

PHYSICS, CHEMISTRY & MATHEMATICS

Pattern - CPT-1

QP Code:

TEST - 10

Time Allotted: 3 Hours

Maximum Marks: 198

- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
- You are not allowed to leave the Examination Hall before the end of the test.

INSTRUCTIONS

Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.

A. General Instructions

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains **Three Sections**.
3. **Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
4. Each **Section** is further divided into **Two Parts: Part-A & B** in the OMR.
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

B. Filling of OMR Sheet

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with HB pencil for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.

C. Marking Scheme For All Two Parts.

- (i) **Part-A (01-06)** – Contains six (06) multiple choice questions which have **ONLY ONE CORRECT** answer. Each question carries **+3 marks** for correct answer and **-1 marks** for wrong answer.
- (ii) **Part-A (07-12)** – Contains seven (06) multiple choice questions which have **One or More** correct answer.
Full Marks: +4 If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
Partial Marks: +1 For darkening a bubble corresponding to **each correct option**, provided **NO** incorrect option is darkened.
Zero Marks: 0 If none of the bubbles is darkened.
Negative Marks: -2 In all other cases.
For example, if **(A), (C) and (D)** are all the correct options for a question, darkening all these three will result in **+4 marks**; darkening only **(A) and (D)** will result in **+2 marks**; and darkening **(A) and (B)** will result in **-2 marks**, as a wrong option is also darkened.
- (ii) **Part-B (01-06)** contains Six (06) Numerical based questions, the answer of which maybe positive or negative numbers or decimals (e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking**.

Name of the Candidate : _____

Batch : _____ Date of Examination : _____

Enrolment Number : _____

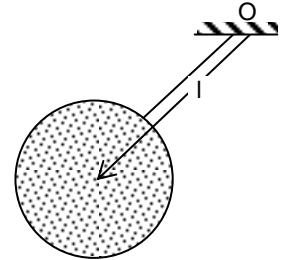
SECTION-1 : PHYSICS

PART – A

(Single Correct Choice Type)

This section contains **6 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct**.

1. Time period of a pendulum which is constructed as a thin walled sphere of radius R filled up with water and suspended from a point O is T_1 (Neglecting viscous forces). Centre of sphere from O is l apart. The time period of small oscillation change to T_2 when the water freezes, then $T_2/T_1 =$



- (A) 1
 (B) $1 + \frac{2}{5} \left(\frac{R}{l} \right)^2$
 (C) $\sqrt{1 + \frac{2}{5} \left(\frac{R}{l} \right)^2}$
 (D) $\sqrt{\frac{1}{1 + \frac{2}{5} \left(\frac{R}{l} \right)^2}}$

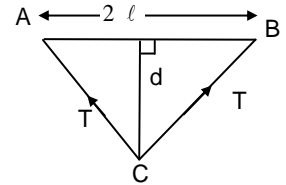
1. **C**

2. A U tube of uniform cross section is kept in a vertical position. A liquid of mass m and density d is filled in one of its limbs. This liquid will oscillate in this tube with time period T given by

- (A) $T = 2\pi \sqrt{\frac{m}{gda}}$ (B) $T = 2\pi \sqrt{\frac{ma}{gd}}$ (C) $T = 2\pi \sqrt{\frac{m}{g}}$ (D) $T = 2\pi \sqrt{\frac{m}{2agd}}$

2. **A**

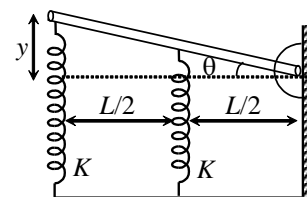
3. A wire of radius r stretched without tension along a straight line is lightly fixed at A and B . What is the tension in the wire, when it is pulled into the shape ACB . Take $Y =$ young's modulus and $d \ll \ell$



- (A) $\frac{Y^2 d^2}{2\pi r^2 \ell^2}$ (B) $\frac{Y\pi r^2 d^2}{2\ell^2}$
 (C) $\frac{Y\pi r^2}{2\ell^2 d^2}$ (D) $\frac{Y\pi r^2 \ell^2}{2d^2}$

3. **B**

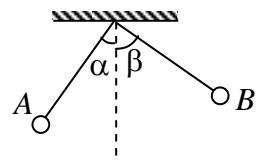
4. A long uniform rod of length L , mass M is free to rotate in a horizontal plane about a vertical axis through its end. Two springs of constant K each are connected as shown. On equilibrium, the rod was horizontal. The frequency of oscillation will be



