

FIITJEE INTERNAL TEST

PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 101032

Common Test-3

Time Allotted: 3 Hours

Maximum Marks: 180

- 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

- Attempt ALL the questions. Answers have to be marked on the OMR sheets.
- This question paper contains **Three Sections**.
- Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
- All the section can be filled in **PART-A & B** of OMR.
- Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
- 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

- Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
- 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.
- OMR sheet contains alphabets, numerals & special characters for marking answers.

C. Marking Scheme For All Two Parts.

- Part-A (01-04)** – Contains Four (04) multiple choice questions which have ONLY ONE CORRECT answer. Each question carries **+3 marks** for correct answer and **-1 marks** for wrong answer.
- PART-A (05–07)** contains (3) Multiple Choice Questions which have One or More Than One 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: -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.
- Part-A (08-10)** – This section contains Three (03) Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **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 **+4 Marks** for correct answer and **-1 marks** for wrong answer.
- Part-B** – This section contains **SIX (06)** questions numerical based questions. The answer to each question is a **NUMERICAL VALUE**. If the numerical value has more than two decimal places, truncate/round-off the value to **TWO** decimal places. Each question carries **+4 marks** for correct answer. **There is no negative marking.**

Name of the Candidate: _____

Batch: _____ Date of Examination: _____

Enrolment Number: _____

Batches – Two Year CRP(2426) Batches

SECTION – I: PHYSICS

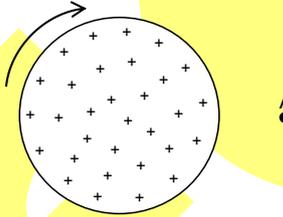
(PART – A)

(Single Correct Answer Type)

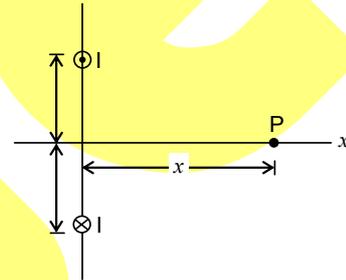
This section contains **4 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct**.

1. A charge particle having a charge q , is moving at right angles to a magnetic field. The quantity which varies is
 (A) Direction of motion (B) KE
 (C) speed (D) angular velocity

2. A positively charged disk is rotated clockwise as shown in figure. The direction of the magnetic field at point A in the plane of the disk is
 (A) pointing out of plane
 (B) pointing into the plane
 (C) towards right
 (D) towards left



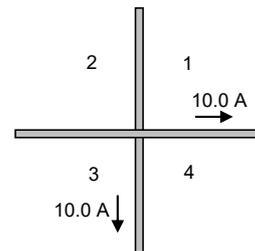
3. Figure shows an end view of two long, parallel wires perpendicular to the xy plane, each carrying a current I , but in opposite directions.



Find the expression for the magnitude of \vec{B} at any point on the x -axis in terms of the x -coordinate of the point.

- (A) $\frac{\sqrt{2} \mu_0 I a}{\pi(x^2 + a^2)}$ (B) $\frac{3 \mu_0 I a}{\pi(x^2 + a^2)}$ (C) $\frac{\mu_0 I a}{2\pi(x^2 + a^2)}$ (D) $\frac{\mu_0 I x}{\pi(x^2 + a^2)}$

4. Two very long, straight wires carrying, currents as shown in fig. Out of the four quadrant shown in the figure, in which quadrant the magnetic field is zero at some point.
 (A) 1
 (B) 2
 (C) 3
 (D) none of these



Space For Rough Work

(One or More Than One Options Correct Type)

This section contains **3 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.

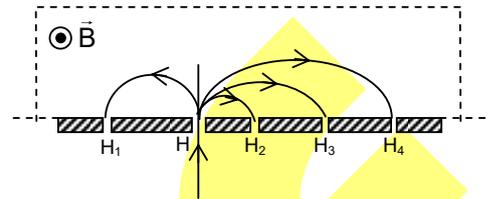
5. An electron and a proton are moving on straight parallel paths with same velocity. They enter a semi-infinite region of uniform magnetic field perpendicular to the velocity. Which of the following statement(s) is/are true?
(A) They will never come out of the magnetic field region.
(B) They will come out travelling along parallel paths.
(C) They will come out at the same time.
(D) They will come out at different times.
6. A charge particle of charge q and mass m is released from rest from origin in uniform field $\vec{E} = E_0 \hat{i}$ and $\vec{B} = B_0 \hat{j}$. Which of the following option(s) is/are correct?
(A) path of charge particle will be helix
(B) path of charge particle will be in $x - z$ plane
(C) Time period of charge particle that touches $z -$ axis is $\frac{2\pi m}{qB_0}$
(D) Maximum y co-ordinate of the particle is $\frac{2E_0 m}{qB_0^2}$
7. H^+ , He^+ and O^{++} ions having same kinetic energy pass through a region of space filled with uniform magnetic field B directed perpendicular to the velocity of ions. The masses of the ions H^+ , He^+ and O^{++} are respectively in the ratio $1 : 4 : 16$. As a result
(A) H^+ ions will be deflected most
(B) only O^{++} ions will be deflected least
(C) He^+ and O^{++} ions will suffer same deflection
(D) All ions will suffer the same deflection

