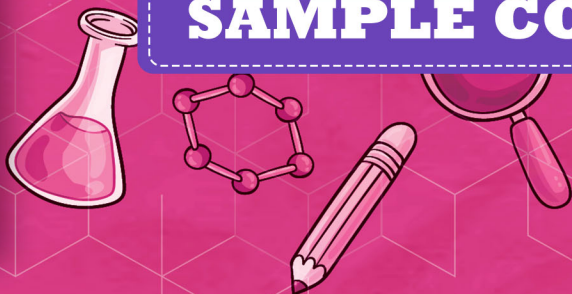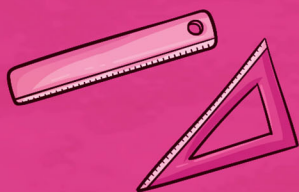Includes Statistical Analysis of All shifts

**Exam EXperts**

# MHT-CET PCB

# SOLVED PAPERS

# 2024

- ◆ Self-Assessment Score Card
- ◆ Smart Keys : Thinking Hatke, Smart Code & Caution

Contains 14 Authentic papers conducted in 2024

**Target Publications® Pvt. Ltd.**

# MHT-CET (PCB)
# SOLVED PAPERS - 2024

**All 14 papers conducted in 2024**

## Salient Features:

- **Authentic 2024 Papers:** Fourteen MHT-CET question papers for Physics, Chemistry, and Biology.

- **Detailed Solutions:** Includes answers and thorough explanation for all difficult questions

- **Trend analysis:**

   ➢ **Graphs:** Visual representation of difficulty levels for papers of each shift.

   ➢ **Tables:** Chapter-wise weightage analysis of all shifts.

- **Concept Mapping:** Each question is mapped to the respective chapter and topic in the solution section for better comprehension

- **Smart Keys:** Features *'Thinking Hatke'*, *'Smart Tips'* and *'Caution'* to tackle questions effectively.

- **Assessment Tool:** Scorecards for self-assessment after each paper to track the progress.

Printed at: **India Printing Works,** Mumbai

# PREFACE

We are delighted to introduce our latest edition, '**MHT-CET (PCB) Solved Papers - 2024**', an exclusive compilation designed to assist students in their preparation for the MHT-CET exams. This edition includes 14 **authentic** exam papers conducted by the State Common Entrance Test Cell, covering:

**Subjects:** Physics, Chemistry, and Biology
**Exam Dates:** April 22 – April 30, 2024 (Morning and Afternoon Shifts)

This book serves as a comprehensive repository of all questions asked in the 2024 exams, offering students a central resource for their preparation.

## Core Attributes

**Detailed Solutions and Conceptual Mapping:**

• Answers and detailed solutions for each question paper.
• Step-by-step explanations to enhance problem-solving skills.
• In biology, key words are kept in bold to facilitate quick learning.
• Solutions include topic names for easy reference.
• Questions requiring multiple concepts are marked as "Multifarious."

**Smart Keys and Self-Assessment:**

• **Thinking Hatke:** Encourages out-of-the-box thinking for problem-solving.
• **Caution:** Highlights common mistakes made while solving MCQs.
• **Smart Tips:** Comprises a set of remarkable study techniques created to benefit students.
• **Self-Assessment Score Cards:** Facilitates thorough self-evaluation

**Statistical and Graphical Insights:**

• **Chapter Weightage Analysis:** Tables showing the number of questions per chapter for each shift.
• **Difficulty Level Breakdown:** Graphical representation of difficulty levels for all 14 papers in each subject, helping students strategize their study plans effectively.

## Key Takeaways

• **Central Repository:** All 2024 PCB question papers in one place.
• **Enhanced Understanding:** In-depth solutions to clarify concepts.
• **Strategic Preparation:** Statistical and graphical insights to guide study plans.
• **Self-Evaluation:** Tools to track and measure progress.

We are confident that '**MHT-CET (PCB) Solved Papers - 2024**' will comprehensively meet the needs of students and effectively assist them in achieving their academic goals. Although there is a possibility that the weightage to a chapter and the level of difficulty of the question paper in the future examination may vary. Solving these papers offer students conviction of their preparedness from the examination point of view.

Publisher
**Edition:** Second

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.

Please write to us on : mail@targetpublications.org

*A book affects eternity; one can never tell where its influence stops.*

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# 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 Std XI | No. of MCQs based on Std XII | Mark(s) Per Question | Total Marks | Duration in Minutes |
|-------|-----------|------|------|------|------|------|
| 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 prescribed by State Council of Educational Research and Training, Maharashtra 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 is 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.**]**

<div style="text-align: center;">

**INDEX**

</div>

# PHYSICS

## Chapter-wise Analysis of MHT-CET 2024 Exam Papers

| Ch. no. | Std. | Chapter name | 22nd April (Shift I) | 22nd April (Shift II) | 23rd April (Shift I) | 23rd April (Shift II) | 24th April (Shift I) | 24th April (Shift II) | 27th April (Shift I) | 27th April (Shift II) | 28th April (Shift I) | 28th April (Shift II) | 29th April (Shift I) | 29th April (Shift II) | 30th April (Shift I) | 30th April (Shift II) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 11th | Motion in a Plane | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 3 | 1 | 17 |
| 4 | 11th | Laws of Motion | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 15 |
| 5 | 11th | Gravitation | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 27 |
| 7 | 11th | Thermal Properties of Matter | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 16 |
| 8 | 11th | Sound | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 12 |
| 9 | 11th | Optics | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 27 |
| 10 | 11th | Electrostatics | 1 | 2 | 1 | 1 | 0 | 0 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 16 |
| 14 | 11th | Semiconductors | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 16 |
| 1 | 12th | Rotational Dynamics | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 4 | 3 | 2 | 3 | 1 | 4 | 37 |
| 2 | 12th | Mechanical Properties of Fluids | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 42 |
| 3 | 12th | Kinetic Theory of Gases and Radiation | 3 | 2 | 3 | 3 | 4 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 39 |
| 4 | 12th | Thermodynamics | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 27 |
| 5 | 12th | Oscillations | 4 | 2 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 46 |
| 6 | 12th | Superposition of Waves | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 0 | 3 | 3 | 42 |
| 7 | 12th | Wave Optics | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 43 |
| 8 | 12th | Electrostatics | 3 | 2 | 3 | 3 | 4 | 4 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 40 |
| 9 | 12th | Current Electricity | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 29 |
| 10 | 12th | Magnetic Fields due to Electric Current | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 3 | 33 |
| 11 | 12th | Magnetic Materials | 1 | 2 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 11 |
| 12 | 12th | Electromagnetic Induction | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 39 |
| 13 | 12th | AC Circuits | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 41 |
| 14 | 12th | Dual Nature of Radiation and Matter | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 27 |
| 15 | 12th | Structure of Atoms and Nuclei | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 31 |
| 16 | 12th | Semiconductor Devices | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 27 |
|  |  | **Total** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **700** |

# PHYSICS

## Difficulty level-wise Analysis of MHT-CET 2024 Exam Papers
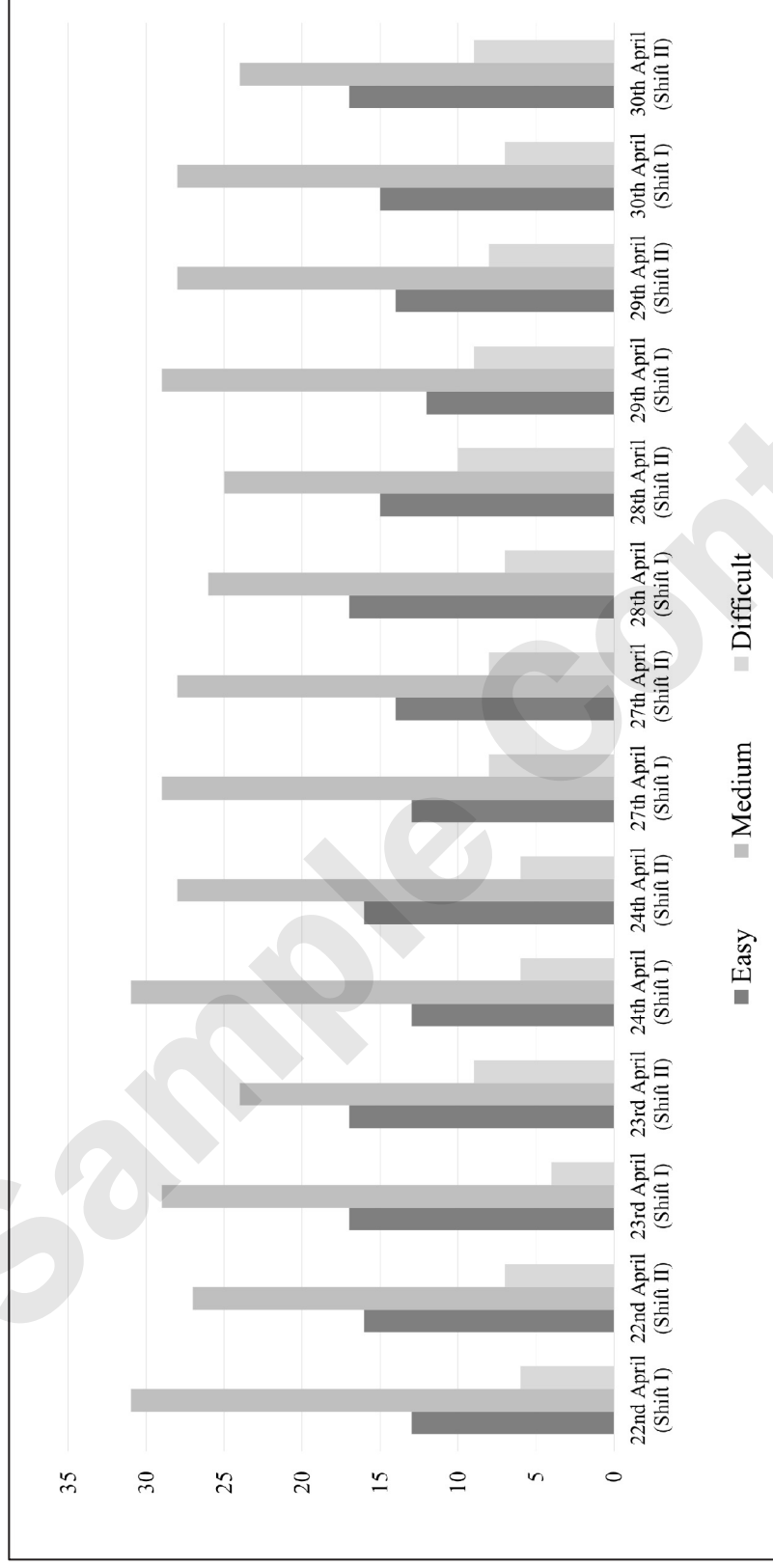


Chart legend: ■ Easy ■ Medium ■ Difficult

X-axis categories: 22nd April (Shift I), 22nd April (Shift II), 23rd April (Shift I), 23rd April (Shift II), 24th April (Shift I), 24th April (Shift II), 27th April (Shift I), 27th April (Shift II), 28th April (Shift I), 28th April (Shift II), 29th April (Shift I), 29th April (Shift II), 30th April (Shift I), 30th April (Shift II)

Y-axis: 0, 5, 10, 15, 20, 25, 30, 35

**E – Easy:** Questions whose answers can be directly and easily answered by the information given in Std. XI and XII Textbooks.