- (A) $\frac{1}{2\pi} \sqrt{\frac{15K}{M}}$ (B) $\frac{1}{2\pi} \sqrt{\frac{15}{4M}}$ (C) $\frac{1}{2\pi} \sqrt{\frac{3K}{4M}}$ (D) $\frac{1}{2\pi} \sqrt{\frac{15K}{4M}}$

4. **D**

5. Two identical simple pendulums A and B are fixed at same point. They are displaced by an angle α and β (α and β are very small and $\beta > \alpha$) and released from rest. Find the time after which B reaches its initial position for the first time. Collisions are elastic and length of the strings is l .



- (A) $\pi\sqrt{\frac{l}{g}}$ (B) $2\pi\sqrt{\frac{l}{g}}$ (C) $\frac{\pi\beta}{\alpha}\sqrt{\frac{l}{g}}$ (D) $\frac{2\pi\beta}{\alpha}\sqrt{\frac{l}{g}}$

5. **B**

6. A tunnel is made across the earth passing through its centre. A ball is dropped from a height h in the tunnel. The motion will be periodic with time period

- (A) $2\pi\sqrt{\frac{R}{g}} + \sqrt{\frac{2h}{g}}$ (B) $2\pi\sqrt{\frac{2R}{g}} + 4\sqrt{\frac{h}{g}}$
 (C) $2\pi\sqrt{\frac{R}{g}} + 4\sqrt{\frac{2h}{g}}$ (D) None of These

6. **D**

(Multi Correct Choice Type)

This section contains 6 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

7. A particle is executing SHM with amplitude A . At displacement $x = \frac{-A}{4}$, force acting on the particle is F , potential energy of the particle is U , velocity of particle is v and kinetic energy is K . Assuming potential energy to be zero at mean position. At displacement $x = \frac{A}{2}$

- (A) force acting on the particle will be $-2F$ (B) potential energy of particle will be $4U$
 (C) velocity of particle will be $\pm\sqrt{\frac{4}{5}}v$ (D) kinetic energy of particle will be $0.8K$

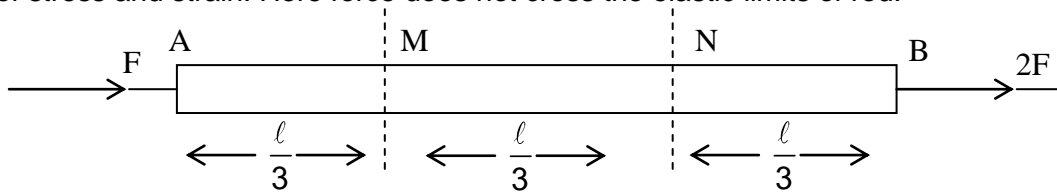
7. **ABCD**

8. A composite rod consists of a steel rod of length 25 cm and cross-sectional area $2A$ and copper rod of length 50 cm and cross-sectional area A . the composite rod is subjected to an axial load F . If the young's moduli of steel and copper are in the ratio 2 : 1 then

- (A) the extension produced in copper rod will more.
 (B) the extension in copper and steel parts will be in the ratio 1 : 8.
 (C) the stress in copper rod will be more.
 (D) no extension will be produced in the steel rod.

8. **AC**

9. There is a uniform rod of mass m and length ℓ as shown in figure. Cross sectional area and Young's modulus of rod are A and Y respectively. Two parallel forces F and $2F$ acts at ends of rod A and B respectively along normal to cross sectional area as shown. Rod is placed on smooth horizontal table. This situation is explained by Hooke's Law which states that under elastic limit, stress is directly proportional to strain. Young's modulus is the ratio of stress and strain. Here force does not cross the elastic limits of rod.

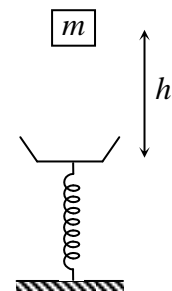


$\Delta\ell_1$ in part MN is $\Delta\ell_2$ and in part NB is $\Delta\ell_3$ then which of the following is/are correct