Space For Rough Work

(Matching List Sets)

This section contains **Three (03)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **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.

8. Figure shows a region containing uniform magnetic field \vec{B} in the direction shown. Four charged particles P, Q, R & S enter through a hole H normal to \vec{B} with same velocity \vec{v} . There are four other holes H_1, H_2, H_3 and H_4 used as charge separators. P comes out through H_1 , Q through H_2 , R through H_3 and S through H_4 . Then (field is within the box shown)



List-I		List-II	
(P)	The negative charge(s) must be	(1)	P
(Q)	Amongst Q, R & S the specific charge is maximum for	(2)	Q
(R)	The speeds of all the particles when they come out of the field will be same for	(3)	R
(S)	The time taken by the particles to come out of the field will be maximum for	(4)	S

The correct option is:

- (A) $P \rightarrow 2$; $Q \rightarrow 1$; $R \rightarrow 1,2,3$; $S \rightarrow 2$ (B) $P \rightarrow 1$; $Q \rightarrow 2$; $R \rightarrow 1,2,3,4$; $S \rightarrow 4$
 (C) $P \rightarrow 1,2$; $Q \rightarrow 2,3$; $R \rightarrow 1$; $S \rightarrow 3$ (D) $P \rightarrow 1$; $Q \rightarrow 3$; $R \rightarrow 1,3,4$; $S \rightarrow 4$

9. Match the following:

	List - I Systems		List - II Paths of charge Particles
(P)	<p>The charge q is projected perpendicular to the electric field. Then it moves through the magnetic field</p>	(1)	
(Q)	<p>The charge is released from rest in a crossed \vec{B} and \vec{E}</p>	(2)	
(R)	<p>The charge is projected perpendicular to E in a crossed \vec{E} and \vec{B}</p>	(3)	
(S)	<p>The charge is projected at a non-zero angle $\theta (< 90^\circ)$ with the magnetic induction.</p>	(4)	
		(5)	

Which one of the following options is correct?

- (A) $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 4, S \rightarrow 2$ (B) $P \rightarrow 3, Q \rightarrow 1, R \rightarrow 5, S \rightarrow 4$
 (C) $P \rightarrow 3, Q \rightarrow 1, R \rightarrow 4, S \rightarrow 2$ (D) $P \rightarrow 4, Q \rightarrow 5, R \rightarrow 4, S \rightarrow 2$

10. Match the List-I with List-II.

List-I		List-II	
(P)	Magnetic flux density due to a current carrying circular coil is	(1)	Zero
(Q)	Magnetic flux density at a point on a current carrying thin wire is	(2)	Maximum at the centre
(R)	Electric field strength due to an uniformly charged ring is	(3)	Continuously decreases as we move away from the centre along the axis.
(S)	Electric potential due to an uniformly charged ring is	(4)	Continuously increases as we move away from the centre upto a definite distance along the axis.
		(5)	Constant along the axis.

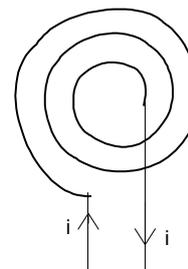
The correct option is:

- (A) $P \rightarrow 2,3 ; Q \rightarrow 4 ; R \rightarrow 5 ; S \rightarrow 3$ (B) $P \rightarrow 3 ; Q \rightarrow 5 ; R \rightarrow 1,2 ; S \rightarrow 3,4$
 (C) $P \rightarrow 2,3 ; Q \rightarrow 1 ; R \rightarrow 4 ; S \rightarrow 2,3$ (D) $P \rightarrow 3,4 ; Q \rightarrow 1 ; R \rightarrow 1,2 ; S \rightarrow 2,3$

(PART – B)

This section contains **SIX (06)** numerical based questions. The answer to each question is a NUMERICAL VALUE. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.