**M – Medium:** These questions require students to identify and apply the appropriate concepts which they studied from Std. XI and XII Textbooks.
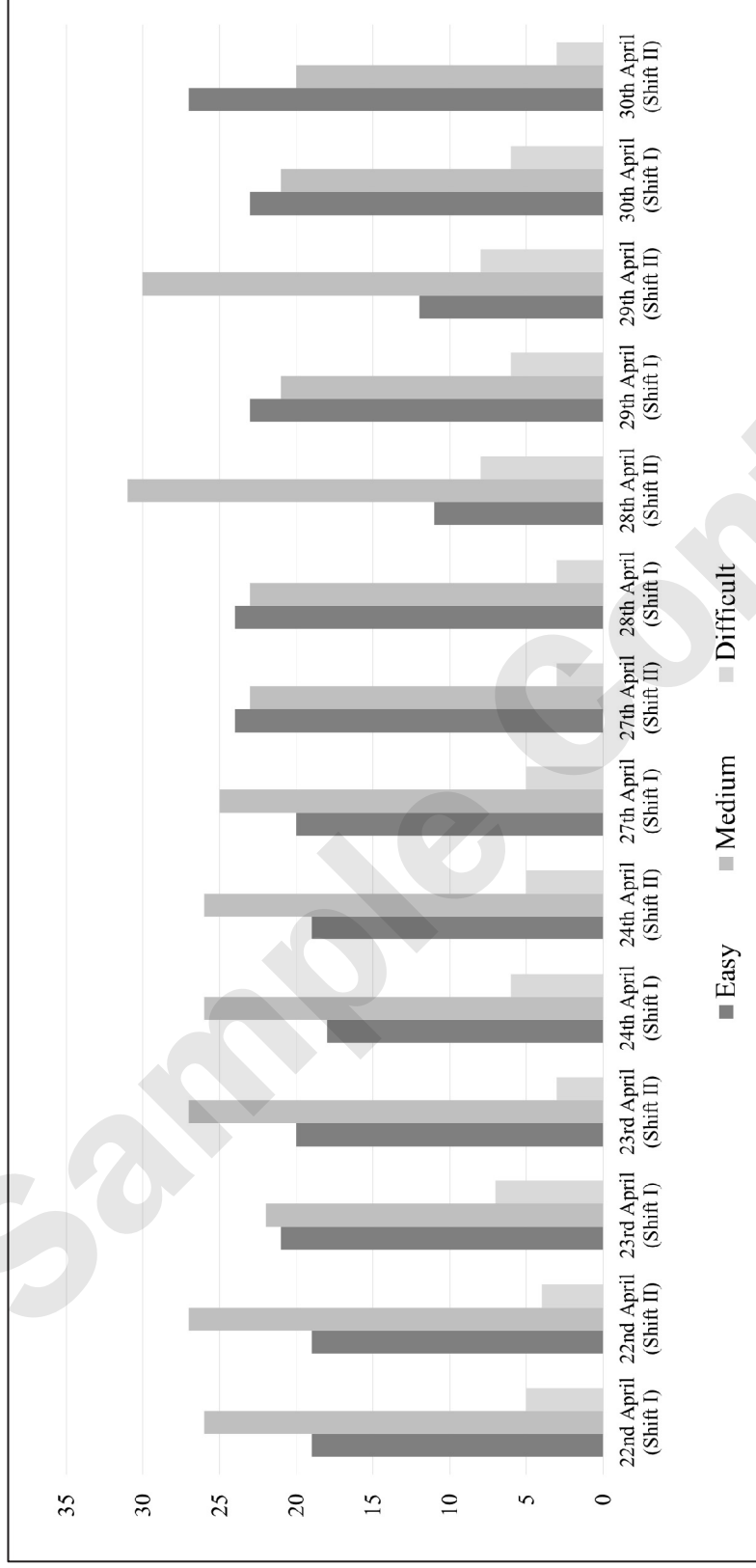
**D – Difficult:** The most Challenging Questions that require application of various concepts and encourage students to think beyond the information given in the textbooks.

### Analysis

➢ **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the fourteen papers, the number of medium questions is slightly higher than easy questions, with a few difficult questions. This indicates that the entrance exam emphasises a lot on understanding and application of concepts. Students are advised to focus on the application of formulae, concepts along with thorough revision while preparing for the entrance exam.

# CHEMISTRY

## Chapter-wise Analysis of MHT-CET 2024 Exam Papers

| Ch. no. | Std. | Chapter name | 22nd April (Shift I) | 22nd April (Shift II) | 23rd April (Shift I) | 23rd April (Shift II) | 24th April (Shift I) | 24th April (Shift II) | 27th April (Shift I) | 27th April (Shift II) | 28th April (Shift I) | 28th April (Shift II) | 29th April (Shift I) | 29th April (Shift II) | 30th April (Shift I) | 30th April (Shift II) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11th | Some Basic Concepts of Chemistry | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 18 |
| 4 | 11th | Structure of Atom | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 27 |
| 5 | 11th | Chemical Bonding | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 14 |
| 6 | 11th | Redox Reactions | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 12 |
| 8 | 11th | Elements of Group 1 and Group 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 13 |
| 10 | 11th | States of Matter: Gaseous and Liquid States | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 13 |
| 11 | 11th | Adsorption and Colloids | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 14 |
| 14 | 11th | Basic Principles of Organic Chemistry | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 17 |
| 15 | 11th | Hydrocarbons | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 2 | 0 | 2 | 1 | 1 | 0 | 1 | 12 |
| 1 | 12th | Solid State | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 43 |
| 2 | 12th | Solutions | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 43 |
| 3 | 12th | Ionic Equilibria | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 42 |
| 4 | 12th | Chemical Thermodynamics | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 42 |
| 5 | 12th | Electrochemistry | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 41 |
| 6 | 12th | Chemical Kinetics | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 41 |
| 7 | 12th | Elements of Groups 16, 17 and 18 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 26 |
| 8 | 12th | Transition and Inner Transition Elements | 2 | 2 | 2 | 2 | 2 | 1 | 4 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 30 |
| 9 | 12th | Coordination Compounds | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 30 |
| 10 | 12th | Halogen Derivatives | 3 | 4 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 1 | 3 | 4 | 3 | 3 | 39 |
| 11 | 12th | Alcohols, Phenols and Ethers | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 4 | 2 | 3 | 3 | 1 | 40 |
| 12 | 12th | Aldehydes, Ketones and Carboxylic Acids | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 45 |
| 13 | 12th | Amines | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 29 |
| 14 | 12th | Biomolecules | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 27 |
| 15 | 12th | Introduction to Polymer Chemistry | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 29 |
| 16 | 12th | Green Chemistry and Nanochemistry | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 13 |
| | | **Total** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **50** | **700** |

# CHEMISTRY

## Difficulty level-wise Analysis of MHT-CET 2024 Exam Papers



■ Easy    ■ Medium    ■ Difficult

**E – Easy:** Questions whose answers can be directly and easily answered by the information given in Std. XI and XII Textbooks.
**M – Medium:** These questions require students to identify and apply the appropriate concepts which they studied from Std. XI and XII Textbooks.
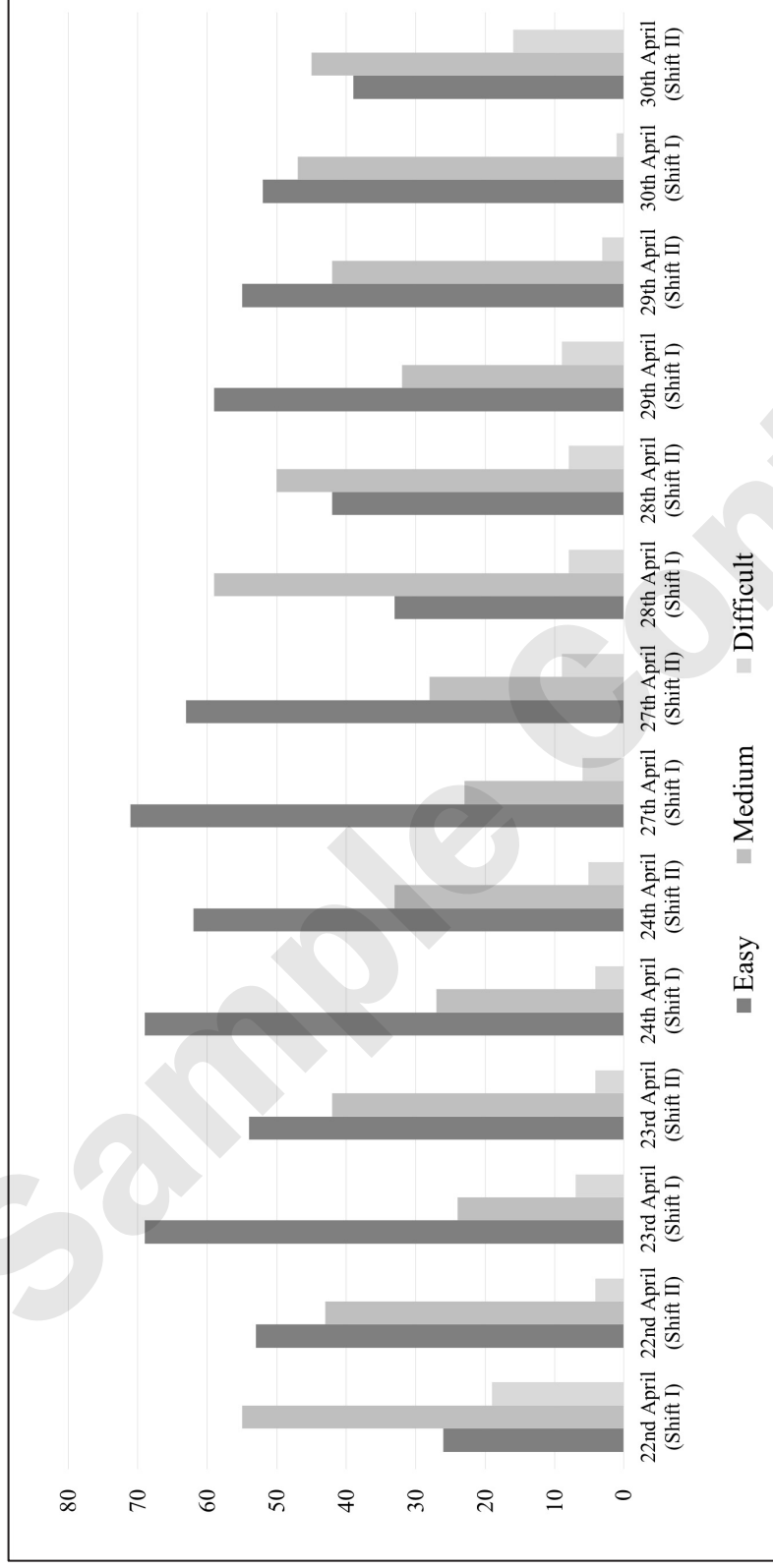**D – Difficult:** The most Challenging Questions that require application of various concepts and encourage students to think beyond the information given in the textbooks.