- (A) The magnitude of change in length in part AM is $\frac{F}{AY} \frac{\ell}{6}$
- (B) The magnitude of change in length in part MN is $\frac{F}{AY} \frac{\ell}{6}$
- (C) The magnitude of change in length in part NB is $\frac{F}{AY} \frac{\ell}{6}$
- (D) The magnitude of change in length in part NB is $\frac{F\ell}{AY2}$
9. **ABD**
10. In a given field force, the potential energy of a particle is given by $U_{(x)} = \frac{P}{x^2} - \frac{q}{x}$ where P and q are positive constant then
- (A) The equilibrium position of particle is $\frac{2P}{q}$.
- (B) The equilibrium position of particle is $\frac{2q}{P}$.
- (C) The angular frequency is $\frac{P^4}{8m\rho^3}$
- (D) The angular frequency is $\frac{q^4}{8m\rho^3}$

10. **AD**

11. A body of mass m fell from a height h at $t = 0$ onto the pan of a spring balance. The masses of the pan and the spring are negligible. The spring constant of the spring is $k = \frac{3mg}{2h}$. Having stuck to the pan, the body starts performing harmonic oscillations in vertical direction, then



- (A) the time period of oscillation is $2\pi\sqrt{\frac{2h}{3g}}$
- (B) the time period of oscillation is $\frac{1}{2\pi}\sqrt{\frac{3g}{2h}}$
- (C) time after which block reaches its extreme position for first time is (when block is performing SHM) $\sqrt{\frac{2h}{g}} + \frac{2\pi}{3}\sqrt{\frac{2h}{3g}}$

(D) time after which block reaches its extreme position for first time is (when block is performing SHM) $\sqrt{\frac{2h}{g}} + \frac{4\pi}{3} \sqrt{\frac{2h}{3g}}$

11. **AC**

12. Density of liquid varies with depth as $\rho = \alpha h$. A small ball of density ρ_0 is released from the free surface of the liquid. Then

(A) the ball will execute SHM of amplitude $\frac{\rho_0}{\alpha}$

(B) the mean position of the ball will be at a depth $\frac{\rho_0}{2\alpha}$ from the free surface

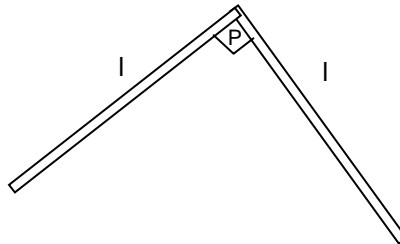
(C) the ball will sink to a maximum depth of $\frac{2\rho_0}{\alpha}$

(D) all of the above

12. **AC**

PART – B (Numerical based)

1. A system (L shaped) of two identical rods of mass m and length l are resting on a peg P shown in the figure. If the system is displaced in its plane by a small angle θ , then period of oscillation is given by $2\pi\sqrt{\frac{kl}{3g}}$. Find the value of $k^2/8 =$



1. **4**

2. If the time period of a simple pendulum of infinite length is on earth's surface is $2\pi\sqrt{\frac{aR_e}{2g}}$, then $a =$

2. **2**

3. If $y = \frac{\text{magnitdue of lateral strain}}{\text{magnitude of longitudinal strain}}$

Then find the $y_{\text{maximum}} : y_{\text{minimum}}$

3. **1**

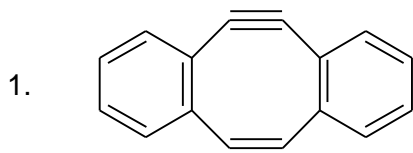
4. Two small balls, each of mass m are connected by a light rigid rod of length L . The system is suspended from its centre by a thin wire of torsional constant k . The rod is rotated about the wire through an angle $\sqrt{\frac{3mgL}{k}}$ and released. Find the ratio of tension in the rod when the system passes through the mean position and its weight. (acceleration due to gravity = g)

4. **2**

5. A particle is attached to the midpoint of a spring of spring constant k . The spring is fixed at both ends if the particle is pulled slightly in a direction perpendicular to length of the spring and its period of oscillation is $2\pi\sqrt{\frac{m}{xk}}$, then find the value of 'x'.
5. **4**
6. A light wooden rod fixed at one end is kept horizontal. A load of 0.4 kg tied to the free end of the rod causes that end to be depressed by 2.8 cm. If this load is set into up and down vibrations, with what frequency will it oscillate?
6. **2.98**

SECTION-2 : CHEMISTRY**PART – A****(Single Correct Choice Type)**

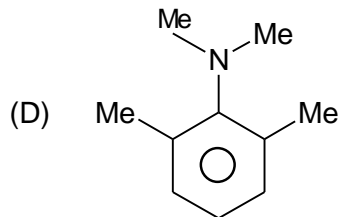
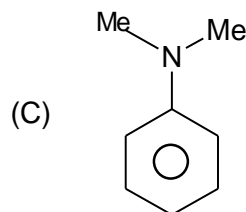
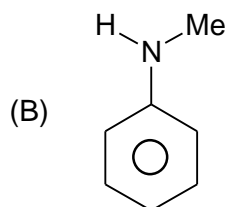
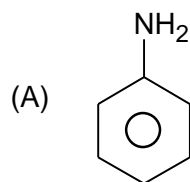
This section contains 6 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.