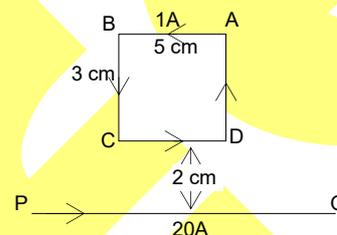
1. A thin insulate wire forms a plane spiral of $N = 100$ turns carrying a current $I = 2.3$ A. The inner and outer radii are equal to $a = 5$ cm and $b = 10$ cm. Find the magnetic field ($\ln 2 = 0.69$) at the centre of spiral [$\ln 2 = 0.69$]



2. A charged particle is projected in a magnetic field $\vec{B} = (x\hat{i} + 4\hat{j})10^{-2}$ T. The acceleration of the particle is found to be $\vec{a} = (16\hat{i} - 2\hat{j})\text{m/s}^2$. Find the value of 'x'.

Space For Rough Work

3. A charged particle is projected in a magnetic field $\vec{B} = (x\hat{i} + 4\hat{j})10^{-2} \text{ T}$. The acceleration of the particle is found to be $\vec{a} = \left(\frac{8}{3}\hat{i} - 2\hat{j}\right) \text{ m/s}^2$. Find the value of 'x'.
4. Two circular coils I and II of radii 20 and 40 cm are made from same wire and are connected in parallel. Find the ratio of the magnetic fields $\frac{B_2}{B_1}$ at their centres.
5. A current $I = 10 \text{ A}$ flows in a ring of radius $r_0 = 15 \text{ cm}$ made of a very thin wire. The tensile strength of the wire is equal to $T = 2.7 \text{ N}$. The ring is placed in a magnetic field, which is perpendicular to the plane of the ring so that the forces tend to break the ring. Find B (in T) at which the ring is broken.
6. A small rectangular loop of sides 5.0 cm and 3.0 cm carries a current of 1A. It is placed with its longer side parallel to a long straight conductor of length 5 cm at a distance of 2 cm from it. If current in the long conductor is 20 A, find the net force (in micro N) on the loop.

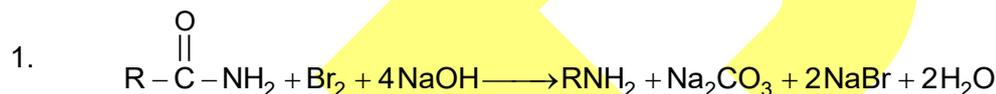


SECTION - II : CHEMISTRY

(PART - A)

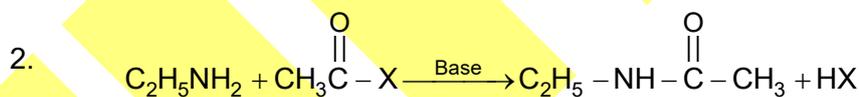
(Single Correct Answer Type)

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



Choose the incorrect statement for the reaction?

- (A) Migration of the alkyl group R takes place from carbon atom to nitrogen atom.
 (B) The product (amine) contains one carbon atom less than the reactant (amide).
 (C) It is a non-redox reaction
 (D) Bond breaking and bond making takes place in the reaction.



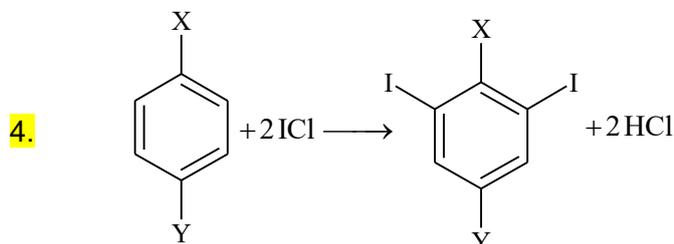
The rate of reaction becomes maximum if X is

- (A) OH (B) Cl (C) CH₃COO (D) NH₂

Space For Rough Work

3. The most acidic dipeptide formed at pH = 4 between glycine ($\text{NH}_2 - \text{CH}_2 - \text{COOH}$, $\text{pI} = 5.97$) and alanine ($\text{NH}_2 - \underset{\text{CH}_3}{\text{CH}} - \text{COOH}$, $\text{pI} = 6.21$) contains

- (A) two alpha hydrogen atoms with respect to the NH_2 group.
 (B) four alpha hydrogen atoms with respect to the peptide linkage.
 (C) two alpha hydrogen atoms with respect to the COOH group.
 (D) one alpha hydrogen atom with respect to the COOH group.