## Analysis

➢ **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the fourteen papers, more numbers of easy and medium questions are asked, with a few difficult questions. This demonstrates that the entrance exam places a strong emphasis on careful reading, comprehension of the text and application of principles. When studying for the entrance exam, it is advisable that students pay close attention to each chapter, concentrate on comprehending various chemical reactions, and practice solving numerical problems.

# BIOLOGY

## Chapter-wise Analysis of MHT-CET 2024 Exam Papers

| Ch. no. | Std. | Chapter name | 22nd April (Shift I) | 22nd April (Shift II) | 23rd April (Shift I) | 23rd April (Shift II) | 24thApril (Shift I) | 24th April (Shift II) | 27th April (Shift I) | 27th April (Shift II) | 28th April (Shift I) | 28th April (Shift II) | 29th April (Shift I) | 29th April (Shift II) | 30th April (Shift I) | 30th April (Shift II) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 11th | Biomolecules | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 52 |
| 13 | 11th | Respiration and Energy Transfer | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 69 |
| 14 | 11th | Human Nutrition | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 4 | 5 | 71 |
| 15 | 11th | Excretion and Osmoregulation | 6 | 5 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 83 |
| 1 | 12th | Reproduction in Lower and Higher Plants | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 85 |
| 2 | 12th | Reproduction in Lower and Higher Animals | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 5 | 6 | 84 |
| 3 | 12th | Inheritance and Variation | 5 | 5 | 4 | 5 | 8 | 5 | 5 | 5 | 5 | 6 | 5 | 5 | 6 | 5 | 74 |
| 4 | 12th | Molecular Basis of Inheritance | 6 | 6 | 5 | 5 | 7 | 5 | 5 | 5 | 5 | 4 | 5 | 6 | 4 | 6 | 74 |
| 5 | 12th | Origin and Evolution of Life | 5 | 5 | 5 | 6 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 70 |
| 6 | 12th | Plant Water Relation | 5 | 5 | 6 | 5 | 5 | 6 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 71 |
| 7 | 12th | Plant Growth and Mineral Nutrition | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 6 | 5 | 5 | 5 | 6 | 5 | 69 |
| 8 | 12th | Respiration and Circulation | 8 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 111 |
| 9 | 12th | Control and Co-ordination | 8 | 10 | 9 | 9 | 7 | 9 | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 8 | 122 |
| 10 | 12th | Human Health and Diseases | 4 | 5 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 58 |
| 11 | 12th | Enhancement of Food Production | 5 | 5 | 6 | 4 | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 6 | 5 | 5 | 71 |
| 12 | 12th | Biotechnology | 4 | 5 | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 5 | 5 | 71 |
| 13 | 12th | Organisms and Populations | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 55 |
| 14 | 12th | Ecosystems and Energy Flow | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 3 | 4 | 56 |
| 15 | 12th | Biodiversity, Conservation and Environmental Issues | 4 | 4 | 4 | 4 | 5 | 2 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 54 |
| | | **Total** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **1400** |

# BIOLOGY

## Difficulty level-wise Analysis of MHT-CET 2024 Exam Papers



Legend: Easy, Medium, Difficult

X-axis categories: 22nd April (Shift I), 22nd April (Shift II), 23rd April (Shift I), 23rd April (Shift II), 24th April (Shift I), 24th April (Shift II), 27th April (Shift I), 27th April (Shift II), 28th April (Shift I), 28th April (Shift II), 29th April (Shift I), 29th April (Shift II), 30th April (Shift I), 30th April (Shift II)

**E – Easy:** Questions whose answers can be directly and easily answered by the information given in Std. XI and XII Textbooks.

**M – Medium:** These questions require students to identify and apply the appropriate concepts which they studied from Std. XI and XII Textbooks.

**D – Difficult:** The most Challenging Questions that require application of various concepts and encourage students to think beyond the information given in the textbooks.

### Analysis

➤ **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the fourteen papers, more numbers of easy and medium questions are asked, with a few difficult questions. This indicates that the entrance exam emphasizes on careful reading, comprehension of the text and application of concepts. Students are advised to study each chapter thoroughly and apply the scientific knowledge of the studied concepts while preparing for the entrance exam.

Time: 180 Minutes     Physics, Chemistry and Biology     Total Marks: 200

Physics and Chemistry

Time: 90 Minutes            Total Marks: 100

## **PHYSICS**

**1.** Water is flowing through a horizontal pipe in a streamline flow. At the narrowest part of the pipe
   (A) velocity is maximum and pressure is minimum.
   (B) pressure is maximum and velocity is minimum.
   (C) both the pressure and velocity are minimum.
   (D) both the pressure and velocity are maximum.

**2.** Two different coils have self - inductance $L_1 = 9 \text{ mH}$ and $L_2 = 3 \text{ mH}$. The current in first coil is increased at a constant rate. The current in the second coil is also increased at the same constant rate. At certain instant of time, the power given to the two coils is same. At that time, there was current and induced voltage in the two coils. At the same instant, the ratio of the energy stored in the first coil to that in second coil is
   (A) $1 : 3$        (B) $3 : 1$
   (C) $1 : 9$        (D) $9 : 1$

**3.** Four masses of $1 \text{ kg}, 2 \text{ kg}, 3 \text{ kg}$ and $4 \text{ kg}$ are kept at co-ordinates $(0, 0)\text{m}$, $(0, 1)\text{m}$ and $(1, 0)\text{m}$ respectively. Using the co-ordinates of centre of mass its position vector is
   (A) $0.5\hat{i} + 0.7\hat{j}$    (B) $0.7\hat{i} + 0.5\hat{j}$
   (C) $0.4\hat{i} + 0.6\hat{j}$    (D) $\hat{i} + \hat{j}$

**4.** In between the plates of parallel plate capacitor of plate separation 'd' a dielectric plate of thickness 't' is inserted. The capacitance becomes one-third of the original capacity without dielectric. The dielectric constant of the plate is
   (A) $\dfrac{t}{2d-t}$      (B) $\dfrac{t}{2d+t}$
   (C) $\dfrac{3t}{d-t}$      (D) $\dfrac{3t}{d+t}$

**5.** A thin rod of length '$4L$' and mass '$4m$' is bent at the points as shown in the figure. The moment of inertia of the rod about an axis passing through point 'O' and perpendicular to plane of the paper is
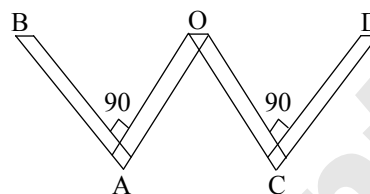


   (A) $\dfrac{mL^2}{3}$      (B) $\dfrac{10\,mL^2}{3}$
   (C) $\dfrac{mL^2}{12}$      (D) $\dfrac{mL^2}{24}$

**6.** The resistance of a coil for d.c. is $5 \, \Omega$. In a.c., the resistance will
   (A) remain same.    (B) increase.
   (C) decrease.        (D) be zero.

**7.** When a ray of light is refracted from one medium to another, then the wavelength changes from $6000 \, \text{Å}$ to $4000 \, \text{Å}$. The critical angle for the interface will be
   (A) $\cos^{-1}\left(\dfrac{3}{2}\right)$    (B) $\sin^{-1}\left(\dfrac{2}{\sqrt{3}}\right)$
   (C) $\sin^{-1}\left(\dfrac{2}{3}\right)$    (D) $\cos^{-1}\left(\dfrac{2}{\sqrt{3}}\right)$

**8.** A pipe closed at one end vibrating in fifth overtone is in unison with open pipe vibrating in its fifth overtone. The ratio of $l_c : l_o$ is [$l_c$ = vibrating length of closed pipe, $l_0$ = vibrating length of open pipe]
   (A) $12 : 11$      (B) $1 : 1$
   (C) $11 : 12$      (D) $5 : 1$

**9.** Two stars 'A' and 'B' radiate maximum energy at $5200 \, \text{Å}$ and $6500 \, \text{Å}$ respectively. Then the ratio of absolute temperatures of stars 'A' and 'B' is
   (A) $25 : 16$      (B) $5 : 4$
   (C) $4 : 5$        (D) $16 : 25$

**10.** A hollow charged metal sphere has a radius 'r'. If the potential difference between its surface and a point at a distance '3r' from the centre is '$v$', then the electric field intensity at a distance '$3r$' is
   (A) $\dfrac{v}{2r}$      (B) $\dfrac{v}{3r}$
   (C) $\dfrac{v}{6r}$      (D) $\dfrac{v}{4r}$

**11.** For a given medium, the speed of light and the polarising angle are ' $v$ ' and ' $i_p$ ' respectively, then ($c =$ speed of light in vaccum )

(A) $v \sin(i_p) = c \cos(i_p)$

(B) $c = v \cot(i_p)$

(C) $v \cos(i_p) = c \sin(i_p)$

(D) $v = c \cos(i_p)$

**12.** A particle of mass 'm' is executing S.H.M. about the origin on x-axis with frequency $\sqrt{\dfrac{ka}{\pi m}}$, where 'k' is a constant and 'a' is the amplitude of S.H.M. If ' $x$ ' is a displacement of a particle, at time 't', potential energy of the particle will be

(A) $\dfrac{1}{2}kax^2$

(B) $\pi kax^2$

(C) $2\pi kax^2$

(D) $2kax^2$

**13.** A satellite is revolving round the earth with orbital speed ' $V_0$ '. If it stops suddenly, the speed with which it will strike the surface of the earth would be ( $V_e =$ escape velocity of a particle on earth's surface)

