

## PHYSICS, CHEMISTRY & MATHEMATICS

Pattern - CPT-2

QP CODE:

PAPER - 2

Time Allotted: 3 Hours

Maximum Marks: 186

- 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.

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 **Blue/Black Ball Point Pen** 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 Part.

- (i) **PART-A (01-08)** contains (8) Multiple Choice Questions which have **One or More Correct** answer.  
*Full Marks: +4* If only the bubble(s) corresponding to all the correct options(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: -1 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 **-1 marks**, as a wrong option is also darkened.
- (ii) **Part-A (09-12)** – This section contains Two (02) List-Match Sets, each List-Match set has Two (02) Multiple Choice Questions. Each List-Match set has two lists: List-I and List-II. FOUR options are given in each Multiple Choice Question based On List-I and List-II and ONLY ONE of these four options satisfies the condition asked in the Multiple Choice Question. Each question carries **+3 Marks** for correct combination chosen and **-1 marks** for wrong options chosen.
- (iii) **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 **+3 marks** for correct answer. **There is no negative marking.**

Name of the Candidate : \_\_\_\_\_

Batch : \_\_\_\_\_ Date of Examination : \_\_\_\_\_

Enrolment Number : \_\_\_\_\_

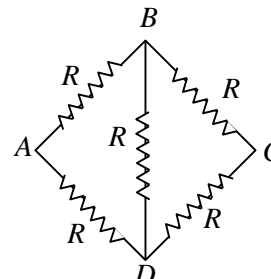
## SECTION – I : PHYSICS

### (PART – A)

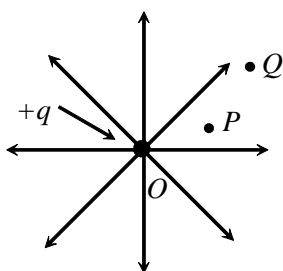
(One or More Than One Options Correct Type)

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.

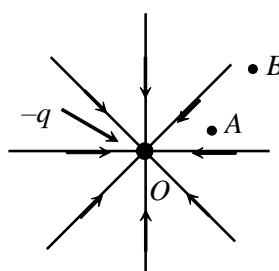
1. Five equal resistance each of value  $R$  are connected in a form shown alongside. The equivalent resistance of the network
- (A) between the points  $B$  and  $D$  is  $R$
- (B) between the point  $B$  and  $D$  is  $R/2$
- (C) between the points  $A$  and  $C$  is  $R$
- (D) between the points  $A$  and  $C$  is  $R/2$



1. **BC**
2. A non-conducting solid sphere of radius  $R$  is uniformly charged. The magnitude of the electric field due to the sphere at a distance  $r$  from its centre
- (A) Increases as  $r$  increases for  $r < R$
- (B) decreases as  $r$  increases for  $0 < r < \infty$
- (C) decreases as  $r$  increase for  $R < r < \infty$
- (D) is discontinuous at  $r = R$
2. **AC**
3. A positively charged thin metal ring of radius  $R$  is fixed in the  $x$ - $y$  plane with its centre at the origin  $O$ . A negatively charged particle  $P$  is released from rest at the point  $(0, 0, z_0)$  where  $z_0 > 0$ . Then the motion of  $P$  is
- (A) periodic for all values of  $z_0$  satisfying  $0 < z_0 < \infty$
- (B) simple harmonic for all values of  $z_0$  satisfying  $0 < z_0 \leq R$
- (C) approximately simple harmonic provided  $z_0 \ll R$
- (D) such that  $P$  crosses  $O$  and continues to move along the negative  $z$ -axis towards  $z = -\infty$
3. **AC**
4. Figures shows the lines of force of the electric field of a positive charge ( $+q$ ) and a negative charge ( $-q$ ) respectively. Which of the following statements are correct?



(a)



(b)

- (A) potential at  $P$  is greater than that at  $Q$ .
- (B) potential at  $A$  is greater than that at  $B$ .
- (C) potential at  $P$  is less than that at  $Q$ .
- (D) potential at  $B$  is greater than that at  $A$ .