In above reaction X and Y are respectively

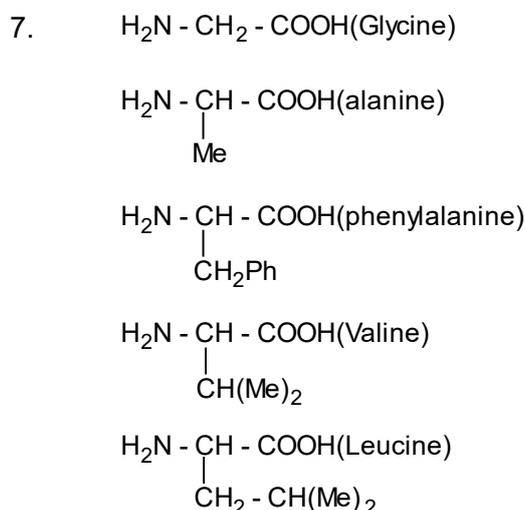
- (A) CH_3 and OH (B) CN and NO_2 (C) NH_2 and NO_2 (D) OCH_3 and OH

(One or More Than One Options Correct Type)

This section contains 3 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE** is correct.

5. D(+)-glucose
 (A) contains the most easily oxidizable functional group at C-1
 (B) forms a tetrahydroxy di-carboxylic acid when reacts with HNO_3
 (C) forms cyclohexane when reacts with conc. HI in presence of red phosphorus
 (D) undergoes dehydration reactions when heated with conc. H_2SO_4
6. $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{COO}^- \longrightarrow \text{CH}_3 - \text{CH} = \text{CH} - \text{COO}^-$
 Which reagent(s) do you need for above reaction?
 (A) NaOH (B) H_3O^+ (C) NaBH_4 (D) H_2O_2

Space For Rough Work



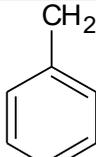
A pentapeptide is formed by combining all the given amino acids **without repetition**. What is/are the characteristic(s) of the peptide?

- (A) it can't form H_2O when reacts with NaOH .
 (B) it can't form N_2 gas when reacts with HNO_2 .
 (C) it can't undergo hydrolysis.
 (D) it can't produce CO_2 gas with NaHCO_3 .

(Matching List Sets)

This section contains **Three (03)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **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.

8. Match the lists.

	List - I (Compounds)	List - II (Reagents used to distinguish the compounds)
(P)	CH_2OH  and COOH 	(1) AgNO_3
(Q)	COCH_3  and NH_2 	(2) 2, 4-dinitrophenylhydrazine
(R)	OH  and $\text{CH} = \text{CH}_2$ 	(3) FeCl_3
(S)	CH_3  and CH_2Cl 	(4) NaHCO_3
		(5) KMnO_4/H^+

- (A) (P) \rightarrow (2), (Q) \rightarrow (1), (R) \rightarrow (3), (S) \rightarrow (5)
 (B) (P) \rightarrow (4), (Q) \rightarrow (5), (R) \rightarrow (4), (S) \rightarrow (1)
 (C) (P) \rightarrow (4), (Q) \rightarrow (2), (R) \rightarrow (3), (S) \rightarrow (1)
 (D) (P) \rightarrow (3), (Q) \rightarrow (2), (R) \rightarrow (4), (S) \rightarrow (5)

9. The amines given in List-I are treated with excess of CH_3I followed by treatment with hot aqueous Ag_2O to form alkenes as the products. Match the amines with the characteristic(s) of their products given in List-II

List - I		List - II	
(P)	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$	(1)	An internal mono alkene is formed
(Q)	$\text{CH}_3\text{CH}_2\text{NHCH}_2\text{CH}_3$	(2)	A terminal mono alkene is formed
(R)	$\text{CH}_3\text{CH}_2 - \underset{\text{NH}_2}{\text{CH}} - \text{C}(\text{CH}_3)_3$	(3)	The simplest alkene is formed
(S)	$\text{H}_2\text{NCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$	(4)	A terminal diene is formed
		(5)	The alkene shows geometrical isomerism

