FIITJEE INTERNAL Common Test

BATCHES – Two Year CRP(2325) Batches

PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 100723 | **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

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. All the section can be filled in **PART-A & B** of 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 Parts.

(i) **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.

(ii) **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 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.

(iii) **Part-A (08-11) –** This section contains Four (04) 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 **+3 Marks** for correct answer and **-1 marks** for wrong answer.

(iii) **Part-B (01-06)** This section contains **SIX (06)** questions. The answer to each question is a **NON-NEGATIVE INTEGER**. For each question, enter the correct integer corresponding to the answer. Each question carries **+4 marks** for correct answer. **There is no negative marking.**

Name of the Candidate: _____

Batch: _____ **Date of Examination:** _____

Enrolment Number: _____

SECTION – II : 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.**

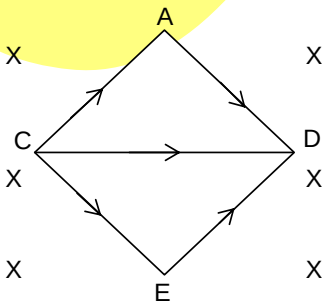
1. Each of two long parallel wires carries a constant current i along the same direction. The wires are separated by a distance 2l. The magnitude of resultant magnetic induction in the symmetric plane of this system located between the wire at a distance R from each wire will be

(A) $\frac{\mu_0 i}{\pi R}$ (B) $\frac{\mu_0 i}{2\pi R}$ (C) $\frac{\mu_0 i}{\pi\sqrt{R^2 - l^2}}$ (D) $\frac{\mu_0 i}{\pi R}\sqrt{1-\frac{l^2}{R^2}}$

2. A positively charged (+q) particle of mass m has kinetic energy K enters vertically downward in a horizontal field of magnetic induction $\vec{B}$. The acceleration of the particle is (neglect gravity)

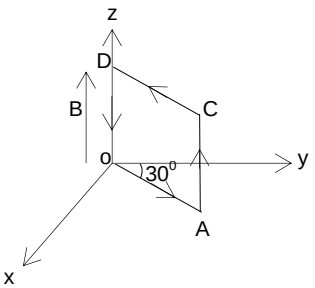
(A) $qB\sqrt{\frac{2K}{m}}$ (B) $\frac{qB\sqrt{2K}}{(m)^{3/2}}$ (C) $\frac{2qB}{(m)^{3/2}}\sqrt{2K}$ (D) $2qB\sqrt{\frac{2K}{m}}$

3. Constant current of 1A flows along three branches of wire frame as shown . The frame is a combination of two equilateral triangles ACD and CDE of side 1m. It is placed in uniform magnetic field B = 4T acting perpendicular to the plane of paper. The magnitude of magnetic force acting on the frame is



(A) 12 N (B) 24 N
(C) 36 N (D) Zero

4. A uniform magnetic field B = 0.3 T is established along the positive direction of Z – axis. A rectangular loop of sides 10 cm and 5 cm carries a current of 12 A. The torque acting on the loop shown in figure is



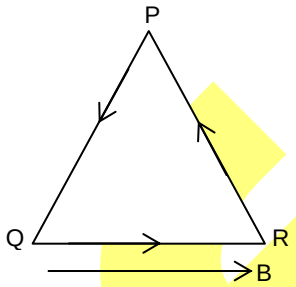
(A) $0.9\times10^{-2}\text{N}-\text{m}$
(B) $1.8\times10^{-2}\text{N}-\text{m}$
(C) $2.4\times10^{-2}\text{N}-\text{m}$
(D) Zero

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 equilateral triangular loop PQR of side l carries a currents i in the direction shown. The loop is kept in uniform magnetic field B, directed parallel to the base of triangle QR as shown. Net force F and torque τ acting on loop is



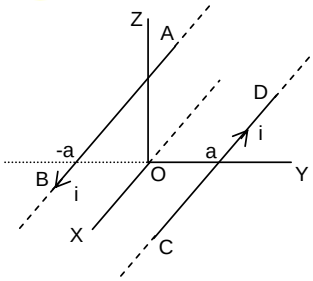
(A) F = 0 (B) F = $\sqrt{3}$ ilB

(C) τ = 0 (D) $\tau = \frac{\sqrt{3}l^2iB}{4}$

6. A proton is fired form origin with velocity $\vec{v} = v_0\hat{j} + v_0\hat{k}$ in a uniform magnetic field $\vec{B} = B_0\hat{j}$.

In the subsequent motion of the proton
(A) its z coordinate can never be negative
(B) its x coordinate can never be positive
(C) its x and z coordinates cannot be zero at the same time
(D) its y coordinate will be proportional to its time of flight.

7. Two long parallel wires, AB and CD, carry equal currents in opposite directions. They lie in the xy plane, parallel to the x-axis, and pass through the points (0, -1, 0) and (0, 1, 0) respectively. The resultant magnetic field is
(A) zero on the x-axis
(B) maximum on the x-axis
(C) directed along the z-axis at the origin, but not at other points on the z-axis
(D) directed along the z-axis at all points on the z-axis



Space For Rough Work

(Matching List Sets)

This section contains **FOUR (04)** 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.

List-I		List-II	
(P)	A charge particle is moving in uniform electric and magnetic field in gravity free space.	(1)	Velocity of the particle may be constant.
(Q)	A charge particle is moving in uniform electric magnetic and gravitational field.	(2)	Path of particle may be straight line.
(R)	A charge particle is moving in uniform magnetic and gravitational field (where electric field is zero)	(3)	Path of particle may be circular.
(S)	A charge particle is moving in only uniform electric field	(4)	Path of particle may be helical.
		(5)	Path of particle must be parabolic.