4. **AD**

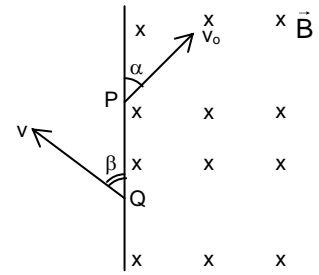
5. A particle of charge  $-q$  and mass  $m$  enters a uniform magnetic field  $\vec{B}$  (perpendicular to paper inwards) at P with a velocity  $v_0$  at an angle  $\alpha$  and leaves the field at Q with velocity  $v$  at angle  $\beta$  as shown in figure. Then

(A)  $\alpha = \beta$

(B)  $v = v_0$

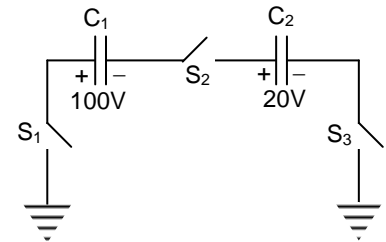
(C)  $PQ = \frac{2mv_0 \sin \alpha}{Bq}$

(D) particle remains in the field for time  $t = \frac{2m(\pi - \alpha)}{Bq}$



5. **ABCD**

6. In the circuit shown in figure  $C_1 = 1 \mu\text{F}$  and  $C_2 = 2 \mu\text{F}$ . Capacitor  $C_1$  is charged to 100 V and  $C_2$  is charged to 20 V. After charging they are connected as shown. When the switches  $S_1$ ,  $S_2$  and  $S_3$  all are closed

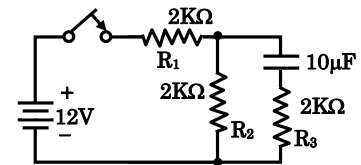
(A) no charge will flow through  $S_2$ (B)  $80 \mu\text{C}$  charge will flow through  $S_1$  in downward direction(C)  $80 \mu\text{C}$  charge will flow through  $S_2$  in upward direction(D)  $80 \mu\text{C}$  charge will flow through  $S_3$  in upward direction

6. **BCD**

7. In the circuit shown, the switch is turned on at  $t = 0$ , Then,

(A) at  $t = 0$ , current supplied by battery is 4 mA(B) at  $t = 0$ , current in  $R_3$  is 2 mA

(C) in the steady state current supplied by battery is 3 mA

(D) in the steady state current in  $R_3$  is zero

7. **ABCD**

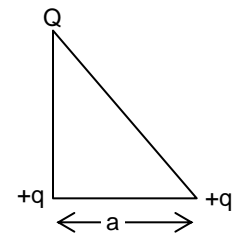
8. Three charges  $Q$ ,  $+q$  and  $+q$  are placed at the vertices of a right angle triangle (isosceles triangle) as shown. The net electrostatic energy of the configuration is zero, if  $Q$  is equal to

(A)  $\frac{-q}{1 + \sqrt{2}}$

(B)  $\frac{-2q}{2 + \sqrt{2}}$

(C)  $-2q$

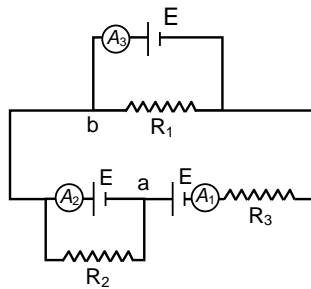
(D)  $+q$



8. **B**

This section contains **2 List-Match Sets**, each List-Match set has **2 Multiple Choice Questions**. Each List-Match set has two lists: List-I and List-II. Four options are given in each Multiple Choice Question based On List-I and List-II and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

**For Question (9 – 10)**



List – I		List – II	
(I)	Reading of ammeter $A_1$ in ampere is	(P)	$4/3$
(II)	Reading of ammeter $A_2$ in ampere is	(Q)	$8/3$
(III)	Reading of ammeter $A_3$ in ampere is	(R)	4
(IV)	Potential difference between point a and point b in volt is	(S)	zero
		(T)	2
		(U)	-1

