Callistemon is an example of ornithophilous plant.

50. **(A)**
Pepsin initiates the digestion of protein in stomach producing proteoses and peptones.

51. **(C)**

52. **(D)**
Different types of gametes formed by genotype TtYy are TY, Ty, tY, ty

53. **(C)**
Generally, vernalization is effective at seed stage in annual plants.

54. **(C)**
Inspiration is initiated due to contraction of diaphragm. The contraction of external intercostal muscles lifts up the ribs which further causes inspiration. Thoracic volume decreases during expiration.

55. **(A)**

56. **(D)**
The phenotypic ratio of F2 generation of a cross between red flowered and white flowered plant of Mirabilis jalapa is 1 : 2 : 1 (1 Red : 2 Pink : 1 White).

Total individuals = 440

∴ ¼ of total individuals = 440/4 = 110

Hence out of 440 offsprings 110 will be red flowered.

57. **(C)**   **58.** **(B)**   **59.** **(A)**

60. **(B)**
Erythrocytes are circular, biconcave and enucleated. Hence 'x' is erythrocyte. Erythrocytes are responsible for the transport of respiratory gases O_2 and CO_2, maintaining pH and viscosity of blood. They also contribute in the process of blood clotting. Thrombocytes are cellular fragments formed from the large cells called megakaryocytes. They are very small, oval shaped cell fragments without nucleus. Hence 'y' is thrombocyte.

61. **(C)**   **62.** **(C)**

63. **(C)**
Hydrarch succession is also known as hydrosere succession. It begins with small phytoplankton replaced by rooted submerged plants followed by submerged and free floating plants and then reed swamp stage, marsh meadow stage, scrubs and finally the trees.

64. **(A)**

65. **(C)**
Widow's peak occurs in homozygous dominant (WW) and also heterozygous (Ww) individuals.

66. **(B)**
I.   Elongation of root at a constant rate shows arithmetic growth.
II.   Geometric growth can be expressed mathematically by the equation $W_1 = W_0\,e^{rt}$.

67. **(D)**   **68.** **(C)**

69. **(A)**
Cardiac output = Stroke Volume (SV) × Heart rate (HR)
Cardiac output = 5000 mL or 5L
Blood volume in ventricles at the end of diastole = 100 mL
Blood volume in ventricles at the end of systole = 50 mL
Stroke volume = 100 – 50 = 50 mL.
So, 5000 ml = 50 mL × Heart rate
Therefore, heart rate = 100 beats per minute.

70. **(D)**

71. **(A)**
All types of muscles are formed from mesoderm except iris muscles and ciliary muscles of eye which originate from ectoderm.
Lacrimal glands and conjunctiva are formed from ectoderm.

72. **(C)**

> **Smart Code - 72**
> **Stages of Human Evolution:**
> **D**octor **Ram** **A**dvised to **Ha**ve **E**gg **N**oodle **S**oup
> **D** – **D**ryopithecus, **Ram** – **Ram**apithecus, **A** – **A**ustralopithecus, **Ha** – Homo **ha**bilis, **E** – Homo **e**rectus, **N** – **N**eanderthal man, **S** – Homo **s**apiens

73. **(A)**

74. **(D)**
i.   Vaccination involves the administration of weakened or inactivated pathogens.
iii. Vaccines do not contain readymade antibodies from hyper-immunized horses; instead, they contain antigens that stimulate the production of antibodies in the recipient.

75. **(C)**   **76.** **(A)**   **77.** **(C)**

78. **(C)**   **79.** **(A)**   **80.** **(D)**

81. **(B)**
Biocontrol agents help to reduce the use of synthetic pesticides.

82. **(B)**

83. **(C)**
The amount of purine is equal to the amount of pyrimidine in DNA.
According to Chargaff's rule,
A + G = C + T
As amount of guanine is 19%, thus the amount of cytosine has to be 19% because in a DNA molecule, guanine always pairs with cytosine.

84. **(D)**   **85.** **(A)**   **86.** **(A)**

87. **(B)**

88. **(C)**
ii. Gene flow is due to emigration and immigration.
v. Smaller populations have greater chances for genetic drift.

89. **(D)**

90. **(D)**
Astrocytes, ependymal cells and oligodendrocytes are neuroglial cells present in CNS.

