

## 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)**

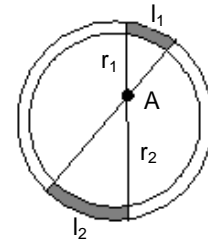
**(One or More Than One Options Correct Type)**

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. An  $\alpha$  particle and a deuteron are placed in an electric field such that forces  $F_1$  and  $F_2$  are acting on them and their accelerations are  $a_1$  and  $a_2$  respectively
- (A)  $F_1 \neq F_2$  (B)  $F_1 = F_2$   
 (C)  $a_1 \neq a_2$  (D)  $a_1 = a_2$

1. **AD**

2. A wire having a uniform linear charge density  $\lambda$ , is bent in the form of a ring of radius  $R$ . Point A as shown in the figure, is in the plane of the ring but not at centre. Two elements of the ring of lengths  $l_1$  and  $l_2$  subtend very small angle at the point A. They are at distance  $r_1$  and  $r_2$  from the point A, respectively ( $r_1 < r_2$ )



- (A) The ratio of charges of elements  $l_1$  and  $l_2$  is  $r_1/r_2$   
 (B) The element  $l_1$  produced greater magnitude of electric field at A than element  $l_2$   
 (C) The elements  $l_1$  and  $l_2$  produce same potential at A  
 (D) The direction of net electric field produced by elements only, at A is towards element  $l_2$

2. **ABCD**

3. Three concentric metallic shells A, B and C of radii  $a$ ,  $b$  and  $c$  ( $a < b < c$ ) have charge densities  $\sigma$ ,  $-\sigma$  and  $\sigma$  respectively. The potentials of A, B and C are

(A)  $V_A = \frac{\sigma}{\epsilon_0}(a - b + c)$  (B)  $V_B = \frac{\sigma}{\epsilon_0} \left( \frac{a^2}{b} - b + c \right)$   
 (C)  $V_C = \frac{\sigma}{\epsilon_0} \left( \frac{a^2}{c} + \frac{b^2}{c} + c \right)$  (D)  $V_A = \frac{\sigma a}{\epsilon_0}; V_B = V_C = 0$

3. **AB**

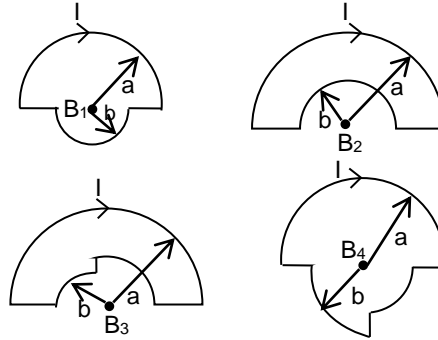
4. A long straight conductor of circular cross-section of radius  $R$  carries a current  $i_0$  whose current density  $J$  is assumed to be varying with radial distance  $r$  as  $J = J_0 \left( \frac{r}{R} \right)$ , where  $J_0$  is a positive constant, then

(A) Magnetic field outside wire varies as  $\frac{J_0 \mu_0 r^2}{3R}$   
 (B) Magnetic field inside wire varies as  $\frac{\mu_0 J_0 R^2}{3r}$

- (C) Inside the conductor graph between magnetic field and radial distance is parabolic  
 (D) Outside the conductor graph between magnetic field and radial distance is hyperbolic.

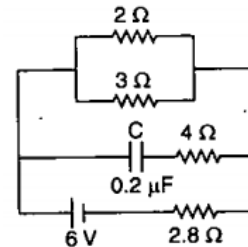
4. **CD**

5. In the loops shown in figure, all curved sections are either semicircles or quarter circles. All the loops carry same current. The magnetic fields at the centres have magnitudes  $B_1$ ,  $B_2$ ,  $B_3$  and  $B_4$ . Then,
- (A)  $B_4$  is maximum  
 (B)  $B_3$  is minimum  
 (C)  $B_4 > B_1 > B_2 > B_3$   
 (D)  $B_1 > B_4 > B_3 > B_2$



5. **ABC**

6. In the circuit shown,
- (A) a current of 0.9 A flows through  $2\ \Omega$  resistor when steady state is reached.  
 (B) a potential drop of 4.2 V appears across the resistance of  $2.8\ \Omega$ .  
 (C) a potential drop of 1.8 V appears across the capacitor C.  
 (D) a potential difference of 4.2 V appears across the capacitor C.