9. In the above circuit,  $R_1 = R_2 = R_3 = 3\Omega$  and e.m.f. of each cell is  $E = 4V$  and negligible internal resistance. All ammeters are ideal. Match the following:

- (A) I  $\rightarrow$  P, II  $\rightarrow$  Q, III  $\rightarrow$  R, IV  $\rightarrow$  S  
 (B) I  $\rightarrow$  T, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  Q  
 (C) I  $\rightarrow$  P, II  $\rightarrow$  Q, III  $\rightarrow$  S, IV  $\rightarrow$  R  
 (D) I  $\rightarrow$  S, II  $\rightarrow$  R, III  $\rightarrow$  T, IV  $\rightarrow$  U

9. **C**

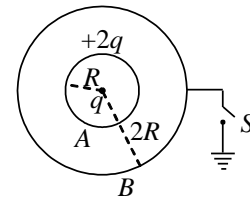
10. In the above circuit if  $R_2$  is removed and  $R_1 = R_3 = 4\Omega$

- (A) I  $\rightarrow$  P, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  R  
 (B) I  $\rightarrow$  T, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  Q  
 (C) I  $\rightarrow$  P, II  $\rightarrow$  Q, III  $\rightarrow$  S, IV  $\rightarrow$  R  
 (D) I  $\rightarrow$  S, II  $\rightarrow$  R, III  $\rightarrow$  T, IV  $\rightarrow$  U

10. **A**

**For Question (11 – 12)**

Two concentric conducting shells  $A$  and  $B$  have radii  $R$  and  $2R$ . A charge  $q$  is placed at the centre of the shells and a charge  $2q$  is given to shell  $A$ .



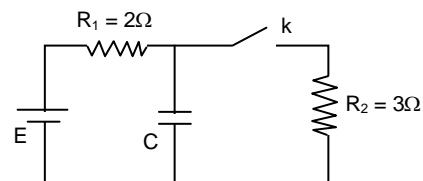
List – I		List – II	
(I)	Charge on inner surface of shell $A$	(P)	$-3q$
(II)	Charge on inner surface of shell $B$	(Q)	Zero
(III)	Charge on outer surface of shell $A$	(R)	$-q$
(IV)	Charge on outer surface of shell $B$	(S)	$3q$
		(T)	$2q$
		(U)	$-2q$

11. When switch is open  
 (A) I  $\rightarrow$  R, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  S  
 (B) I  $\rightarrow$  T, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  Q  
 (C) I  $\rightarrow$  P, II  $\rightarrow$  R, III  $\rightarrow$  S, IV  $\rightarrow$  T  
 (D) I  $\rightarrow$  S, II  $\rightarrow$  R, III  $\rightarrow$  T, IV  $\rightarrow$  U
11. **A**
12. When switch is closed  
 (A) I  $\rightarrow$  P, II  $\rightarrow$  R, III  $\rightarrow$  S, IV  $\rightarrow$  Q  
 (B) I  $\rightarrow$  R, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  Q  
 (C) I  $\rightarrow$  T, II  $\rightarrow$  U, III  $\rightarrow$  R, IV  $\rightarrow$  P  
 (D) I  $\rightarrow$  P, II  $\rightarrow$  Q, III  $\rightarrow$  R, IV  $\rightarrow$  S
12. **B**

**(PART – B)****(Integer Type)**

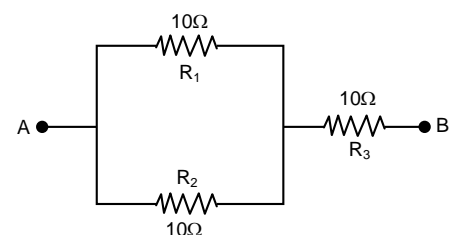
**Part-C (01-06)** contains six (06) Numerical based questions, the answer of which maybe positive or negative numbers or decimals (e.g. 6.25, 7.00, -0.33, -30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking**.

1. In the circuit shown in the figure  $k$  is open. The charge on capacitor  $C$  in steady state is  $q_1$ . Now key is closed and at steady state charge on  $C$  becomes  $q_2$ . Find the ratio of charges  $q_1 / q_2$ .