(A) $\dfrac{V_e^2}{V_0}$

(B) $2V_0$

(C) $\sqrt{V_e^2 - V_0^2}$

(D) $\sqrt{V_e^2 - 2V_0^2}$

**14.** The angular momentum of electron in hydrogen atom in first orbit is 'L'. The change in angular momentum if electron is in second orbit of hydrogen atom is

(A) 2L  (B) L  (C) $\dfrac{L}{2}$  (D) 4L

**15.** Four point masses, each of mass ' m ' are arranged in X - Y plane as shown in the figure. The moment of inertia of this system about X - axis is
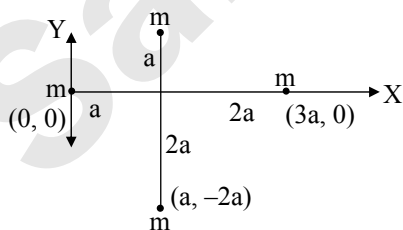


(A) $3\,ma^2$

(B) $4\,ma^2$

(C) $5\,ma^2$

(D) $6\,ma^2$

**16.** In biprism experiment the maximum intensity is ' $I_0$ '. If the path difference between the two interfering waves is ' $\lambda/4$ ' then intensity at the point on the screen is
$$\left[\sin 45^\circ = \cos 45^\circ = \dfrac{1}{\sqrt{2}}\right]$$

(A) $\dfrac{I_0}{4}$

(B) $\dfrac{I_0}{3}$

(C) $\dfrac{I_0}{2}$

(D) $I_0$

**17.** Work done to get ' n ' spherical drops of equal size from a single spherical drop of water, is proportional to

(A) $\left(\dfrac{1}{n^{2/3}} - 1\right)$

(B) $\left(\dfrac{1}{n^{1/3}} - 1\right)$

(C) $n^{1/3} - 1$

(D) $n^{4/3} - 1$

**18.** Diode and resistance are connected as shown in figure. Out of the following statements which one is TRUE?
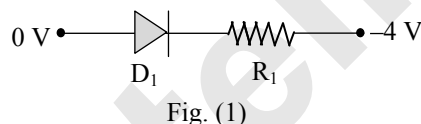


Fig. (1)

Fig. (2)

(A) Diode $D_1$ and diode $D_2$ both are forward biased.

(B) Diode $D_1$. and diode $D_2$ both are reverse biased.

(C) Diode $D_1$ is forward biased and diode $D_2$ is reverse biased.

(D) Diode $D_1$ is reverse biased and diode $D_2$ is forward biased.

**19.** Two uniform strings 'A' and 'B' made of steel are made to vibrate under same tension. If the first overtone of 'A' is equal to second overtone of 'B' and radius of 'A' is twice that of 'B'. Then the ratio of length of string 'A' to that of 'B' is

(A) $2:1$

(B) $3:4$

(C) $3:2$

(D) $1:3$

**20.** Which one of the following is the correct equation for the electric circuit shown in the figure?
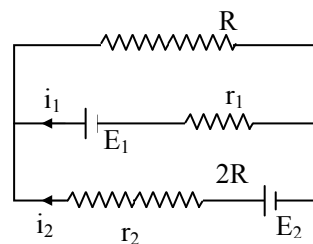


(A) $E_1 - (i_1 + i_2)R + i_1 r_1 = 0$

(B) $E_1 - (i_1 + i_2)R - i_1 r_1 = 0$

(C) $E_2 - i_2 r_2 - E_1 - i_1 r_1 = 0$

(D) $E_2 - (i_1 + i_2)R + i_2 r_2 = 0$

**21.** A pendulum is performing simple harmonic motion. The acceleration of the bob is $20 \text{ cm s}^{-2}$ at a distance of $5 \text{ cm}$ from mean position. The time period of oscillation is
(A)  $2 \text{ s}$
(B)  $\pi \text{ s}$
(C)  $2\pi \text{ s}$
(D)  $1 \text{ s}$

**22.** A spherical body of radius 'r' radiates power 'P' at T kelvin. If the radius s halved and the temperature doubled the power radiated in the same time 't' will be
(A)  $\dfrac{P}{2}$
(B)  $2P$
(C)  $4P$
(D)  $8P$

**23.** For a common emitter transistor configuration the ratio of $\dfrac{I_C}{I_E} = 0.96$, then the current gain in this configuration is
(A)  6
(B)  12
(C)  24
(D)  48

**24.** A stone is thrown upward with a speed 'u' from the top of a tower reaches the ground with velocity '3u'. The height of the tower is (g = acceleration due to gravity)
(A)  $\dfrac{3u^2}{g}$
(B)  $\dfrac{4u^2}{g}$
(C)  $\dfrac{6u^2}{g}$
(D)  $\dfrac{9u^2}{g}$

**25.** A metal surface is illuminated by light of two different wavelengths $207 \text{ nm}$ and $414 \text{ nm}$. The maximum speeds of photoelectrons corresponding to these wavelengths are $u_1$ and $u_2$ respectively with $u_1 : u_2 = 2 : 1$. The work function of the metal is $(hc = 1242 \text{ eV nm})$
(A)  1.6 eV
(B)  2.0 eV
(C)  2.4 eV
(D)  3.0 eV

**26.** In thermodynamic process, which of the following statements is not true?
(A)  In an adiabatic process, the system is insulated from the surroundings.
(B)  In an isochoric process, the pressure remains constant.
(C)  In an isothermal process, the temperature remains constant.
(D)  In an adiabatic process, $pv^\gamma = $ constant.

**27.** A charged particle is subjected to acceleration in a cyclotron which consists of two dees '$D_1$' and '$D_2$'. The charged particle undergoes increase in its speed.
(A)  inside $D_1, D_2$ and the gap between dees.
(B)  only inside $D_1$.
(C)  only in the gap between $D_1$ and $D_2$.
(D)  only inside $D_2$.

**28.** In case of well of death which is a vertical cylindrical wall of radius 'r' inside which vehicle is driven in horizontal circles. If '$m$' is mass of vehicle, '$V$' is the velocity and '$\mu_s$' is the coefficient of static friction between the wheels of vehicle and walls then correct relation is [ g = acceleration due to gravity]
(A)  $V^2 \le \dfrac{rg}{\mu_s}$
(B)  $V \le \dfrac{rg}{\mu_s}$
(C)  $V^2 \geqslant \dfrac{rg}{\mu_s}$
(D)  $V \geqslant \dfrac{rg}{\mu_s}$

**29.** In an oscillating LC circuit, the maximum charge on the capacitor is '$Q$'. When the energy is stored equally between the electric and magnetic fields, the instantaneous charge on the capacitor '$q$' is
(A)  $Q$
(B)  $\dfrac{Q}{2}$
(C)  $\dfrac{Q}{\sqrt{2}}$
(D)  $\dfrac{Q}{\sqrt{3}}$

**30.** Two particles execute S.H.M. of same amplitude and frequency along the same straight line path. They pass each other when going in opposite directions, each time their displacement is half the amplitude. The phase difference between them is $(\sin 30° = 0.5)$
(A)  $\dfrac{\pi}{6}$
(B)  $\dfrac{5\pi}{6}$
(C)  $\dfrac{\pi}{3}$
(D)  $\dfrac{2\pi}{3}$

**31.** The pitch of whistle of an engine appears to drop by 30% of the original value when it passes a stationary observer. If speed of sound in air is $350 \text{ m/s}$, then the speed of engine in $\text{m/s}$ is
(A)  87.5
(B)  105
(C)  150
(D)  175

**32.** A solenoid is connected to a battery so that a steady current flows through it, If an iron core is inserted into the solenoid, then the current in the coil
(A) will not change.
(B) will increase.
(C) will decrease.
(D) may increase or decrease depending upon the direction of the current.

**33.** A monoatomic ideal gas, initially at temperature '$T_1$' is enclosed in a cylinder fitted with a frictionless piston. The gas is allowed to expand adiabatically to a temperature '$T_2$' by releasing the piston suddenly. $L_1$ and $L_2$ are the lengths of the gas columns before and after the expansion respectively. Then $\frac{T_1}{T_2}$ is

(A) $\sqrt{\frac{L_1}{L_2}}$   (B) $\sqrt{\frac{L_2}{L_1}}$

(C) $\left(\frac{L_1}{L_2}\right)^{2/3}$   (D) $\left(\frac{L_2}{L_1}\right)^{2/3}$

**34.** In the diagram, the total electric flux through the closed surface 'S' is
[Given q = charge
$\varepsilon_0$ = permittivity of free space]

(A) $\dfrac{q}{\varepsilon_0}$

(B) $\dfrac{-2q}{\varepsilon_0}$

(C) $\dfrac{-q}{\varepsilon_0}$

(D) $\dfrac{3q}{\varepsilon_0}$
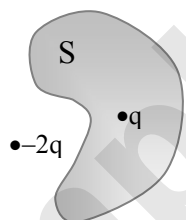


**35.** If an electron in hydrogen atom jumps from $3^{rd}$ orbit to $2^{nd}$ orbit it emits a photon of wavelength '$\lambda$'. When it emits a photon from $4^{th}$ orbit to $3^{rd}$ orbit then the corresponding wavelength of emitted photon will be

(A) $\dfrac{16}{25}\lambda$   (B) $\dfrac{9}{16}\lambda$

(C) $\dfrac{20}{7}\lambda$   (D) $\dfrac{20}{13}\lambda$

**36.** A solenoid having 400 turns/metre has a core of a material with relative permeability 300. If a current of $0.5\,A$ is passed through it, then the magnetisation of the core material is nearly
(A) $6\times10^2\ A/m$   (B) $6\times10^3\ A/m$
(C) $6\times10^4\ A/m$   (D) $6\times10^5\ A/m$

**37.** The volume of a block of metal at $30^\circ C$ changes by $0.12\%$ when its temperature is increased to $70^\circ C$. The coefficient of linear expansion of the metal is
(A) $2\times10^{-5}\ ^\circ C$   (B) $3\times10^{-5}\ ^\circ C$
(C) $4\times10^{-5}\ ^\circ C$   (D) $1\times10^{-5}\ ^\circ C$

**38.** A galvanometer of resistance 'G' can be converted into a voltmeter of range $(0-V)$ volt by connecting a resistance 'R' in series with it. The resistance 'R required to change its range from $\left(0-\dfrac{V}{4}\right)$ volt will be