6. **ABC**

7. In a potentiometer wire experiment the emf of a battery in the primary circuit is 20V and its internal resistance is  $5\ \Omega$ . There is a resistance box in series with the battery and the potentiometer wire, whose resistance can be varied from  $120\ \Omega$  to  $170\ \Omega$ . Resistance of the potentiometer wire is  $75\ \Omega$ . The following potential differences can be measured using this potentiometer.

(A) 5V                      (B) 6V                      (C) 7V                      (D) 8V

7. **ABC**

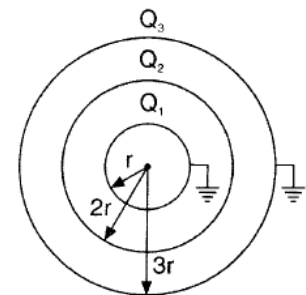
8. Three concentric conducting spherical shells A, B and C have radii  $r$ ,  $2r$  and  $3r$  and possess charges  $Q_1$ ,  $Q_2$  and  $Q_3$  respectively. The innermost and the outermost shells are earthed as shown in the figure. Select the mathematical relations between the charges that are correct.

(A)  $Q_1 + Q_3 = -Q_2$

(B)  $Q_1 = -\frac{Q_2}{4}$

(C)  $\frac{Q_3}{Q_1} = 3$

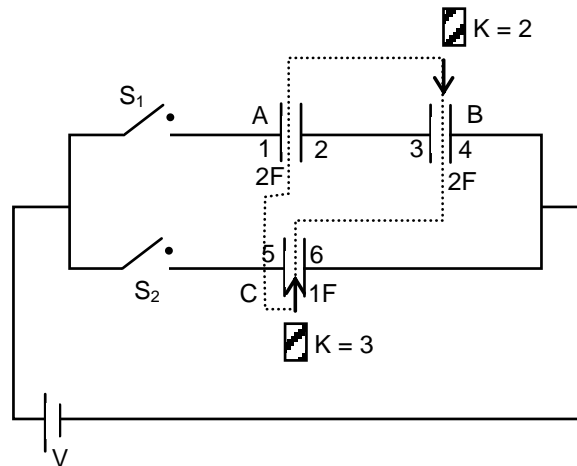
(D)  $\frac{Q_3}{Q_2} = -\frac{1}{3}$



8. **ABC**

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)**



Change in quantities between initial and final situation is given in list-I and its numerical value in list-II.

List-I		List-II	
(I)	Change in amount of + charge on capacitor	(P)	0
(II)	Change in energy	(Q)	$\frac{1}{3}$
(III)	Change in potential difference	(R)	$\frac{1}{36}$
(IV)	Final charge inside closed surface inclosing plate 2, 3 and 5 of different capacitor.]	(S)	$\frac{1}{6}$
		(T)	$\frac{1}{2}$

9.  $S_1$  is closed and  $S_2$  open, and  $V = 1$  volt. In initial situation capacity are given. When capacitors are fully charged then dielectric of dielectric constant shown in figure is inserted in capacitor B to fill space between plates completely for final situation. Then for capacitor B. Choose correct option

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

9. **A**

10. Now switch  $S_2$  is also closed and  $V = 1/6$  volt. In initial situation, capacitor C is completely charged then in final situation, dielectric is inserted completely as shown in figure for capacitor C.

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

10. **C**

**For Question (11 – 12)**

In list-I, circuit having different combination of capacitors are given and in list-II, value of  $C_{eq}$  or charge is given.

List-I (Circuit)		List-II ( $C_{eq}$ ) or Charge	
(I)		(P)	$\frac{3C}{4}$
(II)		(Q)	$\frac{5C}{12}$
(III)		(R)	$\frac{2C}{3}$
(IV)		(S)	$\frac{3C}{2}$

11. For equivalent capacitance between points A and B, match list-I with list-II  
 (A) I → S, II → Q, III → R, IV → P      (B) I → S, II → P, III → Q, IV → R  
 (C) I → S, II → P, III → R, IV → Q      (D) I → S, II → Q, III → P, IV → R

11. **B**

12. Cell of different EMF are connected between point B and D in all four case having potential difference  $\frac{1}{4}$  volt,  $\frac{3}{2}$  volt,  $\frac{5}{6}$  volt and  $\frac{2}{3}$  volt respectively in 1, 2, 3, 4 case. Match the column for charge given by cells