- (A) aromatic (B) non-aromatic
(C) anti-aromatic (D) quasi-aromatic

1. C

2. Which of the following amine do not undergo coupling reaction when treated with PhN_2^+ (benzene diazonium) ion?

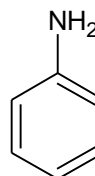
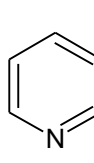
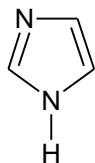
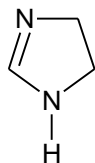
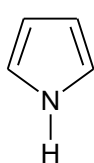


2. D

3. Correct sequence of intermediates formed in Birch reduction of alkyne is
(A) radical, anion-radical, anion (B) anion-radical, anion, radical
(C) anion-radical, radical, anion (D) radical, anion, anion-radical

3. C

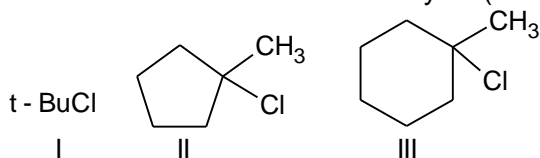
4. Correct basic strength order



- (A) I < II < III < IV < V (B) I < V < IV < III < II
(C) I < V < IV < II < III (D) I < IV < III < II < IV

4. B

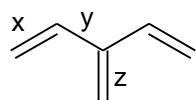
5. Correct order for relative rate of solvolysis (formation of carbocation) in given compounds



- (A) I > II > III (B) III > II > I
 (C) II > I > III (D) I > III > II

5. C

6. Correct bond order(x, y, z) is



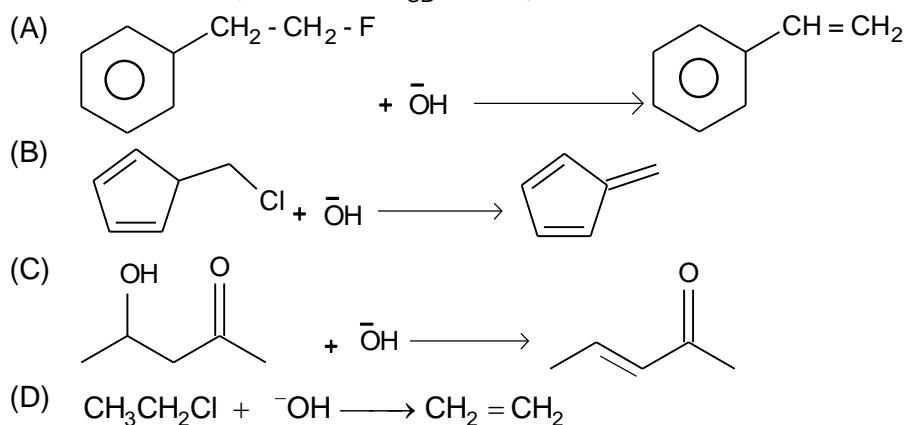
- (A) $x = y = z$ (B) $x > y > z$
 (C) $x > z > y$ (D) $z > x > y$

6. C

(Multi Correct Choice Type)

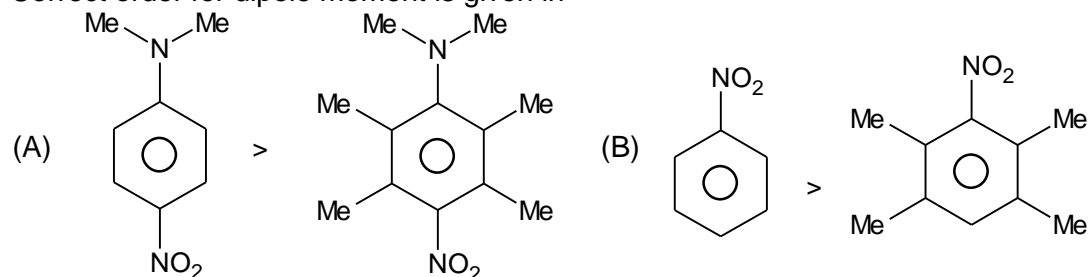
This section contains 6 **multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