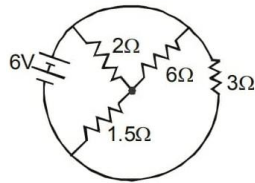
1. **1.66**  
**Range: 1.60 to 1.70**

2. Three equal resistance each of  $10\Omega$  are connected as shown in figure. The maximum safe power consumed by each resistor is  $20W$ . The maximum safe power consumed by the combination is:



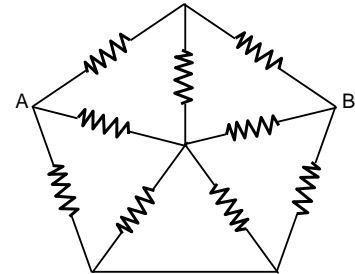
2. **30**

3. The total current supplied to the circuit by the battery is



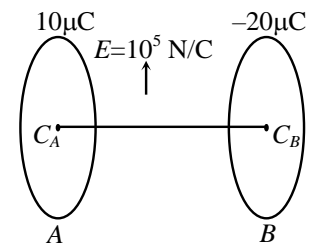
3. 4

4. If resistance of each resistor is 1 ohm, then effective resistance between points A and B of the shown network is



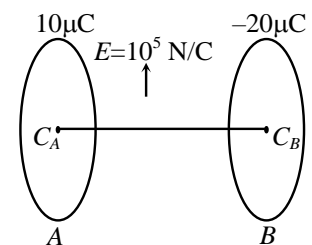
4. **0.66**  
**Range: 0.65 to 0.70**

5. Two circular rings A and B each of radius  $a = 30\text{cm}$  are placed coaxially with their axis horizontal in a uniform electric field  $E = 10^5\text{N/C}$  directed vertically upward as shown in figure. Distance between centres of the rings A and B ( $C_A$  and  $C_B$ ) is 40 cm. Ring A has positive charge  $q_A = 10\mu\text{C}$  and B has a negative charge  $q_B = -20\mu\text{C}$ . A particle of mass  $m$  and charge  $q = 10\mu\text{C}$  is released from rest at the centre of ring A. If particle moves along  $C_A C_B$ , then ( $g = 10\text{m/s}^2$ ). Mass of charge particle is (in gm)



5. **100**

6. Two circular rings A and B each of radius  $a = 30\text{cm}$  are placed coaxially with their axis horizontal in a uniform electric field  $E = 10^5\text{N/C}$  directed vertically upward as shown in figure. Distance between centres of the rings A and B ( $C_A$  and  $C_B$ ) is 40 cm. Ring A has positive charge  $q_A = 10\mu\text{C}$  and B has a negative charge  $q_B = -20\mu\text{C}$ . A particle of mass  $m$  and charge  $q = 10\mu\text{C}$  is released from rest at the centre of ring A. If particle moves along  $C_A C_B$ , then ( $g = 10\text{m/s}^2$ ) work done by electric field, when particle moves from  $C_A$  to  $C_B$  is (in Joules)



6. **3.6**

## SECTION - II : CHEMISTRY

### (PART – A)

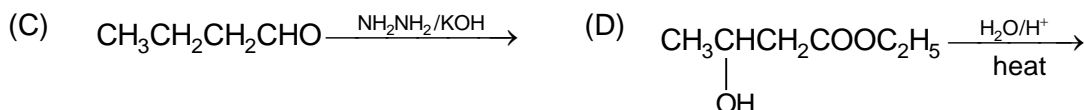
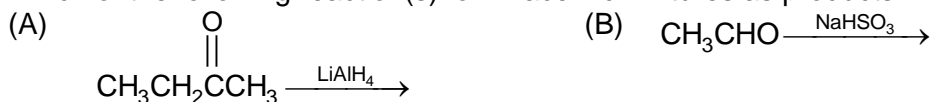
(One or More Than One Options Correct Type)

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.