- (A) (P) \rightarrow (5), (Q) \rightarrow (2), (R) \rightarrow (1), (S) \rightarrow (4)
 (B) (P) \rightarrow (3), (Q) \rightarrow (2), (R) \rightarrow (5), (S) \rightarrow (4)
 (C) (P) \rightarrow (2), (Q) \rightarrow (3), (R) \rightarrow (1), (S) \rightarrow (4)
 (D) (P) \rightarrow (2), (Q) \rightarrow (3), (R) \rightarrow (5), (S) \rightarrow (4)

10. Match the lists.

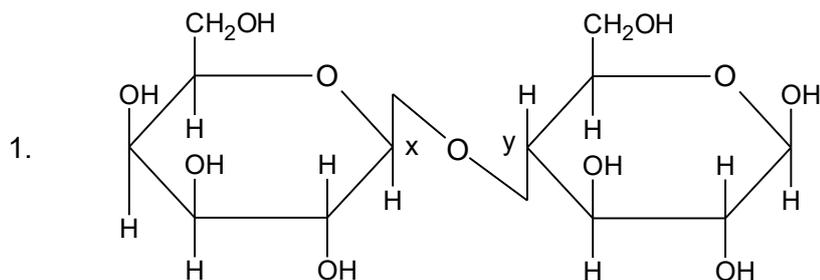
List - I (Reactions)		List - II (Products)	
(P)	$\text{CH}_3\text{COOH} \xrightarrow{\text{P}_4\text{O}_{10}}$	(1)	CH_3CN
(Q)	$\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2 - \text{COOH} \xrightarrow{\text{Heating}}$	(2)	$\text{CH}_3\text{CH}_2\text{NH}_2$
(R)	$\text{CH}_3\text{CONH}_2 \xrightarrow{\text{P}_4\text{O}_{10}}$	(3)	$\text{CH}_3\overset{\text{O}}{\parallel}\text{C} - \text{O} - \overset{\text{O}}{\parallel}\text{CCH}_3$
(S)	$\text{CH}_3\text{CONH}_2 \xrightarrow{\text{LiAlH}_4}$	(4)	$\text{CH}_3\text{CH} = \text{CHCOOH}$
		(5)	$(\text{CH}_3\text{CO})_2\text{O}_2$

- (A) (P) \rightarrow (5), (Q) \rightarrow (2), (R) \rightarrow (3), (S) \rightarrow (1)
 (B) (P) \rightarrow (3), (Q) \rightarrow (4), (R) \rightarrow (1), (S) \rightarrow (2)
 (C) (P) \rightarrow (5), (Q) \rightarrow (3), (R) \rightarrow (2), (S) \rightarrow (1)
 (D) (P) \rightarrow (3), (Q) \rightarrow (5), (R) \rightarrow (1), (S) \rightarrow (2)

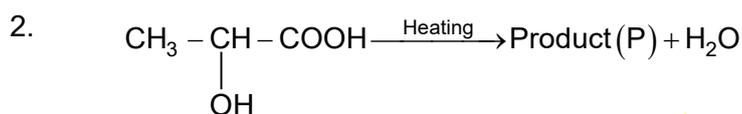
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(PART – B)

This section contains **SIX (06)** numerical based questions. The answer to each question is a NUMERICAL VALUE. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.

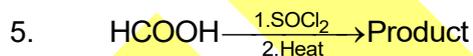
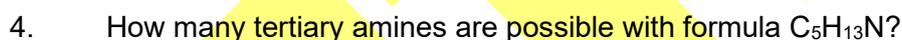
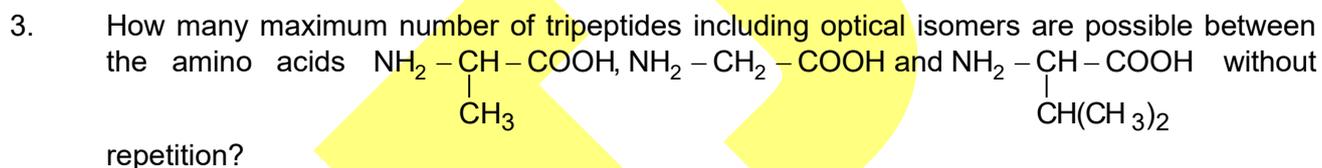


The structure of the disaccharide lactose is given above. If the carbon atoms at the linkages of the two monosaccharides are assigned number of x and y according to IUPAC nomenclature, what is the value of $(x + y)$?