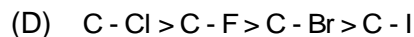
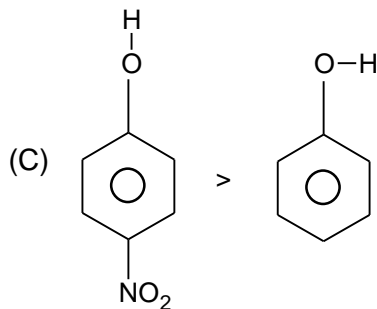
7. Which is/are example involve E_{CB}^1 as major mechanism?



7. ABC

8. Correct order for dipole moment is given in





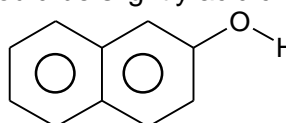
8. ABCD

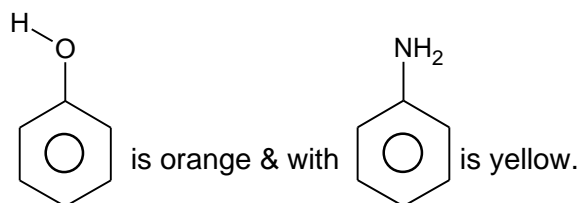
9. Which is correct statement about diazo-coupling reaction?

(A) Benzene diazonium ion is a strong electrophile (PhN_2^+)

(B) For diazocoupling reaction of phenol, pH optima should be slightly basic.

(C) For diazocoupling reaction of aniline pH optima should be slightly acidic

(D) The colour of diazocoupling product with β -naphthol  is red, with



9. BCD

10. Which is/are the correct statement(s)?

(A) Enolate ions behave as ambident nucleophile

(B) C - H bond energy is ethyne > ethene > ethane

(C) The lone pair of P in PH_3 is present in 's' orbital but lone pair of N in NH_3 is present in sp^3 orbital

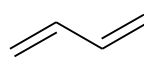
(D) The lone pair of N in NH_3 and P in PH_3 both are present in sp^3 hybrid orbital

10. ABC

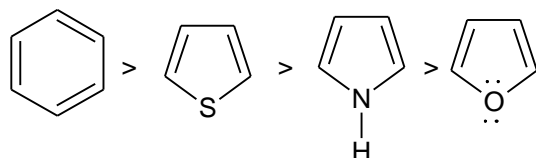
11. Which is/are correct about resonance/mesomerism?

(A) Resonance can take place in sigma bonded molecules, i.e. in saturated molecules

(B) Mesomeric effect can take place in sigma bonded molecules, i.e. in saturated molecules

(C) $\text{CH}_2 = \text{CH} = \text{CH} = \text{CH}_2$ is a resonating structure of 