(A) $\dfrac{R-G}{2}$   (B) $\dfrac{R-2G}{3}$

(C) $\dfrac{R-3G}{4}$   (D) $\dfrac{4R-3G}{5}$

**39.** A light metal disc of radius 'r' floats on water surface and bends the surface downwards along the perimeter making an angle '$\theta$' with the vertical edge of the disc. If the weight of water displaced by the disc is '$W$', the weight of the metal disc is [ T = surface tension of water]
(A) $W - 2\pi rT\cos\theta$   (B) $2\pi rT + W$
(C) $2\pi rT\cos\theta + W$   (D) $2\pi rT\cos\theta - W$
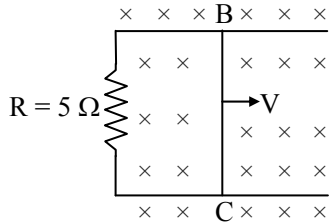
**40.** The magnetic field at the centre of a current carrying circular coil of area 'A' is 'B'. The magnetic moment of the coil is ($\mu_0$ = permeability of free space)

(A) $\dfrac{2B}{\mu_0}\sqrt{\dfrac{A^3}{\pi}}$   (B) $\dfrac{BA^2}{4\mu_0\pi}$

(C) $\dfrac{2\pi}{\mu_0}\sqrt{A^3}$   (D) $\dfrac{\mu_0}{2B}\sqrt{\dfrac{A^3}{\pi}}$

**41.** A parallel combination of two capacitors of capacities 'C' and '$\dfrac{C}{3}$' respectively is connected across a battery of 12 volt. When both capacitors are fully charged, the charge and energy stored in them is $Q_1, Q_2$ and $E_1, E_2$ respectively. Then the ratio of $(E_1 - E_2)$ to $(Q_1 - Q_2)$ is
(A) 1 : 8   (B) 1 : 6
(C) 8 : 1   (D) 6 : 1

**42.** A transparent sphere of refractive index '$\mu$' and radius of curvature 'R' is kept in air. A point object is placed at a distance 'd' from the surface of the sphere so that the real image is formed at the same distance '$d$' from exactly opposite side of the sphere. The distance 'd' is

(A) $\dfrac{\mu}{R}$     (B) $R(\mu-1)$

(C) $\dfrac{R}{(\mu-1)}$     (D) $\dfrac{R}{(\mu+1)}$

**43.** The instantaneous value of current in an a.c. circuit is $I = 2\sin\left[100\pi t + \dfrac{\pi}{3}\right]$ A. The current will be maximum for the first time at $(\sin 90^0 = 1)$

(A) $\dfrac{1}{100}$ s     (B) $\dfrac{1}{200}$ s

(C) $\dfrac{1}{400}$ s     (D) $\dfrac{1}{600}$ s

**44.** A fixed mass of gas at constant pressure occupies a volume 'V'. The gas undergoes a rise in temperature so that the r.m.s. velocity of the molecule is doubled. The new volume will be

(A) $\dfrac{V}{2}$     (B) $\dfrac{V}{\sqrt{2}}$

(C) $2\,V$     (D) $4V$

**45.** The Boolean expression for $X - OR$ gate $C = (A \oplus B)$ is equivalent to

(A) $(\bar{A} \cdot B) + (A \cdot \bar{B})$     (B) $A + (\bar{A} \cdot \bar{B})$

(C) $(A \cdot B) + \bar{B}$     (D) $(A \cdot B) + (\bar{A} \cdot \bar{B})$

**46.** The equation of simple harmonic progressive wave is given by $y = A\sin(100\pi t - 4x)$. The distance between two particles having a phase difference of $\left(\dfrac{\pi}{4}\right)^c$ is

(A) $\dfrac{\pi}{18}$ m     (B) $\dfrac{\pi}{16}$ m

(C) $\dfrac{\pi}{9}$ m     (D) $\dfrac{\pi}{3}$ m

**47.** A photon and an electron have an equal energy 'E'. The ratio of wavelength '$\lambda_P$' of photon to that of electron '$\lambda_e$' is proportional to

(A) $\sqrt{E}$     (B) $\dfrac{1}{\sqrt{E}}$

(C) $\dfrac{1}{E}$     (D) $E$

**48.** The height at which the acceleration due to gravity becomes $\dfrac{g}{4}$ in terms of R is [R = the radius of the earth]

(A) $\dfrac{R}{\sqrt{2}}$     (B) $R$

(C) $\sqrt{2}\,R$     (D) $2R$

**49.** In a biprism experiment, fifth dark fringe is obtained at a point. A thin transparent film of refractive index '$\mu$' is placed in one of the interfering paths. Now $7^{th}$ bright fringe is obtained at the same point. If '$\lambda$' is the wavelength of light used, the thickness of film is equal to

(A) $1.5(\mu-1)\lambda$     (B) $\dfrac{1.5\lambda}{(\mu-1)}$

(C) $2.5(\mu-1)\lambda$     (D) $\dfrac{2.5\lambda}{(\mu-1)}$

**50.** Figure shows a rectangular frame situated in a constant magnetic field. A wire $BC$ of length $1\,m$ is moved out with velocity $4\,m/s$. Magnetic field strength is $0.15\,T$. Force acting on the wire $BC$ is



(A) $18\,N$     (B) $1.8\,N$

(C) $0.18\,N$     (D) $0.018\,N$

## CHEMISTRY

**1.** Which element from following does NOT exhibit magnetic moment in +1 state?

(A) Zn     (B) Co

(C) Cu     (D) Mn

**2.** The entropy of vaporisation of benzene is $85\,J\,K^{-1}\,mol^{-1}$. When 117 g of benzene vaporises at its boiling point, what is entropy change of surrounding if process is at equilibrium?

(A) $-85\,J\,K^{-1}$

(B) $-85 \times 1.5\,J\,K^{-1}$

(C) $85 \times 1.5\,J\,K^{-1}$

(D) $42.5\,J\,K^{-1}$

3. Which from the following equations represents the relation between solubility (mol $L^{-1}$) and solubility product for the salt $B_2A$?

(A) $S = \left(\dfrac{K_{sp}}{4}\right)^{1/3}$      (B) $S = \left(4\,K_{sp}\right)^{1/3}$

(C) $S = \left(\dfrac{K_{sp}}{3}\right)^{1/3}$      (D) $S = \left(3\,K_{sp}\right)^{1/3}$

4. What is the number of chiral carbon atoms and number of formyl groups respectively present in ribose?
(A) 2 and 2      (B) 2 and 1
(C) 3 and 1      (D) 3 and 2

5. Calculate the Henry's law constant at 25 °C if solubility of gas in liquid is $2.1 \times 10^{-2}$ mol $dm^{-3}$ at 0.18 bar.
(A) 0.1166 mol $dm^{-3}\,bar^{-1}$
(B) 0.1445 mol $dm^{-3}\,bar^{-1}$
(C) 0.1730 mol $dm^{-3}\,bar^{-1}$
(D) 0.2014 mol $dm^{-3}\,bar^{-1}$

6. What is the name of isopropyl alcohol according to carbinol system?
(A) Methyl carbinol
(B) Dimethyl carbinol
(C) Ethyl carbinol
(D) Propyl carbinol

7. What is the frequency of red light having wave length 750 nm?
(A) $3.0 \times 10^{14}$ Hz      (B) $4.0 \times 10^{14}$ Hz
(C) $7.5 \times 10^{14}$ Hz      (D) $9.0 \times 10^{14}$ Hz

8. Identify the product 'C' formed in the following series of reactions.
Bromoethane $\xrightarrow[\text{Dry ether}]{\text{Mg}}$ A $\xrightarrow[\text{Dry ether}]{\text{HOH}}$ B $\xrightarrow[\text{UV light}]{\text{Br}_2}$ C
(A) Ethane
(B) Bromoethane
(C) Ethyl magnesium bromide
(D) Ethene

9. Which from following groups exhibits +I effect?
(A) $-COOR$      (B) $-COOH$
(C) $-C_2H_5$      (D) $-NO_2$

10. Which of the following equation exhibits integrated rate law equation for first order reaction?
(A) $k = \dfrac{[A]_0 - [A]_t}{2}$
(B) $k = \dfrac{2 \cdot 303}{t} \times \log \dfrac{a}{(a-x)}$
(C) $k = \dfrac{1}{t} \ln \dfrac{(a-x)}{a}$
(D) $k = \dfrac{1}{t} \times \dfrac{x}{a(a-x)}$

11. Which from following statements is NOT true about physisorption?
(A) The forces operating are weak van der Waals forces.
(B) It is not specific in nature.
(C) It is irreversible.
(D) The heat of adsorption is low and lies in the range 20-40 kJ $mol^{-1}$.

12. Which from following is a semisynthetic polymer?
(A) Silk      (B) Terylene
(C) Viscose rayon      (D) Neoprene

13. Calculate the molar mass of an element having density 19.2 $g\,cm^{-3}$ if it forms fcc structure $\left[a^3 \times N_A = 40 \text{ cm}^3 \text{ mol}^{-1}\right]$
(A) 192 g $mol^{-1}$      (B) 186 g $mol^{-1}$
(C) 210 g $mol^{-1}$      (D) 280 g $mol^{-1}$

14. Which among the following is the strongest acid?
(A) Acetic acid
(B) Monochloroacetic acid
(C) Dichloroacetic acid
(D) Trichloroacetic acid

15. What is the ratio of mass of nitrogen that combines with 16 parts by weight of oxygen in $N_2O$, NO, $NO_2$?
(A) $4:2:1$      (B) $2:1:1$
(C) $1:1:2$      (D) $1:2:4$

16. What is the quantity of electricity required to liberate 112 $cm^3$ of hydrogen gas at STP from acidified water?
(A) 482.5 C      (B) 965 C
(C) 500 C      (D) 96500 C
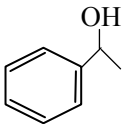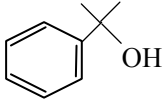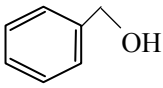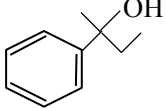
17. Which of the following is selected as cathode for a galvanic cell set up with nickel anode?
(A) Mg      (B) Cu
(C) Al      (D) Zn

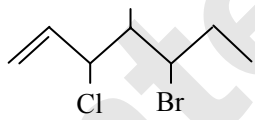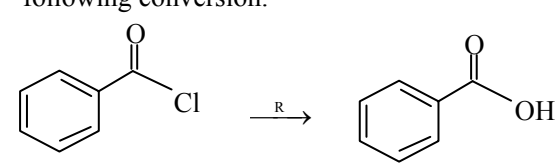18. Which among the following is haloarene?