1. Which of the following substance(s) does/do not contain intermolecular hydrogen bond between its/their own molecules?  
 (A) The functional isomer of  $C_2H_5OH$   
 (B) The functional isomer of  $CH_3COOCH_3$   
 (C) The most basic isomer of n-butyl amine (in gaseous state)  
 (D) The product of Hofmann's bromamide reaction

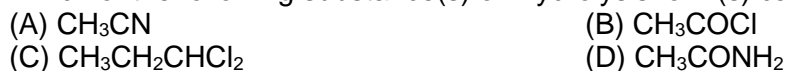
1. **AC**

2. Which of the following reaction(s) form racemic mixtures as products?



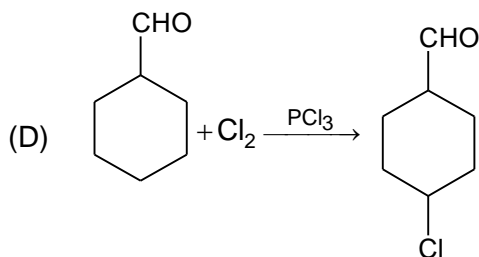
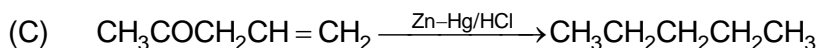
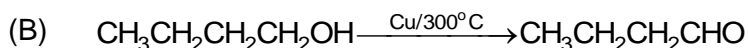
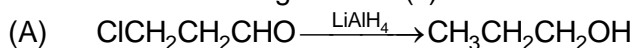
2. **AB**

3. Which of the following substance(s) on hydrolysis form(s) carboxylic acids?



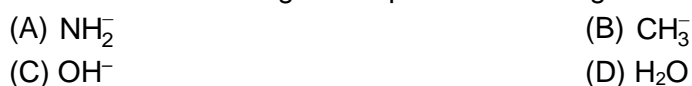
3. **ABD**

4. Which of the following reaction(s) do/does not form the correct product?



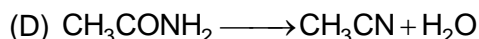
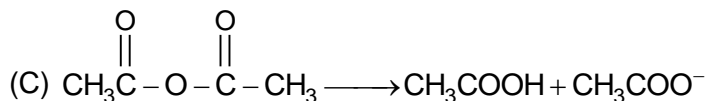
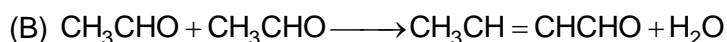
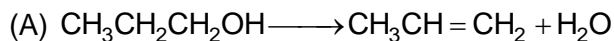
4. **CD**

5. Which of the following nucleophiles are stronger than  $NH_3$ ?



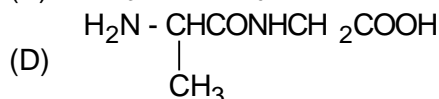
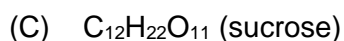
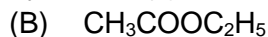
5. **ABC**

6. Which of the following reaction(s) takes place in presence of NaOH?



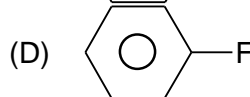
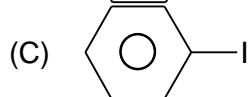
6. **BC**

7. Which of the following compound(s) on hydrolysis form(s) more than one type of product?



7. **BCD**

8. Which of the following cannot be prepared by Sandmeyer's reaction?



8. **CD**

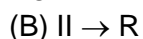
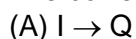
This section contains **2 List-Match Sets**, each List-Match set has **2 Multiple Choice Questions**. Each List-Match set has two lists: List-I and List-II. Four options are given in each Multiple Choice Question based On List-I and List-II and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

### For Question (9 – 10)

Match the following & answer accordingly:

		List- II	
(I)	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$	(P)	forms a geminal dichloride when reacts with $\text{PCl}_5$
(II)	$\text{CH}_3\overset{\text{O}}{\parallel}\text{CCH}_3$	(Q)	undergoes dehydrogenation when heated on Cu at $300^\circ\text{C}$
(III)	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	(R)	is formed by hydrolysis of a primary geminal dichloride
(IV)	$\text{CH}_3\underset{\text{OH}}{\text{CH}}\text{CH}_2\text{CH}_3$	(S)	is obtained by heating calcium acetate
		(T)	forms a primary monochloride when reacts with $\text{SOCl}_2$
		(U)	contains asymmetric carbon atom