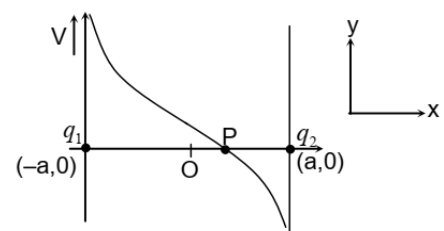
- (A) I → P, II → R, III → S, IV → Q      (B) I → R, II → P, III → Q, IV → S  
 (C) I → Q, II → S, III → P, IV → R      (D) I → P, II → S, III → Q, IV → R

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. The following curve represents the variation of potential at points on x-axis due to two-point charges  $q_1$  and  $q_2$  separated by a distance  $2a$ . Find the ratio of magnitude of two charges  $|q_2/q_1|$  (point O is origin and coordinates of point P is  $(\frac{a}{3}, 0)$ )

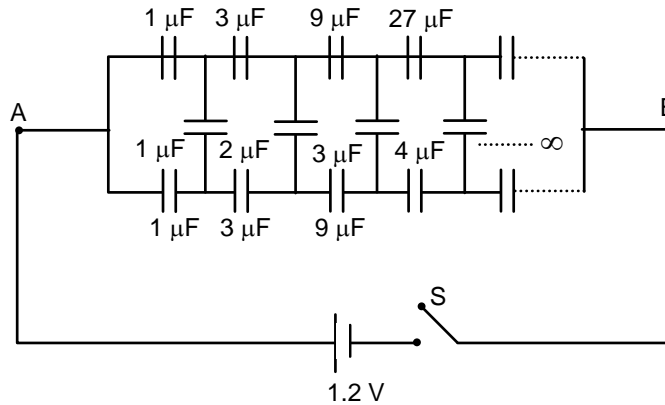


1. **0.50**

2. ABCD is a semi-circular wire carrying current in a region of uniform magnetic field. Arc AB = Arc BC = Arc CD. The magnitude of the force on the wire is 0.8 N, while magnitude of the force on arc AB alone is 0.9 N. The lines of action of these two forces inclined at an angle of  $\cos^{-1}\left(\frac{2}{3}\right)$ . Find the magnitude of the force (in N) on arc CD alone.

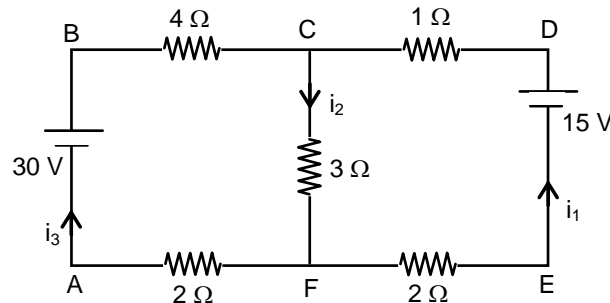
2. **0.70**

3. If the switch S is closed, then total charge supplied by the battery of  $E = 1.2$  Volt to the circuit is equal to .....



3. **1.60**

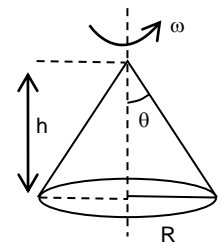
4. The figure shows a network of five resistances and two batteries



Ratio of current  $\frac{i_1}{i_2}$ .

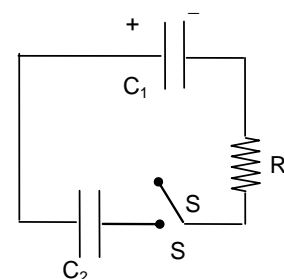
4. **0.25**

5. 'Q' charge is uniformly distributed over the surface of a right circular cone of semi-vertical angle  $\theta$  and height  $h$ . The cone is uniformly rotated about its axis at angular velocity  $\omega$ . Magnetic moment associated with the cone is found to be  $nQ\omega h^2 \tan^2 \theta$  where value of 'n' is



5. **0.25**

6. A charged capacitor  $C_1 = 12 \mu\text{F}$  with voltage 4 volt is connected to an uncharged capacitor  $C_2 = 4 \mu\text{F}$  and a resistance of  $4 \Omega$  as shown in diagram. The total heat generation across resistance is  $\Delta H = n \times 10^{-4}$  joule upto a time interval  $t_0$ . If at  $t = t_0$ , voltage across  $C_1$  is 3V. Then value of 'n' is:



6. **0.24**

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*ace For Rough Work*

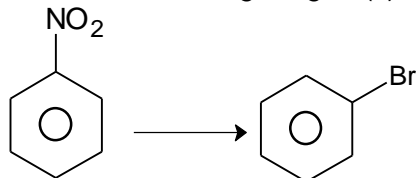
## SECTION - II : CHEMISTRY

### (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**.

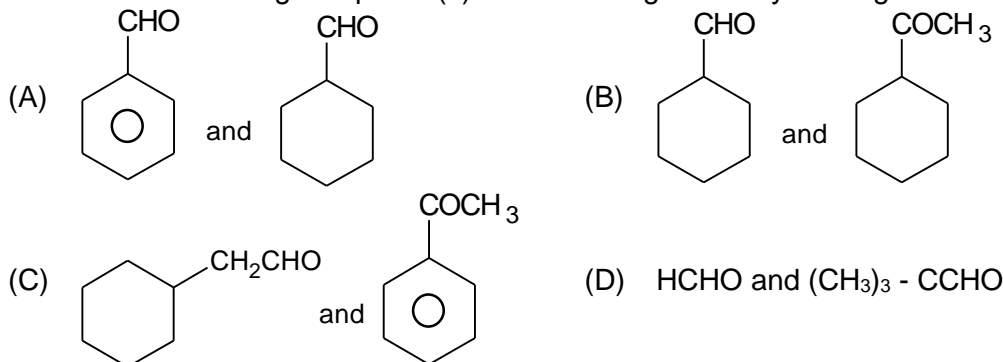
1. Which of the following reagent(s) is/are used to perform the given change?



- (A)  $\text{NaNO}_2/\text{HCl}$  (B)  $\text{Sn}/\text{HCl}$   
(C)  $\text{H}_3\text{PO}_2$  (D)  $\text{Br}_2/\text{Fe}$

1. **ABCD**

2. Which of the following compound(s) can be distinguished by Fehling's solution test?



2. **ABC**

3. In which of the following option the left side species is a better nucleophile than the right side species in aqueous solution?

- (A)  $\text{CH}_3\text{O}^-$ ,  $\text{PhO}^-$  (B)  $\text{I}^-$ ,  $\text{Cl}^-$   
(C)  $\text{SH}^-$ ,  $\text{OH}^-$  (D)  $\text{NO}_2^-$ ,  $\text{NO}_3^-$

3. **ABCD**

4. Which of the following compound(s) on reduction with  $\text{LiAlH}_4$  forms ethanol?

- (A)  $\text{CH}_3\text{CHO}$  (B)  $\text{CH}_3\overset{\text{O}}{\parallel}\text{COC}_2\text{H}_5$   
(C)  $\text{CH}_3\text{COOH}$  (D)  $\text{CH}_3\text{CH}_2\text{CN}$

4. **ABC**

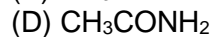
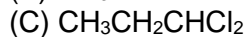
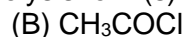
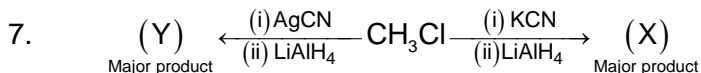
5. Which of the following compound(s) on hydrolysis form(s) more than one type of product?

- (A)  $\text{H}_2\text{N}-\text{CH}_2-\text{CONH}-\text{CH}_2-\text{COOH}$  (B)  $\text{CH}_3\text{COOC}_2\text{H}_5$   
(C)  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$  (sucrose) (D)  $\text{H}_2\text{N}-\underset{\text{CH}_3}{\text{CH}}\text{CONHCH}_2\text{COOH}$



5. **BCD**

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

6. **ABD**

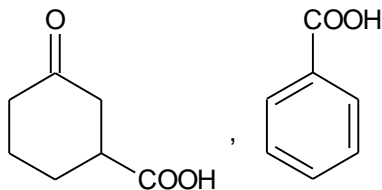
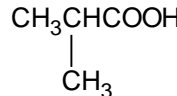
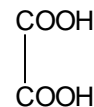
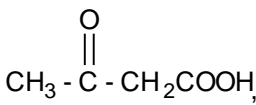
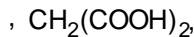
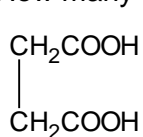
Choose correct statement(s) regarding the above reaction

(A) Product(s) (X) and (Y) are functional isomers

(B) (X) is more basic than (Y)