(A)       (B) 

(C)       (D)
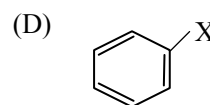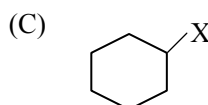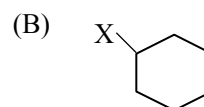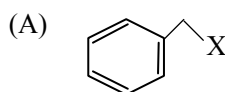
**19.** Which from following chemical activities does NOT exhibit good atom economy according to the principles of green chemistry ?
(A) Formation of Grignard reagent.
(B) Action of HX on alkene to form alkylhalide.
(C) Action of thionyl chloride on ethanol to form ethyl chloride.
(D) Formation of cyclohexanol from phenol by catalytic hydrogenation.

**20.** Calculate activation energy for a reaction if it's rate doubles when temperature is raised from 20 °C to 35 °C (R = 8.314 J $K^{-1}$ $mol^{-1}$)
(A) 17.336 kJ      (B) 26.900 kJ
(C) 34.673 kJ      (D) 44.236 kJ

**21.** What is the formal charge present on oxygen atom (numbered 1) in Lewis structure of $CO_2$ ?

$$:O \equiv C - \ddot{O}:$$

(A) 0        (B) −1
(C) +1       (D) −2

**22.** Which among the following is a monomer of natural rubber?
(A) 2-Methyl-1, 3-butadiene
(B) 1, 1, 2, 2-Tetrafluoroethene
(C) 2-Chloro-1, 3 butadiene
(D) 1, 3-butadiene

**23.** Identify the product obtained when alkyl alkanoate is hydrolysed with dilute HCl.
(A) Alkanol and Alkanoic acid
(B) Alkanal and Alkanone
(C) Alkanone and Alkanoic acid
(D) Alkanol and Alkanal

**24.** Which of the following changes exhibit that nitrogen undergoes oxidation?
(A) $NH_4^+ \to N_2$      (B) $NO_3^- \to NO$
(C) $NO_2 \to NO_2^-$      (D) $NO_3 \to NH_4^+$

**25.** The molar conductivity of 0.02 mol $dm^{-3}$ solution of sodium hydroxide is 230.5 $\Omega^{-1}$ $cm^2$ $mol^{-1}$. What is it's conductivity?
(A) 0.01155 $\Omega^{-1}$ $cm^{-1}$
(B) 0.02308 $\Omega^{-1}$ $cm^{-1}$
(C) 0.00461 $\Omega^{-1}$ $cm^{-1}$
(D) 0.05613 $\Omega^{-1}$ $cm^{-1}$

**26.** Calculate the volume occupied by particle in simple cubic unit cell if volume of unit cell is $5.5 \times 10^{-22}$ $cm^3$.
(A) $2.88 \times 10^{-22}$ $cm^3$    (B) $1.87 \times 10^{-22}$ $cm^3$
(C) $1.02 \times 10^{-22}$ $cm^3$    (D) $3.44 \times 10^{-22}$ $cm^3$

**27.** Which of the following is primary benzylic alcohol?
(A)       (B) 
(C)       (D) 

**28.** Which from following elements is a decay product of thorium?
(A) S        (B) Se
(C) Po       (D) Te

**29.** If half life of a first order reaction is 10 minutes, find the time required to decrease concentration of reactant from 0.08 M to 0.02 M.
(A) 10 minutes    (B) 20 minutes
(C) 30 minutes    (D) 40 minutes

**30.** Calculate the pOH of buffer solution formed from 0.3 M weak base and 0.45 M of its salt with strong acid $[pK_b = 4.7447]$
(A) 6.45      (B) 4.07
(C) 4.92      (D) 5.51

**31.** Which from following complexes is having ambidentate ligand in it?
(A) Sodium hexafluoroaluminate(III)
(B) Pentaaquaisothiocyanatoiron(III) ion
(C) Hexacyanoferrate(II) ion
(D) Trioxalatocobaltate(III) ion

**32.** What is the minimum number of spheres required to develop an octahedral void?
(A) 2        (B) 4
(C) 6        (D) 8

**33.** 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

**34.** Identify the use of calcium carbonate from following.
(A) For mercerising cotton fabrics.
(B) As a source of hydride.
(C) As chlorinating agent.
(D) In tooth paste.

**35.** Which of the following acid strength is used to get good yield of alkyl iodide from alcohol and sodium iodide in phosphoric acid?
(A) 15%       (B) 35%
(C) 65%       (D) 95%

**36.** Identify false statement about transition elements.
(A) As per IUPAC convention, transition metal atom have incomplete d-subshell.
(B) 6d-series includes all elements from $Ac(Z=89)$ to $Cn(Z=112)$.
(C) These elements are placed in group 3 to 12 in modern periodic table.
(D) In these $(n-1)$ d-orbital is filled successively.

**37.** Which from following terms is explained by first law of thermodynamics?
(A) Entropy
(B) Free energy
(C) Conservation of energy
(D) Enthalpy

**38.** Calculate degree of dissociation of a weak monobasic acid in 0.01 M solution if dissociation constant is $1.6\times10^{-5}$.
(A) 0.02
(B) 0.03
(C) 0.04
(D) 0.05

**39.** Which from following is an example of solution of solid as solute and liquid as solvent?
(A) Sea water
(B) Brass
(C) Gasoline
(D) Iodine in air

**40.** Identify the coordination number of aluminium in potassium trioxalatoaluminate(III).
(A) 2
(B) 4
(C) 6
(D) 12

**41.** Which of the following isomeric amines has the highest boiling point?
(A) tert-Butylamine
(B) Ethyldimethylamine
(C) Diethylamine
(D) n-Butylamine

**42.** If A, B, C, D are four different elements with outer electronic configuration as $A=4s^2 4p^4$, $B=4s^2 4p^5$, $C=5s^2 5p^4$, $D=5s^2 5p^5$.
Find the element having highest ionization enthalpy $(\Delta_i H_1)$
(A) A
(B) B
(C) C
(D) D

**43.** What is the change in internal energy for $2CO_{(g)}+O_{2(g)}\rightarrow 2CO_{2(g)}$ at 25 °C ?
$(R = 8.314$ J K$^{-1}$ mol$^{-1}$, $\Delta H = -560$ kJ)
(A) $-557.5$ kJ
(B) $-530.0$ kJ
(C) $510.0$ kJ
(D) $656.9$ kJ

**44.** Calculate the final pressure required to reduce the volume of a gas to one third, if initial pressure is $1.6\times10^5$ Nm$^{-2}$.
(A) $5.4\times10^5$ Nm$^{-2}$
(B) $1.6\times10^5$ Nm$^{-2}$
(C) $2.11\times10^5$ Nm$^{-2}$
(D) $4.8\times10^5$ Nm$^{-2}$

**45.** If osmotic pressure of 0.2 M aqueous glucose solution is 5 atm at 300 K. Calculate the concentration of glucose solution having osmotic pressure 2.5 atm at same temperature.
(A) 0.1 M
(B) 0.05 M
(C) 0.75 M
(D) 0.25 M

**46.** What is the IUPAC name of following compound?



(A) 3-Chloro-4-methyl-5-bromohept-1-ene
(B) 4-Methyl-3-bromo-5-chlorohept-6-ene
(C) 3-Bromo-4-methyl-5-chlorohept-6-ene
(D) 5-Bromo-3-chloro-4-methylhept-1-ene

**47.** Which amino acid from following contains highest number of N atoms in it?
(A) Histidine
(B) Lysine
(C) Arginine
(D) Glutamine

**48.** Identify the reagent 'R' necessary to bring the following conversion.



(A) $H_2O$
(B) $CrO_3$
(C) NaOH (dil.)
(D) $KMnO_4$

**49.** Identify 'A' in the following reaction.
A + Acetic anhydride $\xrightarrow{H^\oplus}$ Aspirin + Acetic acid
(A) Acrylic acid
(B) Oxalic acid
(C) Salicylic acid
(D) Phthalic acid

**50.** What are the possible values of magnetic quantum number for p orbital ?
(A) 2
(B) 3
(C) 5
(D) 6

Biology

Time: 90 Minutes

Total Marks: 100

**1.** In eukaryotic organisms, replication of DNA occurs in _____.
(A) anaphase
(B) G$_1$ phase
(C) G$_2$ phase
(D) S phase

**2.** Capillarity theory was proposed by_____
(A) Bohem
(B) J. Priestley
(C) Dixon and Joly
(D) Levitt

**3.** Given below are two statements.
Statement I - Oxaloacetate is useful as a precursor for synthesis of aspartic acid.
Statement II - α-ketoglutarate is useful for synthesis of glutamic acid.
In light of above statements, select the correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**4.** Given below are two statements.
Statement I - Defecation is an involuntary process that takes place through anal opening guarded by sphincter muscles.
Statement II - Distension of rectum stimulates pressure sensitive receptors that initiate a neural reflex for egestion.
In light of above statements, select the correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**5.** Angina pectoris is severe pain and heaviness in chest that is mainly caused due to
(A) metabolic disorder of pancreas
(B) deficiency of iodine in diet
(C) reduction in blood supply to cardiac muscles due to atherosclerosis
(D) long term exposure to dust particles as in silicosis

**6.** The term 'Niche' denotes the_____ role played by an organism in its environment.
(A) chemical
(B) functional
(C) biological
(D) physical

**7.** When the phage DNA enters the host bacterium, the host cell protects itself from the viral DNA attacks with the help of _____ enzyme.
(A) exonuclease
(B) restriction endonuclease
(C) DNA ligase
(D) helicase

**8.** Given below are two statements.
Statement I - Nervous tissue is without lymphatic vessels.
Statement II - Nervous tissue is endodermal in origin.
In light of above statements, choose the most appropriate correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**9.** With reference to adolescence, what is mhGAP?
(A) A programme by Maharashtra State Government to improve mental health.
(B) A programme by WHO to improve reproductive health.
(C) A programme by WHO for the treatment of mental disorder.
(D) A programme by Maharashtra State Government for the treatment of physical disorder.