9. The correct matching between list-I and list-II is



9. **C**



10. The correct matching between list-I and list-II is  
 (A) I → U (B) II → S  
 (C) III → P (D) IV → R
10. B

**For Question (11 – 12)**

Match the following & answer accordingly:

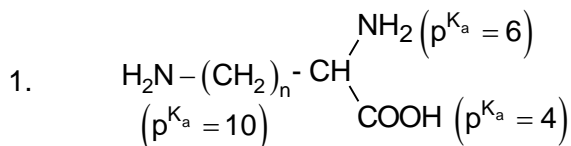
		List- II	
(I)	CH <sub>3</sub> CH <sub>2</sub> COOH	(P)	forms C <sub>2</sub> H <sub>5</sub> OH when treated with LiAlH <sub>4</sub>
(II)	CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>	(Q)	Undergoes dehydration when treated with P <sub>4</sub> O <sub>10</sub>
(III)	CH <sub>3</sub> CONH <sub>2</sub>	(R)	Hydrolysis is irreversible in both acidic and basic medium
(IV)	CH <sub>3</sub> COOCOCH <sub>3</sub>	(S)	Is obtained by the reaction between CH <sub>3</sub> COCl and CH <sub>3</sub> COONa
		(T)	Forms a primary amine when reacts with Br <sub>2</sub> /KOH
		(U)	Alkaline hydrolysis of higher members is called saponification

11. The correct matching between list-I and list-II is  
 (A) I → P (B) II → T  
 (C) III → U (D) IV → S
11. D
12. The correct matching between list-I and list-II is  
 (A) I → R (B) II → U  
 (C) III → P (D) IV → T
12. B

**(PART – B)**

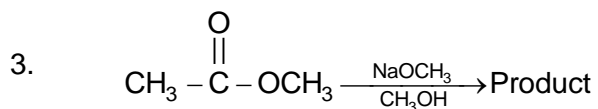
(Integer Type)

**Part-C (01-06)** contains six (06) Numerical based questions, the answer of which may be 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**.



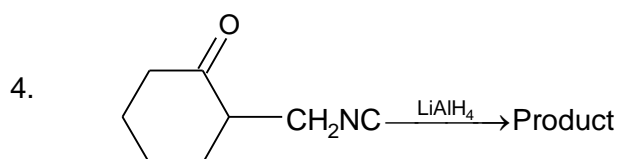
What is the pH of the amino acid at which it can exist as a dipolar ion?

1. 8
2. A polyhydric alcohol reacts with CH<sub>3</sub>COCl in presence of pyridine. If the molar mass difference between the product and reactant is 252 g mol<sup>-1</sup>, how many OH group(s) is/are present in the alcohol?
2. 6



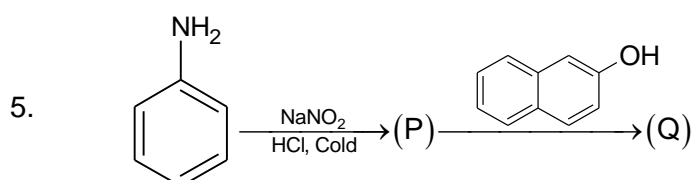
What is the molar mass of the product of above reaction in  $\text{g mol}^{-1}$  unit?

3. 116



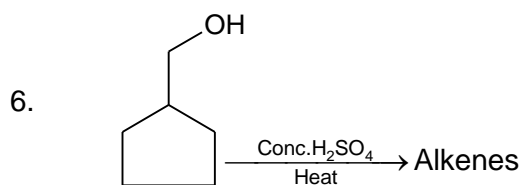
How many hydrogen atoms are present in the product of above reaction?

4. 17



How many pi-bond(s) is/are present in the colourful product(Q)?

5. 9



How many alkene(s) is/are formed in above reaction?

6. 3

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**Space of Rough Work**

## **SECTION - III : MATHEMATICS**

### **(PART – A)**

#### **(One or More Than One Options Correct Type)**

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.