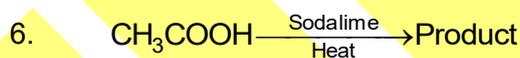


If x is the number of stereoisomers shown by product(P)
 y is the number of sides in the cyclic product(P) and
 z is the number of oxygen atom present in(P),

What is the value of $\left(\frac{x + y + z}{10}\right)$?



How many different type of gases are formed as product in above reaction?



If molar mass of the simplest product(organic) formed in above reaction is X , what is the value of $\frac{X}{10}$?

Space For Rough Work

SECTION – III : MATHEMATICS

(PART – A)

(Single Correct Answer Type)

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

1. Let $I(x) = \int \frac{x^2 (x \sec^2 x + \tan x)}{(x \tan x + 1)^2} dx$ if $I(0) = 0$, then $I\left(\frac{\pi}{4}\right)$ is equal to
- (A) $\log_e \frac{(\pi+4)^2}{16} - \frac{\pi^2}{4(\pi+4)}$ (B) $\log_e \frac{(\pi+4)^2}{16} + \frac{\pi^2}{4(\pi+4)}$
- (C) $\log_e \frac{(\pi+4)^2}{32} - \frac{\pi^2}{4(\pi+4)}$ (D) $\log_e \frac{(\pi+4)^2}{32} + \frac{\pi^2}{4(\pi+4)}$
2. The integral $\int \frac{\left(1 - \frac{1}{\sqrt{3}}\right)(\cos x - \sin x)}{\left(1 + \frac{2}{\sqrt{3}} \sin 2x\right)} dx$ is equal to
- (A) $\frac{1}{2} \log_e \left| \frac{\tan\left(\frac{x}{2} + \frac{\pi}{12}\right)}{\tan\left(\frac{x}{2} + \frac{\pi}{6}\right)} \right| + C$ (B) $\frac{1}{2} \log_e \left| \frac{\tan\left(\frac{x}{2} + \frac{\pi}{6}\right)}{\tan\left(\frac{x}{2} + \frac{\pi}{3}\right)} \right| + C$
- (C) $\log_e \left| \frac{\tan\left(\frac{x}{2} + \frac{\pi}{12}\right)}{\tan\left(\frac{x}{2} + \frac{\pi}{2}\right)} \right| + C$ (D) $\frac{1}{2} \log_e \left| \frac{\tan\left(\frac{x}{2} - \frac{\pi}{12}\right)}{\tan\left(\frac{x}{2} - \frac{\pi}{6}\right)} \right| + C$
3. The integral $\int_0^1 \frac{1}{7^{\lfloor x \rfloor}} dx$, where $\lfloor \cdot \rfloor$ denotes the greatest integer function, is equal to
- (A) $1 + 6 \log_e \left(\frac{6}{7}\right)$ (B) $1 - 6 \log_e \left(\frac{6}{7}\right)$ (C) $\log_e \left(\frac{7}{6}\right)$ (D) $1 - 7 \log_e \left(\frac{6}{7}\right)$
4. Let $f(x) = \int_0^x g(t) dt$, where g is a non-zero even function. If $f(x+5) = g(x)$, then $\int_0^x f(t) dt$ equals
- (A) $\int_{x+5}^5 g(t) dt$ (B) $5 \int_{x+5}^5 g(t) dt$ (C) $\int_5^{x+5} g(t) dt$ (D) $2 \int_5^{x+5} g(t) dt$

Space For Rough Work

(One or More Than One Options Correct Type)

This section contains **3 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.

5. $\int \frac{x dx}{x^4 + x^2 + 1}$ equals

(A) $\frac{2}{3} \tan^{-1} \left(\frac{2x^2 + 1}{\sqrt{3}} \right) + C$

(B) $\frac{1}{\sqrt{3}} \left[\tan^{-1} \left(\frac{2x-1}{\sqrt{3}} \right) - \tan^{-1} \left(\frac{2x+1}{\sqrt{3}} \right) \right] + C$

(C) $\frac{1}{\sqrt{3}} \tan^{-1} \left(\frac{2x^2 + 1}{\sqrt{3}} \right) + C$

(D) $\frac{1}{\sqrt{3}} \left[\tan^{-1} \left(\frac{2x-1}{\sqrt{3}} \right) + \tan^{-1} \left(\frac{2x+1}{\sqrt{3}} \right) \right] + C$

6. Let $f(x) = \begin{cases} x+1, & 0 \leq x \leq 1 \\ 2x^2 - 6x + 6, & 1 < x \leq 2 \end{cases}$ and $g(t) = \int_{t-1}^t f(x) dx$ for $t \in [1, 2]$. Which of the following hold(s) good?