(C) (Y) is more basic than (X)

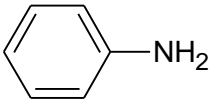
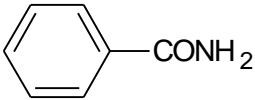
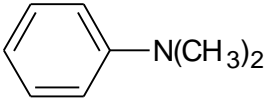
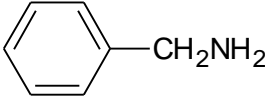
(D) (X) and (Y) contain same number of carbon atoms

7. **ACD**8. How many of the following substances evolve  $\text{CO}_2$  gas on heating?(A) 1  
(C) 3(B) 2  
(D) 48. **C**

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)		(P)	Responds to Hoffmann's bromamide reaction
(II)		(Q)	Undergoes carbylamine reaction
(III)		(R)	Can undergo dehydration reaction
(IV)		(S)	Forms alcohol when treated with NaNO2/HCl
		(T)	Does not react with CH3COCl for side chain substitution
		(U)	Forms diazonium salt, when reacts with NaNO2/HCl at cold condition

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

**For Question (11 – 12)**

Match the following &amp; answer accordingly:

		List- II	
(I)	$\begin{array}{c} \text{OH} \\   \\ \text{CH}_3 - \text{CH} - \text{CH}_3 \end{array}$	(P)	Undergoes dehydration on heating
(II)	$\begin{array}{c} \text{OH} \\   \\ \text{CH}_3 - \text{CH} - \text{CH}_2\text{COOH} \end{array}$	(Q)	Forms a ketone when heating over copper metal
(III)	$\begin{array}{c} \text{O} \\    \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH}_3 \end{array}$	(R)	Undergoes decarboxylation on heating
(IV)	$\begin{array}{c} \text{COOH} \\ / \\ \text{CH}_2 \\ \backslash \\ \text{COOH} \end{array}$	(S)	Forms on unsaturated acid upon heating
		(T)	Forms a tertiary alcohol when treated with Grignard reagent followed by hydrolysis
		(U)	When treated with Zn(Hg)/conc.HCl a hydrocarbon is formed

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

- (A) I → S (B) II → Q  
(C) III → P (D) IV → R

11. D

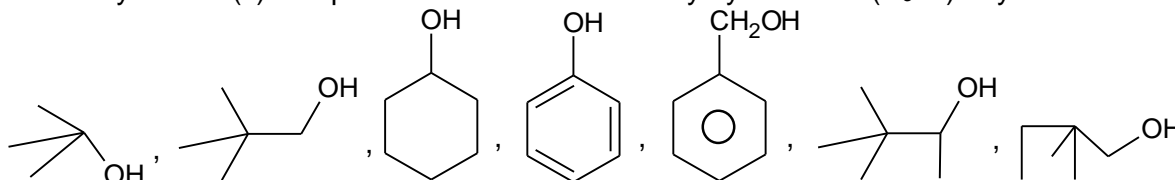
12. The correct matching between list-I and list-II is

- (A) I → Q (B) II → T  
(C) III → R (D) IV → P

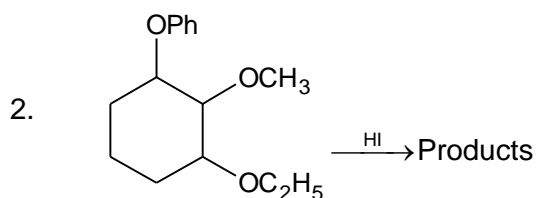
12. A

**(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, -0.30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking**.

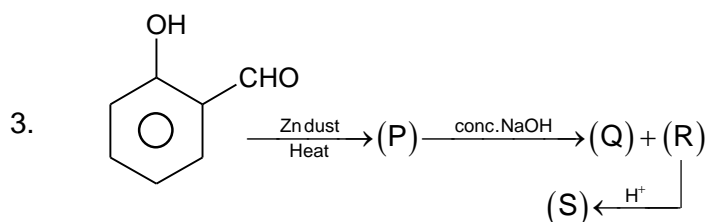
1. How many alcohol(s) and phenols is/are not formed by hydration of  $(\text{H}_3\text{O}^+)$  any alkene?