1. If  $\lim_{x \rightarrow 0} \frac{x(1 + a \cos x) - b \sin x}{(f(x))^3} = 1$  and  $\lim_{x \rightarrow 0} \frac{f(x)}{x} = 1$  then

(A)  $a = \frac{-5}{2}$

(B)  $a = -\frac{7}{2}$

(C)  $a = \frac{-5}{3}$

(D)  $b = \frac{-3}{2}$

1. AD

2. Which of the following function(s) is/are periodic with period  $\pi$ ?

(A)  $f(x) = |\sin x|$

(B)  $f(x) = [x + \pi]$

(C)  $f(x) = \cos(\sin x)$

(D)  $f(x) = \cos^2 x$

(where  $[.]$  represents greatest integer function)

2. ACD

3. Let  $f(x) = \lim_{n \rightarrow \infty} \frac{x^{2n} - 1}{x^{2n} + 1}$ , then

(A)  $f(x) = 1$  for  $|x| > 1$

(B)  $f(x) = -1$  for  $|x| < 1$

(C)  $f(x)$  is not defined for any value of  $x$

(D)  $f(x) = 1$  for  $|x| = 1$

3. AB

4. Point of discontinuity of the function  $f(x) = \frac{1 + \cos 5x}{1 - \cos 4x}$

(A)  $x = 0$

(B)  $x = \frac{\pi}{2}$

(C)  $\pi$

(D)  $x = \frac{\pi}{4}$

4. ABC

5. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be a differential function satisfying  $f(x + y) + f(x) \cdot f(y) = f(xy + 1)$ . Also  $f(0) = -1$ ,  $f'(0) = f'(1) = 1$ . Then

(A)  $f(1) = 0$

(B)  $f(2) = 1$

(C)  $f(3) = 2$

(D)  $f(4) = 5$

5. ABC

6. If  $\int \frac{x(x+1)(2x^2-x+1)}{(x^3+x^2+x-1)^3} dx = \frac{1}{Af^2(x)} + C$  where  $f(1) = 2$  then

- (A) A equals  $-2$  (B) Range of function  $f$  is  $(-\infty, \infty)$   
 (C)  $f$  has a point of inflexion at  $x = 1$  (D)  $f$  is many one function

6. ABCD

7.  $\int \frac{dx}{\sqrt{\sin^3 x \cos^5 x}} = a\sqrt{\cot x} + b\sqrt{\tan^3 x} + c$ , where 'c' is the constant of integration, then

- (A)  $a = -2$  (B)  $a = 2$   
 (C)  $b = \frac{-2}{3}$  (D)  $b = \frac{2}{3}$

7. BD

8. If  $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx = \lambda f(x) + c$  then

- (A)  $\lambda = -\frac{1}{8}$ ,  $f(x) = \cos 4x$  (B)  $\lambda = \frac{1}{8}$ ,  $f(x) = \sin 4x$   
 (C) Least period of  $f(x)$  is  $\frac{\pi}{4}$  (D)  $f(x)$  is an even function

8. ACD

This section contains **2 List-Match Sets**, each List-Match set has **2 Multiple Choice Questions**. Each List-Match set has two lists: List-I and List-II. Four options are given in each Multiple Choice Question based On List-I and List-II and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

**For Question (9 – 10)**

Match the following

	Column-I		Column-II
(I)	$f : \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = (x-1)(x-2)\dots\dots(x-11)$	(P)	one one
(II)	$f : \mathbb{R} - \left\{ \frac{-4}{3} \right\} \rightarrow \mathbb{R}$ $f(x) = \frac{2x+1}{3x+4}$	(Q)	onto
(III)	$f : \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = e^{\sin x} + e^{-\sin x}$	(R)	many one
(IV)	$f : \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = \log(x^2 + 2x + 3)$	(S)	into
		(T)	BIJECTIVE

9. Which is correct option?

- (A)  $I \rightarrow RQ$  (B)  $III \rightarrow Q, S$   
 (C)  $II \rightarrow PR$  (D)  $IV \rightarrow PQ$