(D) Resonance energy of monocyclic aromatic system (in terms of magnitude) is

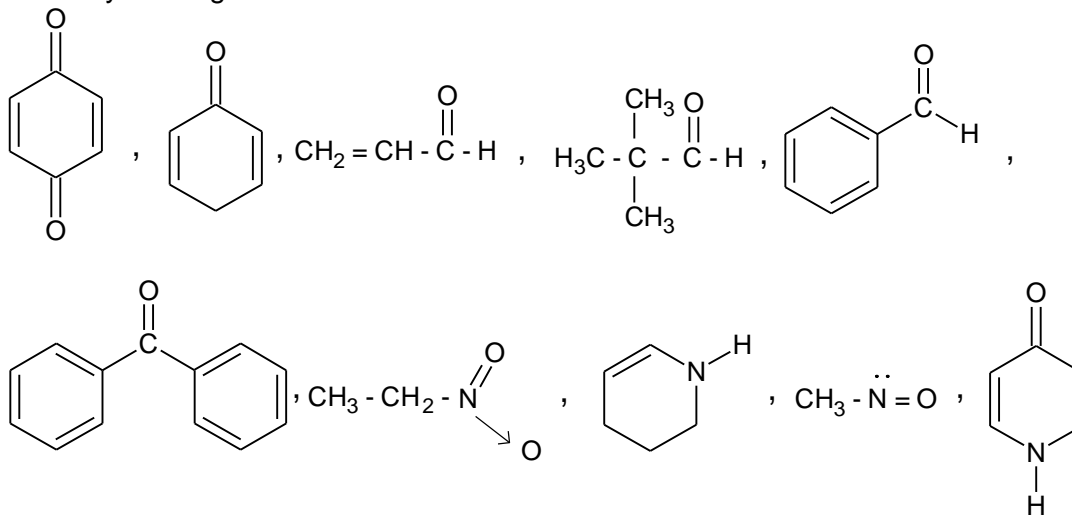


11. AD

12. Correct statements about cyclic/ring systems
- (A) In small cyclic rings(3 and 4-membered), both Bayer's strain and torsional strain(Pitzer's strain) is present but angle strain predominated.
- (B) Medium or common rings(5, 6, 7 membered) are largely unstrained, the strain that is usually predominated is torsional strain(Pitzer's).
- (C) Large rings have little or no strain but entropy is less, therefore less preferred to exist.
- (D) Cyclopropane is more acidic than cyclobutane
12. ABCD

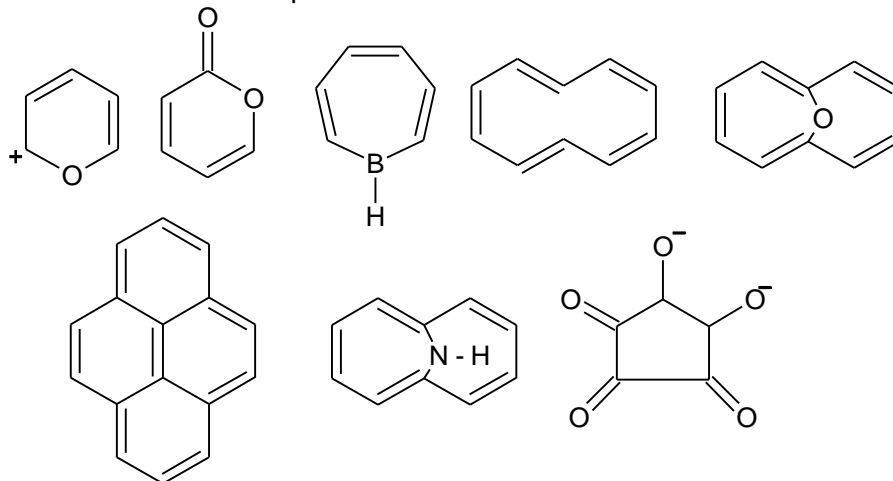
PART – B
(Numerical based)

1. How many of the given molecule can show tautomerism?



1. 5
2. Number of hetroatom in a molecule of
Tear gas is x
Mustard gas is y
Phosgene is z
Value of $x + y - z$ is

2. 6
3. Number of aromatic species is



3. 7

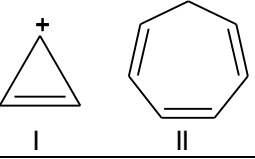
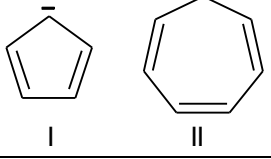
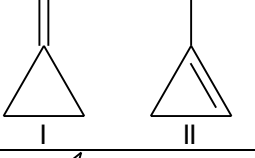
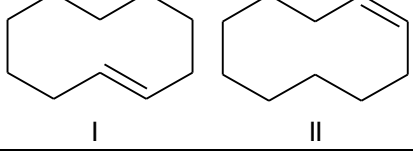
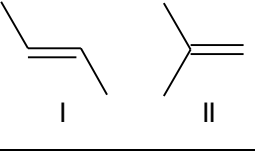
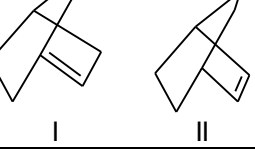
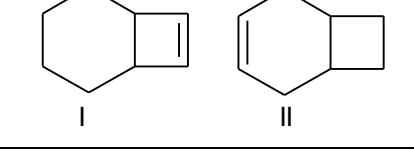
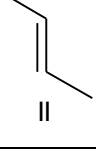
4. What is the minimum number of carbon atom in simple cycloalkene i.e. unsubstituted cycloalkene to show cis-trans or geometrical isomerism?