1. 4



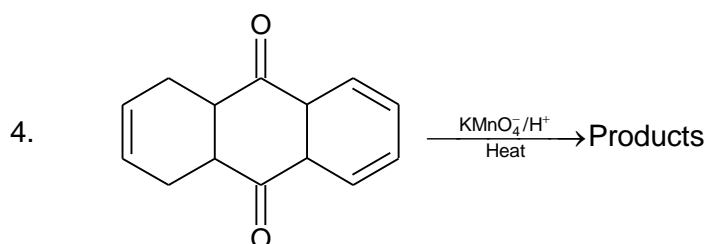
How many maximum number of moles of HI can be consumed by one mole of the above reactant?

2. **7**



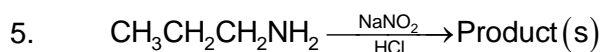
How many oxygen atom(s) is/are presenting (S)?

3. **2**



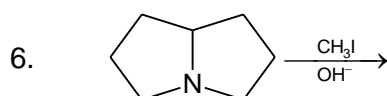
How many moles of carbon dioxide gas(es) is/are evolved in the above reaction?

4. **3**



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

5. **2**



How many exhaustive methylation step(s) is/are required to remove the nitrogen atom of above compound as trimethyl amine?

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. The angle between the tangents to the curves  $y = x^2$  and  $x = y^2$  at (1, 1) is

(A)  $\cos^{-1} \frac{4}{5}$

(B)  $\sin^{-1} \frac{3}{5}$

(C)  $\tan^{-1} \frac{3}{4}$

(D)  $\tan^{-1} \frac{1}{3}$

1. ABC

2. Which of the functions have domain R

(A)  $x^3 - 6x^2 + 8x + 7$

(B)  $3\sin x + 4\cos x$

(C)  $\tan x$

(D)  $\sec x$

2. AB

3. If  $f(x) = \begin{cases} -4\sin x + \cos x & \text{for } x \leq -\frac{\pi}{2} \\ a\sin x + b & \text{for } -\frac{\pi}{2} < x < \frac{\pi}{2} \\ \cos x + 2 & \text{for } x \geq \frac{\pi}{2} \end{cases}$  is continuous then:

(A)  $a = -1$

(B)  $b = 3$

(C)  $a = 1$

(D)  $b = -3$

3. AB

4. 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)

4. ACD

5. 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  $\frac{\pi}{2}$

(D)  $f(x)$  is an even function

5. ACD

6. For the curve  $y = be^{x/a}$ , which one of the following is **INCORRECT**

(A) Length of sub-tangent is constant

(B) Length of sub-normal is constant

(C) Length of tangent is constant

(D) Length of normal is constant

6. BCD

7. If  $\lim_{n \rightarrow \infty} \left( an - \frac{1+n^2}{1+n} \right) = b$ , where  $a$  is a finite number, then
- (A)  $a = 1$  (B)  $a = 0$   
 (C)  $b = 1$  (D)  $b = -1$

7. AC

8. Let  $f(x) = |x^2 - 3x - 4|$ ,  $-1 \leq x \leq 4$ , then

- (A)  $f(x)$  monotonically increases in  $\left(-1, \frac{3}{2}\right)$   
 (B)  $f(x)$  monotonically decreases in  $\left(\frac{3}{2}, 4\right)$   
 (C) local maximum value of  $f(x)$  is  $\frac{25}{4}$   
 (D) local minimum value of  $f(x)$  is 0

8. ABCD

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
(A)	$x \in [\pi, 2\pi] \Rightarrow  \tan^{-1}(\tan x) $ can be	(P)	$ x - 2\pi $
(B)	$x \in [\pi, 2\pi] \Rightarrow  \cot^{-1}(\cot x) $ can be	(Q)	$ x - \pi $
(C)	$x \in [-\pi, \pi] \Rightarrow  \sin^{-1}(\sin x) $ can be	(R)	$ x $
(D)	$x \in [-\pi, \pi] \Rightarrow  \cos^{-1}(\cos x) $ can be	(S)	$ x + \pi $
		(T)	$\frac{\pi}{2}$

9. Which is correct option?

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

9. C

10. Which is correct option?

- (A) I  $\rightarrow$  P, S (B) I  $\rightarrow$  QS  
 (C) III  $\rightarrow$  QRST (D) IV  $\rightarrow$  Q, R

10. C

**For Question (11 – 12)**

Match the following

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

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  $y = \frac{2^{\log_{2/4} x} - 3^{\log_{27}(x^2+1)} - 2x}{7^{4 \log_{49} x} - x - 1}$  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**