**10.** Damage to biodiversity takes place due to natural reasons which includes the following EXCEPT
(A) Volcanic eruption
(B) Forest fires
(C) Reclamation
(D) Earthquakes

**11.** Match the disorder in column I with their nature in column II.

| | Column I | | Column II |
|---|---|---|---|
| i. | Thalassemia | a. | X monosomy |
| ii. | Turner's syndrome | b. | Extra X chromosomes in male |
| iii. | Klinefelter's syndrome | c. | 21$^{st}$ Trisomy |
| iv. | Down's syndrome | d. | Mendelian disorder |

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

**12.** Chemical digestion of which one of the following starts first in human alimentary canal?
(A) Proteins           (B) Starch
(C) Lipids and fats    (D) Cellulose

**13.** DDT resistant mosquitoes and different beak sizes of African seed cracker finches show _____ type of selection respectively.
(A) stabilizing and directional
(B) disruptive and balancing
(C) directional and disruptive
(D) balancing and directional

**14.** The number of ATP molecules generated in aerobic respiration after oxidation of two molecules of pyruvic acid is.
(A) 6    (B) 12    (C) 24    (D) 30

**15.** During oogenesis the meiotic division is arrested at_____ before fertilization.
(A) Anaphase I      (B) Metaphase I
(C) Anaphase II     (D) Metaphase II

**16.** Accessory cells of stomata are reservoirs of _____.
(A) $Zn^{++}$ ions
(B) $H^+$ ions
(C) $K^+$ ions
(D) $H^+$ ions and $Cl^-$ ions

**17.** Mature erythrocytes are enucleated in following animals EXCEPT
i. Rat            ii. Monkey
iii. Llama        iv. Camel
v. Elephant
Choose the correct answer from options given below.
(A) i and ii only     (B) iii, iv and v only
(C) iii and iv only   (D) v only

**18.** Agarose gel electrophoresis is used to separate DNA fragments. The DNA fragments separate due to _____.
(A) difference in their staining property
(B) difference in the base sequence in them

(C) positive charge on the fragments
(D) difference in the size of fragments

**19.** How many of the following are the symbiotic nitrogen fixing micro-organisms?
*Rhizobium, Anabaena, Frankia, Azotobacter, Nostoc, Clostridium, Beijerinckia, Klebsiella*
(A) 2    (B) 3    (C) 4    (D) 5

**20.** CSF is secreted by
(A) choroid plexus only.
(B) Pia mater and choroid plexus only.
(C) Pia mater, choroid plexus and ependymal cells lining the ventricles.
(D) White matter, Pia mater and grey matter.

**21.** Match the scientist in column I with their contribution in column II and choose the correct option.

| | Column I | | Column II |
|---|---|---|---|
| i. | Alexander Van Humboldt | a. | Estimated 7 million species round the globe |
| ii. | Robert May | b. | Rivet popper hypothesis |
| iii. | David Tillman | c. | Species Area Relationship |
| iv. | Paul Ehrlich | d. | Productivity stability hypothesis |

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

**22.** Given below are two statements:
Statement I - During night, guard cells become flaccid.
Statement II - During day time, guard cells become turgid due to endosmosis.
In light of above statements, choose the most appropriate answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**23.** Which one of the following is an EXCEPTION to the generalization made by Mendel on the basis of his experiments on garden pea plant?
(A) Single trait → single gene → Two alleles.
(B) Two alleles show interaction in which one is completely dominant.
(C) The genotypic and phenotypic ratios are identical in monohybrid crosses.
(D) Factors (genes) for different traits present on different chromosomes assort independently.

**24.** People who consume high protein diet can develop _____ stones.
(A) calcium (B) uric acid
(C) struvite (D) cystine

**25.** In an angiospermic embryo, upper swollen suspensor cell towards the micropyle, functions as _____.
(A) haustorium (B) hypophysis
(C) epicotyl (D) hypocotyl

**26.** In large proteins, peptide chains are much looped, twisted and folded back on themselves. The folded structure is due to the formation of _____ bonds.
(A) phosphodiester (B) peptide
(C) disulphide (D) glycosidic

**27.** Arrange the following in sequence during the transmission of nerve impulse at chemical synapse.
i. Neurotransmitter binds with receptors of post synaptic cell.
ii. Calcium channels open and the calcium diffuses inward from ECF.
iii. Impulse travels along the axon of presynaptic neuron.
iv. Release of neurotransmitter by exocytosis.
v. Synaptic vesicles fuse with cell membrane of axon terminal of presynaptic neuron.
(A) i, ii, v, iii, iv (B) iii, v, ii, iv, i
(C) ii, v, i, iii, iv (D) iii, ii, v, iv, i

**28.** The highest level of ecological hierarchy in ecological organization is
(A) biome (B) community
(C) population (D) organism

**29.** Primary productivity in an ecosystem refers to the rate of generation of _____.
(A) oxygen (B) carbon dioxide
(C) detritus (D) biomass

**30.** Cells of malignant tumor spread from one organ to other via blood or lymph and cause new tumor. This property is called _____.
(A) metastasis (B) parthenogenesis
(C) interkinesis (D) metamorphosis

**31.** Haemoglobin has maximum affinity for
(A) $CO_2$ (B) $O_2$ (C) CO (D) $H^+$

**32.** Given below are two statements:
Statement I – In prokaryotes, there is only replicon however in eukaryotes, these are several replicons in tandem.
Statement II – Two separated strands in a replicon of DNA are prevented from re-joining by helicase enzyme.
In light of above statements, choose the correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**33.** Which of the following characteristics are seen in a stable community?
i. It is strong enough to withstand environmental disturbance and recovers quickly.
ii. It is resistant to invasive species.
iii. It exhibits constant change in biomass production over a period of time.
iv. It has more species diversity.
(A) i, iii and iv only (B) i, ii and iv only
(C) i, ii and iii only (D) ii and iv only

**34.** Given below are two statements:
Statement I - Back cross is the crossing of $F_1$ - hybrid with one of the two parents from which they were derived.
Statement II - Test cross involves the crossing of $F_1$ - hybrid with its homozygous recessive parent.
In light of above statements, choose the correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**35.** Complete the analogy with respect to structure of sperm
Nebenkern : 'X' : : Acrosome is formed from : 'Y'

| | 'X' | 'Y' |
|---|---|---|
| (A) | Mitochondria | centrioles |
| (B) | Nucleus | Golgi body |
| (C) | Mitochondria | Golgi body |
| (D) | Nucleus | centrioles |

**36.** Given below are two statements:
Statement I - The muscularis of intestine can be differentiated into longitudinal and oblique muscles only.
Statement II - The muscularis of stomach is made up of outer- longitudinal, middle oblique and inner circular muscles.
In light of above statements, choose the most appropriate answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

37. An organ with sphincters at its origin is _____
(A) urinary bladder (B) urethra
(C) ureter (D) renal pelvic

38. The size of mRNA is generally related to _____.
(A) the number of codons it has
(B) the size of the ribosome
(C) the size of entire DNA molecule
(D) the number of anticodons it has

39. Given below are two statements:
Statement I - Reactions involved in Krebs cycle are anabolic and catabolic.
Statement II - During oxidation of acetyl Co-A, stepwise oxidation of acetyl part of acetyl Co-A occurs.
In light of above statements, choose the most appropriate answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

40. Match the valves of human heart in column I with the respective opening they guard in column II and select the correct option.

| | Column I | | Column II |
|---|---|---|---|
| i. | Eustachian valve | a. | Opening of pulmonary aorta |
| ii. | Thebesian valve | b. | Left atrioventricular aperture |
| iii. | Mitral valve | c. | opening of inferior vena cava |
| iv. | Semilunar valve | d. | opening of coronary sinus |

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

41. The _____ gene from *Bacillus thuringiensis* produces a protein that forms crystalline inclusions in bacterial spores.
(A) *cry* (B) *myc*
(C) *ras* (D) *nif*

42. Lateral sulcus separates _____.
(A) frontal lobe from parietal lobe
(B) parietal lobe from occipital lobe
(C) temporal lobe from frontal and parietal lobes
(D) parietal lobe from occipital and frontal lobes

43. Which of the following is INCORRECT about Primary and Secondary ecological successions?
(A) Primary succession occurs where no living organisms were present before.
(B) Primary succession is slow.
(C) Secondary succession is quicker.
(D) Soil is already present where primary succession takes place.

44. Following are viral diseases in poultry, EXCEPT _____
(A) Ranikhet (B) Avian influenza
(C) Pullorum (D) Bronchitis

45. All the 64 codons in the dictionary of genetic code were deciphered by _____
(A) Watson and Crick
(B) Dr. Har Gobind Khorana
(C) Yanofski and Sarabhai
(D) Nirenberg, Matthaei and Ochoa

46. Median vertical depression of external genitalia in females, enclosing the urethral and vaginal opening is _____.
(A) Mons pubis (B) Vestibule
(C) Clitoris (D) Hymen

47. Bird pollinated flowers are usually _____
(A) large, showy and brightly coloured
(B) small and brightly coloured
(C) large and colourless
(D) with strong fragrance

48. Complete the following analogy.
Parietal wall of Bowman's capsule : squamous epithelium : : PCT : _____ epithelium.
(A) ciliated (B) cuboidal
(C) squamous (D) transitional

49. Complete the following reaction by replacing (Y) with proper word.
Emulsified fats $\xrightarrow{\text{Lipases}}$ Fatty acids + __(Y)__
(A) monoglycerides (B) monosaccharides
(C) disaccharides (D) triglycerides

50. Complete the following analogy with respect to classification of mammals.
Marsupials : _(i)_ :: monotremes : _(ii)_

|   | (i) | (ii) |
|---|---|---|
| (A) | pouched mammals | placental mammals |
| (B) | pouched mammals | egg laying mammals |
| (C) | placental mammals | egg laying mammals |
| (D) | placental mammals | pouched mammals |

**51.** While studying flowering behaviour in _____ and _____ plant, Garner and Allard discovered photoperiodism.
(A) rice, wheat
(B) tobacco, soyabean
(C) tomato, soyabean
(D) wheat, tobacco

**52.** Which of the following bacteria do not solubilize the insoluble rock phosphate?
(A) *Bacillus polymyxa* and *Pseudomonas striata*.
(B) *Micrococcus* and *Aspergillus* spp.
(C) *Pseudomonas striata* and *Agrobacterium*.
(D) *Klebsiella* and *Beijerinckia*.

**53.** Atherosclerosis can be treated with recombinant protein called _____
(A) platelet derived growth factor.
(B) interleukin -1 receptor.
(C) tissue plasminogen activator.
(D) macrophage activating factor.

**54.** Match elements given in Column I with their deficiency symptoms shown by plants given in Column II

|  | Column I |  | Column II |
|---|---|---|---|
| i. | Chlorine | a. | Brown heart disease |
| ii. | Boron | b. | Malformed leaves |
| iii. | Zinc | c. | Poor growth of the plant |
| iv. | Copper | d. | Die-back of shoots |

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

**55.** Given below are two statements.
Statement I - Biome constitute, a large regional terrestrial unit delimited by a specific climate zone having major vegetation zone and associated fauna.
Statement II - Biome is the fourth level of ecological hierarchy.
In light of above statements, select the correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**56.** Identify the INCORRECT statement.
(A) Around 25% of the drugs sold in the global medicine market worldwide are plant derivatives.
(B) 25,000 plant species are put to use by tribals worldwide as traditional medicines.

(C) The relationship between diversity and well being of ecosystem is linear.
(D) Rich diversity leads to lesser variation in biomass production over a period of time.