(A) $f(x)$ is continuous and differentiable in $[0, 2]$

(B) $g'(t)$ vanishes for $t = \frac{3}{2}$ and 2

(C) $g(t)$ is maximum at $t = \frac{3}{2}$

(D) $g(t)$ is minimum at $t = 1$

7. Let $I = \int_0^1 \sqrt{\frac{1+\sqrt{x}}{1-\sqrt{x}}} dx$ and $J = \int_0^1 \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}} dx$, then the correct statement is/are:

(A) $I+J=2$

(B) $I-J=\pi$

(C) $I = \frac{2+\pi}{2}$

(D) $J = \frac{4-\pi}{2}$

Space For Rough Work

(Matching List Sets)

This section contains **Three (03)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **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.

8. Match each entry in **List – I** to the correct entry in **List – II**.

	List – I		List – II
(P)	If $I = \int_2^3 ((x-1)^3 + (4-x)^3 + x) \cos \pi x dx$, then $ 50\pi^2 I $ is equal to	(1)	0
(Q)	If $J = \int_0^{10} \operatorname{sgn}(\sin \pi x) dx$, then $10J$ is equal to, where $\operatorname{sgn} x$ denotes signum function of x	(2)	100
(R)	If $K = \int_0^{102} [\cot^{-1} x] dx$, then $[K]$ is equal to, where $[y]$ denotes largest integer less than or equal to y	(3)	50
(S)	If $L = \frac{\int_0^{51} [x+25] dx}{\int_0^{51} \{x+25\} dx}$, then $\frac{L}{2}$ is equal to, (where $[.]$ is G.I.F. and $\{.\}$ is F.P.F)	(4)	70
		(5)	15

The correct option is

- (A) $P \rightarrow (4)$ $Q \rightarrow (2)$ $R \rightarrow (5)$ $S \rightarrow (1)$ (B) $P \rightarrow (2)$ $Q \rightarrow (4)$ $R \rightarrow (1)$ $S \rightarrow (5)$
 (C) $P \rightarrow (3)$ $Q \rightarrow (3)$ $R \rightarrow (4)$ $S \rightarrow (4)$ (D) $P \rightarrow (2)$ $Q \rightarrow (1)$ $R \rightarrow (1)$ $S \rightarrow (3)$

9. Match each entry in **List – I** to the correct entry in **List – II**.

	List – I		List – II
(P)	Let $f(x)$ is a continuous function. If $f(1)=1$ and $\int_0^x t.f(2x-t)dt = \frac{1}{2} \tan^{-1}(x^2)$, then the value of $4 \int_1^2 f(x) dx$ is equal to	(1)	0
(Q)	Let $f(x) = \prod_{r=1}^{2009} (x-r)$, then the value of the definite integral $\int_1^{2009} f(x) dx$ is equal to	(2)	1
(R)	If $\int_0^{\ln 10} \frac{e^x \sqrt{e^x - 1}}{e^x + 8} dx$ has the value equal to $(a - b\pi)$, then $\frac{a}{b}$ equals	(3)	2
(S)	Suppose g is the inverse function of a differentiable function f and $G(x) = \frac{1}{g(x)}$. If $f(4) = 2$ and $f'(4) = \frac{1}{16}$ then $(G'(2))^2$ equals	(4)	3
		(5)	4

The correct option is

- (A) $P \rightarrow (4)$ $Q \rightarrow (2)$ $R \rightarrow (5)$ $S \rightarrow (1)$ (B) $P \rightarrow (4)$ $Q \rightarrow (1)$ $R \rightarrow (5)$ $S \rightarrow (2)$
 (C) $P \rightarrow (3)$ $Q \rightarrow (3)$ $R \rightarrow (4)$ $S \rightarrow (4)$ (D) $P \rightarrow (1)$ $Q \rightarrow (5)$ $R \rightarrow (3)$ $S \rightarrow (4)$