4. 8

5. Number of cyclic structural isomers of C_3H_6O is

5. 9

6. In how many of given pair of species I is more stable than II

 <p>I II</p>	 <p>I II</p>	<p>1 - Hexene I 2 - Hexene II</p>
 <p>I II</p>	 <p>I II</p>	 <p>I II</p>
 <p>I II</p>	 <p>I II</p>	<p>$CH_3 - O - CH = CH_2$ I</p>  <p>II</p>

6. 3

SECTION-3 : MATHEMATICS**PART – A****(Single Correct Choice Type)**

This section contains 6 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

1. ${}^nC_0 - {}^nC_1 + {}^nC_2 - {}^nC_3 + \dots + (-1)^{m-1} {}^nC_{m-1}$ is equal to

- (A) $(-1)^{m-1} {}^nC_m$ (B) $(-1)^{m-n-1} {}^nC_{m-1}$
 (C) $(-1)^{m-1-n-1} {}^nC_{m-1}$ (D) $(-1)^m {}^nC_m$

1. C

2. $\sum_{i=0}^{n-1} \left(\sum_{j=i+1}^n (j^n C_i + i^n C_j) \right) =$

- (A) $n2^{n-1}$ (B) $n^2 2^n$
 (C) $n^2 2^{n-1}$ (D) $n2^n$

2. C

3. If n is an odd natural number, then $\sum_{r=0}^n \frac{(-1)^r}{{}^nC_r} =$

- (A) -1 (B) $\frac{1}{n}$
 (C) 1 (D) 0

3. D

4. Let the set of complex numbers $(a_1, b_1); (a_2, b_2); (a_3, b_3) \dots$ denoting the points on the complex plane satisfying $(a_{n+1}, b_{n+1}) = (\sqrt{3}a_n - b_n, \sqrt{3}b_n + a_n)$ for $n = 1, 2, 3, \dots$

Suppose $(a_{100}, b_{100}) = (2, 4)$ then the value of $(a_1 + b_1)$ is equal to:

- (A) $\frac{1}{2^{96}}$ (B) $\frac{1}{2^{97}}$
 (C) $\frac{1}{2^{98}}$ (D) $\frac{1}{2^{99}}$

4. C

5. The complex number z which satisfies the equations $|z| = 1$ and $\left| \frac{z - \sqrt{2}(1+i)}{z} \right| = 1$ is:

- (A) 1 (B) $1+i$
 (C) $\frac{1+i}{\sqrt{2}}$ (D) $\frac{-1-i}{\sqrt{2}}$

5. C

6. If a, b, c are distinct non-zero complex numbers such that $|a| = |b| = |c|$. If z_1 and z_2 are the roots of $az^2 + bz + c = 0$ such that $|z_1| = 2$, then the value of $(16z_2 + z_1)$ is equal to:

- (A) $\frac{c}{b}$ (B) $\frac{-4c}{b}$
 (C) $\frac{4c}{b}$ (D) $\frac{-c}{b}$

6. B

(Multi Correct Choice Type)

This section contains 6 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

7. Let n be a positive integer and $(1+x+x^2)^n = a_0 + a_1x + a_2x^2 + \dots + a_{n-1}x^{2n-1} + a_{2n}x^{2n}$, then

- (A) $\sum_{r=0}^{n-1} a_r = \frac{1}{2}(3^n - a_n)$
 (B) $\sum_{r=0}^{2n} (-1)^r a_r^2 = a_n$
 (C) $a_0^2 - a_1^2 + a_2^2 - a_3^2 + \dots + (-1)^{n-1} a_{n-1}^2 = \frac{a_n}{2}(1 - (-1)^n a_n)$
 (D) $(r+1)a_{r+1} = (n-r)a_r + (2n-r+1)a_{r-1}, 1 \leq r \leq 2n-1$

7. ABCD

8. Let $n \in \mathbb{N}, n \geq 4$ and $P = \prod_{r=0}^n {}^n C_r$, then

- (A) $P > \left(\frac{2^n}{n+1}\right)^{n+1}$ (B) $P < \left(\frac{2^n}{n+1}\right)^{n+1}$
 (C) $P < \left(\frac{2^n - 2}{n-1}\right)^{n-1}$ (D) $P < \left(\frac{2^n - 2}{n-1}\right)^n$

8. BCD

9. Let $S_1 = \sum_{r=0}^n ({}^{2n+1}C_{2r})^2$ and $S_2 = \sum_{r=0}^n ({}^{2n+1}C_{2r+1})^2$, then

- (A) $S_1 = \frac{1}{2}(4^{n+2}C_{2n} + (-1)^n 2^{n+1}C_n)$ (B) $S_2 = \frac{1}{2}(4^{n+2}C_{2n} - (-1)^n 2^{n+1}C_n)$
 (C) $S_1 = \frac{1}{2}(4^{n+2}C_{2n+1})$ (D) $S_2 = \frac{1}{2}(4^{n+2}C_{2n+1})$