9. A

Match the following

	Column-I		Column-II
(I)	$f : \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = (x-1)(x-2)\dots(x-11)$	(P)	one one
(II)	$f : \mathbb{R} - \left\{ \frac{-4}{3} \right\} \rightarrow \mathbb{R}$ $f(x) = \frac{2x+1}{3x+4}$	(Q)	onto
(III)	$f : \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = e^{\sin x} + e^{-\sin x}$	(R)	many one
(IV)	$f : \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = \log(x^2 + 2x + 3)$	(S)	into
		(T)	BIJECTIVE

10. Which is correct option?

(A) I  $\rightarrow$  P, S

(B) I  $\rightarrow$  QS

(C) III  $\rightarrow$  RS

(D) IV  $\rightarrow$  P, R

10. C

**For Question (11 – 12)**

In the following  $[x]$  denotes the greatest integer less than or equal to  $x$ .

Match the function in Column I with the properties in Column II

	Column-I		Column-II
(I)	$x x $	(P)	continues in $(-1, 1)$
(II)	$\sqrt{ x }$	(Q)	differentiable in $(-1, 1)$
(III)	$x + [x]$	(R)	strictly increasing in $(-1, 1)$
(IV)	$ x-1  +  x+1 $	(S)	non differentiable at least at one point in $(-1, 1)$
		(T)	strictly decreasing in $(-1, 1)$

11. Which is correct option?

(A) I  $\rightarrow$  R

(B) II  $\rightarrow$  P, S

(C) I  $\rightarrow$  P

(D) IV  $\rightarrow$  PR

11. B

In the following  $[x]$  denotes the greatest integer less than or equal to  $x$ .

Match the function in Column I with the properties in Column II

	Column-I		Column-II
(I)	$x x $	(P)	continues in $(-1, 1)$
(II)	$\sqrt{ x }$	(Q)	differentiable in $(-1, 1)$
(III)	$x + [x]$	(R)	strictly increasing in $(-1, 1)$
(IV)	$ x-1  +  x+1 $	(S)	non differentiable at least at one point in $(-1, 1)$
		(T)	strictly decreasing in $(-1, 1)$

12. Which is correct option?

(A) I  $\rightarrow$  R

(B) II  $\rightarrow$  ST

(C) I  $\rightarrow$  PT

(D) IV  $\rightarrow$  PQ

12. D

**(PART – B)****(Integer Type)**

**Part-C (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**.

1.  $y = f(x)$  is a continuous function such that its graph passes through  $(a, 0)$ . Then

$$\lim_{x \rightarrow a} \frac{\log_e(1+3f(x))}{2f(x)} \text{ is}$$

1. 1.5

2. If  $f(x) = px + q$  and  $f(f(f(x))) = 8x + 21$ , where  $p$  and  $q$  are real numbers, then  $3(p + q)$  equals

2. 15

3. The local minimum of  $f(x) = (x+2)^2(x-4)$ . is

3. -32

4.  $\int \frac{dx}{\sqrt{1+x} - \sqrt{x}} = a(1+x)^{3/2} - bx^{3/2} + c$  then  $3(a-b)$  equals

4. 4

5. Let  $y = \frac{2^{\log_{2^{1/4}} x} - 3^{\log_{27}(x^2+1)^3} - 2x}{7^{4\log_{49} x} - x - 1}$  and  $\frac{dy}{dx} = ax + b$ , then the value of  $10(a + b)$  is

5. 30

6. If  $\int \frac{\sin 2x}{\sin 3x \sin 5x} dx = \frac{1}{p} \log_e |\sin 3x| - \frac{1}{q} \log_e |\sin 5x| + c$  then  $|p - q|$  is \_\_\_\_\_

6. 2

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*Space For Rough Work*

# **FIITJEE COMMON TEST**

**BATCHES: Two Year CRP (2022)**

**PHASE TEST-4: PAPER-2**

**JEE ADVANCED LEVEL**

**ANSWER KEY**

**ANSWER KEYS**

**PHYSICS**

**CHEMISTRY**

**MATHEMATICS**