10. Match each entry in **List – I** to the correct entry in **List – II**.

	List – I		List – II
(P)	The function $f(x) = \frac{e^{x \cos x} - 1 - x}{\sin x^2}$ is not defined at $x = 0$. The value of $f(0)$ so that f is continuous at $x = 0$ is	(1)	-1
(Q)	The value of the definite integral $\int_0^1 \frac{dx}{\sqrt{x} + \sqrt[3]{x}}$ equals $a + b \ln 2$, where a and b are integers then $(a + b)$ equals	(2)	0
(R)	Given $e^n \int_0^n \frac{\sec^2 \theta - \tan \theta}{e^\theta} d\theta = 1$ then the value of $\tan(n)$ is equal to	(3)	$\frac{1}{2}$
(S)	Let $a_n = \int_{\frac{1}{n+1}}^{\frac{1}{n}} \tan^{-1}(nx) dx$ and $b_n = \int_{\frac{1}{n+1}}^{\frac{1}{n}} \sin^{-1}(nx) dx$ then $\lim_{n \rightarrow \infty} \frac{a_n}{b_n}$ has the value equal to	(4)	1
		(5)	3

The correct option is

(A) $P \rightarrow (3)$ $Q \rightarrow (1)$ $R \rightarrow (4)$ $S \rightarrow (2)$

(B) $P \rightarrow (2)$ $Q \rightarrow (4)$ $R \rightarrow (1)$ $S \rightarrow (5)$

(C) $P \rightarrow (3)$ $Q \rightarrow (3)$ $R \rightarrow (4)$ $S \rightarrow (4)$

(D) $P \rightarrow (1)$ $Q \rightarrow (5)$ $R \rightarrow (3)$ $S \rightarrow (4)$

(PART – B)

This section contains **SIX (06)** numerical based questions. The answer to each question is a NUMERICAL VALUE. If the numerical value has more than two decimal places, truncate/round-off the value to TWO decimal places.

1. If $\int \frac{\cos x - \sin x}{\sqrt{8 - \sin 2x}} dx = a \sin^{-1} \left(\frac{\sin x + \cos x}{b} \right) + c$, where c is a constant of integration, then $a + b$ is

2. $f(x) = \int \frac{5x^8 + 7x^6}{(x^2 + 1 + 2x^7)^2} dx, (x \geq 0), f(0) = 0$ and $f(1) = \frac{1}{K}$, then the value of K is

3. Let f be a twice differentiable function on \mathbb{R} . If $f'(0) = 4$ and

$$f(x) + \int_0^x (x-t)f'(t) dt = (e^{2x} + e^{-2x}) \cos 2x + \frac{2}{a} x, \text{ then } (2a+1)^5 a^2 \text{ is equal to}$$

4. Let $f(x) = \max \{|x+1|, |x+2|, \dots, |x+5|\}$. Then $\int_{-6}^0 f(x) dx$ is equal to _____

5. If $n(2n+1) \int_0^1 (1-x^n)^{2n} dx = 1177 \int_0^1 (1-x^n)^{2n+1} dx$, then $n \in \mathbb{N}$ is equal to _____.

6. Let $[t]$ denote the greatest integer less than or equal to t . Then the value of $\int_1^2 |2x - [3x]| dx$ is _____.

Space For Rough Work

FIITJEE INTERNAL TEST

Batches – Two Year CRP(2426) Batches

Common Test – 3

Code: 101032

JEE ADVANCED LEVEL

ANSWER KEY

ANSWER KEYS

Physics

PART – A

- | | | | |
|-------|-------|-------|------|
| 1. A | 2. A | 3. D | 4. B |
| 5. BD | 6. BC | 7. AC | 8. B |
| 9. C | 10. C | | |

PART – B

- | | | | |
|---------|---------|---------|---------|
| 1. 2.00 | 2. 0.50 | 3. 3.00 | 4. 0.25 |
| 5. 1.80 | 6. 6.00 | | |

Chemistry

PART – A

- | | | | |
|--------|-------|--------|------|
| 1. C | 2. B | 3. C | 4. C |
| 5. ABD | 6. AB | 7. ABD | 8. C |
| 9. C | 10. B | | |

PART – B

- | | | | |
|------|--------|-------|------|
| 1. 5 | 2. 1.2 | 3. 24 | 4. 3 |
| 5. 3 | 6. 1.6 | | |

Mathematics

PART – A

- | | | | |
|-------|--------|-------|------|
| 1. C | 2. A | 3. A | 4. A |
| 5. BC | 6. BCD | 7. BD | 8. D |
| 9. B | 10. A | | |

PART – B

- | | | | |
|-------|------|------|-------|
| 1. 4 | 2. 4 | 3. 8 | 4. 21 |
| 5. 24 | 6. 1 | | |