91. **(A)**   **92.** **(B)**

93. **(D)**
Transfer of *Arabidopsis* gene improves the oil content and oil quality of oil crops like soybean, oil palm, rapeseed and sunflower.

94. **(C)**   **95.** **(C)**   **96.** **(D)**

97. **(C)**   **98.** **(D)**

99. **(C)**
Oestrogen is a steroid hormone.

100. **(C)**

Page no. **167** to 1**84** are purposely left blank.

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61. **(B)**

Smart Tip - Q.61
Grit means stone.

62. **(C)**
High blood pressure is caused due to genetic and environmental factors.

63. **(A)**

64. **(C)**
Aldolase is used in glycolysis for cleavage of Fructose -1, 6-Diphosphate

65. **(A)**
Parthenocarpy is the production of fruit without fertilization of ovule. The fruit is therefore seedless like in banana.

66. **(A)**   **67.** **(B)**   **68.** **(A)**

69. **(D)**   **70.** **(A)**   **71.** **(B)**

72. **(A)**   **73.** **(D)**

74. **(D)**

Thinking Hatke - 74
We know that Typhoid is caused by *Salmonella*. This correct pairing (3-d) is observed in option (D) only. Therefore, the probability of having answer from other options is eliminated and option (D) is the correct answer.

75. **(D)**
Realised natality- The number of births when environmental pressures come into play.

76. **(D)**   **77.** **(C)**   **78.** **(A)**

79. **(D)**
$lac\ z \rightarrow$ β-galactosidase
$lac\ y \rightarrow$ Permease
$lac\ a \rightarrow$ Transacetylase

80. **(B)**   **81.** **(A)**

82. **(B)**
Particles with diameter 10 μm may settle in the soil but particles with 1 μm or less remain suspended in the air.

83. **(C)**

                    Husband   Wife
Gametes: $I^A I^B$ × $I^A i$

Offsprings

	I^A	i
I^A	$I^A I^A$ 'A' blood group	$I^A i$ 'A' blood group
I^B	$I^A I^B$ 'AB' blood group	$I^B i$ 'B' blood group

Thus, number of genotypes : 4
      number of phenotypes : 3

84. **(D)**   **85.** **(B)**

86. **(B)**

Thinking Hatke - Q.86
Statements i and ii are contradictory, and statements iii and iv are contradictory. Option (A) having both i and ii, as well as options (C) and (D) having both iii and iv, can be easily eliminated. The correct answer is option (B).

87. **(D)**

$^{14}N^{15}N$ DNA is allowed to undergo replication in ^{15}N medium

↓

1st Generation
$(^{14}N^{15}N)$ $(^{15}N^{15}N)$

↓

2nd Generation
$(^{14}N^{15}N)$, $(^{15}N^{15}N)$, $(^{15}N^{15}N)$, $(^{15}N^{15}N)$
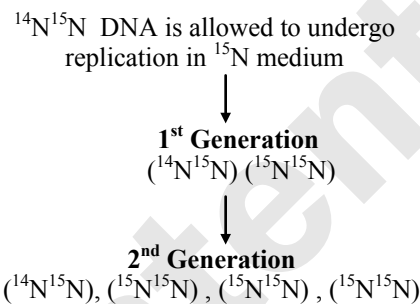
88. **(B)**   **89.** **(C)**   **90.** **(B)**

91. **(A)**   **92.** **(B)**   **93.** **(B)**

94. **(B)**   **95.** **(A)**   **96.** **(C)**

97. **(B)**   **98.** **(D)**   **99.** **(A)**

100. **(A)**

Page no. **186** to **255** are purposely left blank.

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Self-Assessment Score Card

- Each question in Physics, Chemistry and Biology carries **1 Mark**.
- There is no negative marking for wrong answers.

Mock Test – 01

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test – 02

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test – 03

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test – 04

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test - 05

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test - 06

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test – 07

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Chemistry			50
Biology			100
Total			**200**

Mock Test – 08

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test – 09

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

Mock Test - 10

	Correct Answers	Score	Out of
Physics			50
Chemistry			50
Biology			100
Total			**200**

"Great things are not done by impulse, but by a series of small things brought together." — Vincent van Gogh

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