**57.** Two different amino acids are never encoded by the same codon, this character of genetic code is called _____.
(A) commaless
(B) degeneracy
(C) non-ambiguous
(D) non-overlapping

**58.** Given below are two statements.
Statement I - Root hair is composed of two layers.
Statement II - Outer layer of root hair cell wall is composed of cellulose and inner layer is made up of pectin.
In light of above statements, choose the most appropriate answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**59.** The fully developed foetus gives signals for uterine contractions by secreting _____ hormones.
(A) Oxytocin and ACTH
(B) Oxytocin and corticosteroids
(C) ACTH and prostaglandins
(D) ACTH and corticosteroids

**60.** Just before fertilization, the angiosperm's embryo sac contains _____ and _____ nuclei.
(A) six haploid, one diploid
(B) five haploid, two diploid
(C) six diploid, one haploid
(D) seven haploid, one diploid

**61.** Complete the analogy
ANP : inhibition of JGA cells :: Angiotensin II : _____
(A) dilates arterioles in kidney
(B) enhances reabsorption of $Na^+$ by PCT
(C) inhibition of aldosterone secretion
(D) stimulates diuresis

**62.** Given below are two statements.
Statement I - An ecosystem is a self regulatory and self sustaining structural and functional unit of nature.
Statement II - Entire biosphere can be considered as one global ecosystem.
In 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 and statement II is incorrect.

(D) Statement I is incorrect and statement II is correct.

63. The number of reduced coenzymes NADH+H$^+$ formed during complete oxidation of one molecule of glucose.

(A) 2    (B) 8    (C) 10    (D) 12

64. Monohybrid crosses are useful in demonstrating which of the following laws of inheritance suggested by Mendel?

(A) Law of dominance and law of independent assortment.

(B) Law of segregation and law of independent assortment.

(C) Law of purity of gamete and law of dominance.

(D) Law of independent assortment only.

65. Enzymes are needed only in small quantities to catalyse reactions because

(A) they act very fast.

(B) they remain unchanged at the end of the reaction.

(C) they are made up to proteins.

(D) they are temperature and pH sensitive.

66. The number of amino groups in the amino acids present in amides is _____.

(A) one      (B) two

(C) three     (D) four

67. Which of the following are the initial and final steps during the process of ecological succession?

(A) Nudation and Aggregation

(B) Invasion and Competition

(C) Competition and co-action

(D) Nudation and Stabilization

68. Match column I with column II and select the correct option

| | Column I | | Column II |
|---|---|---|---|
| i. | Carrot and spinach | a. | High protein content |
| ii. | Bitter gourd | b. | More Vit A and minerals |
| iii. | Maize | c. | More Vit C |
| iv. | Wheat Atlas-66 | d. | Twice the amount of lysine and tryptophan |

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

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

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

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

69. Hypersecretion of glucocorticoid leads to _____.

(A) Cushing's disease

(B) Addison's disease

(C) Grave's disease

(D) Bleeders' disease

70. The restriction enzymes used as molecular scissors are type of _____

(A) ligases       (B) nucleases

(C) protease      (D) carboxylases

71. Given below are two statements.

Statement I – *Calotropis* growing in abandoned fields is never consumed by cattle and goats.

Statement II – *Calotropis* produces highly poisonous cardiac glycosides.

In light of above statements, select the most appropriate answer from the option 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 and statement II is incorrect.

(D) Statement I is incorrect and statement II is correct.

72. Phenotypically tall plants can be obtained from genetically dwarf maize plants by application of _____.

(A) Gibberellins    (B) Auxins

(C) Ethylene       (D) ABA

73. Islets of Langerhans are _____.

(A) groups of endocrine cells of pancreas

(B) group of cells in the stroma of thyroid gland

(C) star shaped glial cells of CNS

(D) grey masses within the white matter of nervous system

74. *Homo sapiens* are most closely related to _____.

(A) Lemurs      (B) Tarsiers

(C) Baboons     (D) Orangutan

75. Complete the analogy with respect to reproductive system.

Male : Penis : : Female : _____.

(A) Vagina       (B) Vulva

(C) Clitoris      (D) Cervix

76. In a male gametophyte, ploidy of tube cell and a male gamete is _____.

(A) both are haploid

(B) both are diploid

(C) tube cell is haploid and male gamete is diploid

(D) tube cell is diploid and male gamete is haploid

**77.** In which of the following, bilirubin is excreted in urine?
(A) Marasmus (B) Kwashiorkor
(C) Jaundice (D) Indigestion

**78.** The only 5C intermediate formed during reactions of TCA cycle is _____.
(A) Oxalosuccinic acid
(B) $\alpha$-ketoglutarate
(C) Succinyl CoA
(D) Cis - Aconitate

**79.** Secondary metabolites like glucosinolates are produced by cabbage to
(A) protect it from many pests
(B) attracts insects for pollination
(C) kills weeds around it
(D) improve soil fertilization

**80.** Tubular fluid tends to become acidic in the _____ of nephron.
(A) PCT
(B) DCT
(C) neck
(D) Henle's loop

**81.** All are events of pollen-pistil interaction EXCEPT
(A) absorption of water and nutrients from the stigmatic surface.
(B) first division of pollen grain.
(C) deposition of pollen grain on stigma.
(D) germination of pollen grains to produce pollen tube.

**82.** Which one of the following cells secrete heparin, histamine and serotonin?
(A) Lymphocytes (B) Basophils
(C) Eosinophils (D) Thrombocytes

**83.** In an antibody, disulphide bonds are present _____.
i. between two heavy chains
ii. between two light chains
iii. between the constant region of light chain and the constant region of a heavy chain
iv. between antigen binding sites of both the heavy and light chains
v. between the variable region of light chain and that of heavy chain
Select the correct answer from the options given below
(A) i and ii only (B) i and iii only
(C) ii and v only (D) ii and iv only

**84.** The water which percolates deep in the soil is _____.
(A) Gravitational water
(B) Capillary water
(C) Combined water
(D) Hygroscopic water

**85.** Select INCORRECT statements with respects transport of $CO_2$ by RBCs and plasma.
i. 23% of $CO_2$ released from tissue cells diffuse into plasma first and then into RBCs.
ii. Within RBCs carbonic acid immediately dissociates into $H^+$ and $HCO_3^-$.
iii. In RBCs $CO_2$ combines with $H_2O$ to form carbonic acid.
iv. $H^+$ ions move out of RBCs and combine with $Na^+$ to form $NaHCO_3$.
v. 7% of $CO_2$ is transported in dissolved form as carbonic acid in plasma.
In the light of above statements choose the correct answer from option given below.
(A) i, ii and iii only (B) iii, iv and v only
(C) ii and v only (D) i and iv only

**86.** Dispersal of pollens is an example of
(A) gene mutation
(B) genetic drifts
(C) genetic recombination
(D) gene flow

**87.** Given below are two statements:
Statement I - Toddy is made by fermenting fleshy pedicels of cashews nuts.
Statement II - Fenny is made by fermenting the sugar sap extracted from palm plants and coconut palm.
In light of above statements, select the correct answer from the option 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 and statement II is incorrect.
(D) Statement I is incorrect and statement II is correct.

**88.** Which one of the following pair of hormones is NOT antagonistic?
(A) Calcitonin and Parathormone
(B) Glucagon and Insulin
(C) Atrial Natriuretic hormone and Aldosterone
(D) Oestrogen and Progesterone

**89.** In the processing of hnRNA in eukaryotic cell, the primary transcripts are processed in the following sequence.
(A) Splicing, Capping, Tailing
(B) Tailing, Capping, Splicing
(C) Splicing, Tailing, Capping
(D) Tailing, Splicing, Capping

**90.** Hormone causing vigorous contraction of myometrium to initiate parturition is _____.
(A) hCG (B) ACTH
(C) corticosteroids (D) oxytocin

**91.** Which plant hormone is called antitranspirant?
(A) Gibberellins     (B) Auxin
(C) Ethylene          (D) ABA

**92.** Blood osmolarity decreases with the secretion of
i. ADH
ii. aldosterone
iii. angiotensin II
iv. ANP
(A) i and ii only     (B) ii and iii only
(C) ii and iv only    (D) i only

**93.** Blood plasma transports oxygen in dissolved state, percentage of which is _____.
(A) 7%      (B) 3%
(C) 23%     (D) 10%

**94.** Which of the following statements are correct?
i. X chromosome has large amount of euchromatin.
ii. heterochromatin is genetically inert.
iii. Both X and Y chromosomes are homologous.
iv. Crossing over does not take place in sex chromosomes in female.
Choose the correct option.
(A) i and ii only      (B) ii and iii only
(C) i, ii and iii only  (D) iv and v only

**95.** Identify label 'X' from the given diagram and name the cells, which regulate concentration of calcium and phosphorous in the blood and select the correct option given below.
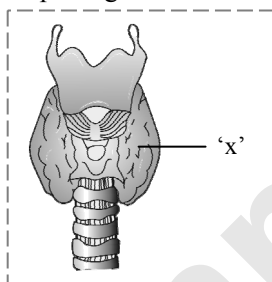


(A) Thyroid gland - Parafollicular cells
(B) Thyroid gland - Sertoli cells

(C) Parathyroid gland - Acidophils
(D) Parathyroid gland - chromatophores

**96.** Which one of the following is the most primitive ancestor of *Homo sapiens?*
(A) *Ramapithecus*
(B) *Australopithecus*
(C) *Dryopithecus*
(D) Neanderthal man

**97.** Match column I with column II and select the correct option.

|      | Column I       |    | Column II          |
|------|----------------|----|--------------------|
| i.   | Frontal lobe   | a. | Gustato receptors  |
| ii.  | Parietal lobe  | b. | Olfactory receptors|
| iii. | Temporal lobe  | c. | Sense of vision    |
| iv.  | Occipital lobe | d. | Broca's area       |

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

**98.** Which one of the following diseases is caused by a fungus?
(A) Filariasis     (B) Ringworm
(C) Typhoid        (D) Acute coryza

**99.** Respiratory centres that control the rate and depth of breathing are located in _____.
(A) medulla oblongata only
(B) cerebrum only
(C) cerebellum and pons
(D) pons and medulla oblongata

**100.** In sea grass, pollens are long, ribbon like and without exine exhibiting _____ pollination.
(A) ornithophilous
(B) hypohydrophilous
(C) epihydrophilous
(D) anaemophilous

| MHT-CET - 2024 22nd April (Shift – I) Score card | | |
|---|---|---|
| **Subject** | **Total Number of correct answers** | **Total Marks:** |
| **Physics** |  | (Out of 50) |
| **Chemistry** |  | (Out of 50) |
| **Biology** |  | (Out of 100) |
| **Total** |  | (Out of 200) |

[*Each Question carries 1 Mark, there is no negative marking.*]