9. CD

10. Let $A(z_1), B(z_2), C(z_3), D(z_4)$ are four distinct points in complex plane such that $2|z_4 - z_1| = |z_4 - z_2| + |z_4 - z_3|$, $2|z_4 - z_1| + |z_4 - z_3| = 2|z_4 - z_3| = |z_4 - z_1| + |z_4 - z_2|$ and $\frac{z_4 - z_1}{z_3 - z_2}$ is purely imaginary, then
- (A) $\frac{z_4 - z_2}{z_3 - z_1}$ is purely real (B) $\frac{z_4 - z_3}{z_2 - z_1}$ is purely imaginary
 (C) $3z_4 = z_1 + z_2 + z_3$ (D) $|z_4 - z_1| = |z_4 - z_2|$
10. BCD
11. Let $A(z_1), B(z_2), C(z_3)$ are points in complex plane such that $z_1|z_2 - z_3| - z_2|z_3 - z_1| - z_3|z_1 - z_2| = 0$, then which of the following may be correct?
- (A) A, B, C are collinear such that A lies between B and C
 (B) A, B, C are collinear such that B lies between A and C
 (C) A, B, C are collinear such that C lies between A and B
 (D) O (0) is the centre of circle which touches the sides of triangle ABC.
11. AD
12. Let $2 \leq |z| \leq 4$ $m =$ minimum value of $\left|z + \frac{1}{z}\right|$, $M =$ maximum value of $\left|z + \frac{1}{z}\right|$, then
- (A) $m = \frac{3}{2}$ (B) $m = \frac{5}{2}$
 (C) $M = \frac{15}{4}$ (D) $M = \frac{17}{4}$
12. AD

PART – B
(Numerical based)

1. Let $S = {}^{31}C_1 - \left(1 + \frac{1}{2}\right) {}^{31}C_2 + \left(1 + \frac{1}{2} + \frac{1}{3}\right) {}^{31}C_3 - \left(1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}\right) {}^{31}C_4 + \dots + \left(1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{31}\right) {}^{31}C_{31}$, then $\frac{1}{S}$ is equal to
1. 31
2. Using the identity $\frac{1}{{}^{2n+1}C_r} + \frac{1}{{}^{2n+1}C_{r+1}} = \frac{2n+2}{2n+1} \frac{1}{{}^{2n}C_r}$, then value of $\sum_{r=1}^{19} \frac{(-1)^r r}{{}^{20}C_r} = \frac{p}{q}$, where p and q are relatively prime natural numbers, then p + q is equal to
2. 21
3. Let $x = (5 + 2\sqrt{6})^n$, $n \in \mathbb{N}$, then find the value of $x - x^2 + x[x]$, where $[.]$ denotes greatest integer function.
3. 1

4. If $\cos\theta_1 + 2\cos\theta_2 + 3\cos\theta_3 = 0 = \sin\theta_1 + 2\sin\theta_2 + 3\sin\theta_3$, then $\sin 3\theta_1 + 8\sin 3\theta_2 + 27\sin 3\theta_3 = \lambda \sin(\theta_1 + \theta_2 + \theta_3)$, where $\lambda =$
4. 18
5. The equation $z^{10} + (13z - 1)^{10} = 0$ has 10 complex roots $z_1, \bar{z}_1, z_2, \bar{z}_2, \dots, z_5, \bar{z}_5$. Then the value of $\frac{1}{|z_1|^2} + \frac{1}{|z_2|^2} + \frac{1}{|z_3|^2} + \frac{1}{|z_4|^2} + \frac{1}{|z_5|^2}$ is equal to
5. 850
6. Let $F(z) = \frac{z+i}{z-i}$ for all complex numbers $z \neq i$ and let $z_n = F(z_{n-1})$ for all $n \in \mathbb{N}$. Given that $z_0 = \frac{1}{137} + i$ and $z_{2020} = a + ib$, where $a, b \in \mathbb{R}$, find $a + b$.
6. 275

ANSWERS

SECTION-1 : PHYSICS

PART – A

PART – B

SECTION – 2 : CHEMISTRY

PART – A

PART – B

SECTION – 3 : MATHEMATICS

PART – A

PART – B