The correct option is:
(A) P $\rightarrow$ 1,2,4 ; Q $\rightarrow$ 2,3,4 ; R $\rightarrow$ 2 ; S $\rightarrow$ 4
(B) P $\rightarrow$ 1,2,4 ; Q $\rightarrow$ 1,2,3,4 ; R $\rightarrow$ 1,2,4 ; S $\rightarrow$ 2
(C) P $\rightarrow$ 1,2,4 ; Q $\rightarrow$ 3,4 ; R $\rightarrow$ 3 ; S $\rightarrow$ 2,5
(D) P $\rightarrow$ 3,4 ; Q $\rightarrow$ 2 ; R $\rightarrow$ 5 ; S $\rightarrow$ 1,2

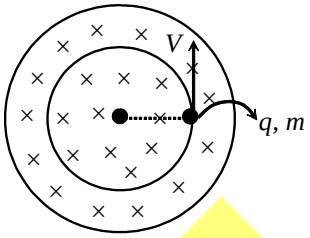
9. Two long parallel wires carrying equal currents in opposite directions are placed at $x = \pm a$ parallel to *Y*-axis with $z = 0$. Then

List-I		List-II	
(P)	Magnetic field B_1 at origin *O*	(1)	$\frac{\mu_0 i}{3\pi a}$
(Q)	Magnetic field B_2 at *P* (2*a*, 0, 0)	(2)	$\frac{\mu_0 i}{4\pi a}$
(R)	Magnetic field at *M* (*a*, 0, 0)	(3)	$\frac{\mu_0 i}{\pi a}$
(S)	If wire carries current in the same direction, then magnetic field at origin	(4)	zero
		(5)	none

The correct option is:
(A) P $\rightarrow$ 3 ; Q $\rightarrow$ 1 ; R $\rightarrow$ 4 ; S $\rightarrow$ 2
(B) P $\rightarrow$ 2 ; Q $\rightarrow$ 1 ; R $\rightarrow$ 5 ; S $\rightarrow$ 3
(C) P $\rightarrow$ 3 ; Q $\rightarrow$ 5 ; R $\rightarrow$ 2 ; S $\rightarrow$ 1
(D) P $\rightarrow$ 3 ; Q $\rightarrow$ 1 ; R $\rightarrow$ 2 ; S $\rightarrow$ 2

Space For Rough Work

10. The central cross-section of a long cylindrical region containing uniform but time varying magnetic field B is shown. A particle of constant mass and variable positive charge moves in a circle in the plane, so that the radius of the circle remains constant.



List-I		List-II	
(P)	If the magnetic field is increased by 2%, the speed of the particle will	(1)	decrease
(Q)	If the magnetic field is decreased by 4%, the speed of the particle will	(2)	increase
(R)	If the magnetic field is increased by 2%, the charge of the particle will	(3)	change by 1%
(S)	If the magnetic field is decreased by 4%, the charge of the particle will	(4)	change by 2%
		(5)	change by 3%

The correct option is:
(A) P $\rightarrow$ 2,3 ; Q $\rightarrow$ 1,4 ; R $\rightarrow$ 1,3 ; S $\rightarrow$ 2,4 (B) P $\rightarrow$ 2.3 ; Q $\rightarrow$ 1.5 ; R $\rightarrow$ 3 ; S $\rightarrow$ 2,4
(C) P $\rightarrow$ 1,5 ; Q $\rightarrow$ 3,4 ; R $\rightarrow$ 2 ; S $\rightarrow$ 2,4 (D) P $\rightarrow$ 2 ; Q $\rightarrow$ 3,4 ; R $\rightarrow$ 1,2 ; S $\rightarrow$ 3

11. 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

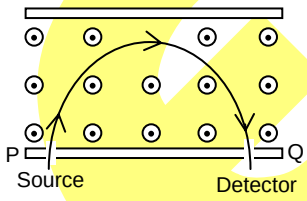
Space For Rough Work

(PART – B)

(Non – Negative Integer)

1. A charged particle is projected in a magnetic field $\vec{B} = \left(x\hat{i} + 4\hat{j}\right)10^{-2}\,T$. The acceleration of the particle is found to be a $\vec{a} = \left(\frac{8}{3}\hat{i} - 2\hat{j}\right) m/s^2$. Find the value of 'x'.

2. A uniform magnetic field with a slit system as shown in the figure is to be used as a momentum filter for high energy charged particles (enter and exit perpendicular to PQ) . With a field of B tesla it is found that the filter transmits α particle each of energy 2.2 MeV. The magnetic field is increased to 2.13B tesla and deuteron ions are passed into the filter. What is the approximate energy (In MeV) of each deuteron ions transmitted by the filter?

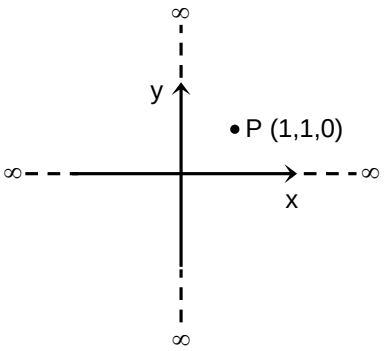


3. Two circular coils of radii 5 cm and 10 cm carry equal current of 2 A in opposite sense . The coils have 50 and 100 turns respectively and are placed in such a way that they lie in same plane and their centres coincide. Magnitude of magnetic field(in Tesla) at the common centre of coils is

4. A steady current I goes through a wire loop PQR having shape of a right angle triangle with PQ = 3x, PR = 4x and QR = 5x. If the magnitude of the magnetic moment is k(Ix^2). Find the value of k.

5. A particle having a mass of 0.5 g carries a charge 2.5×10^{-8} C. The particle is given an initial horizontal velocity of $4\times10^4 ms^{-1}$. To keep the particle moving in a horizontal direction, the minimum value of magnetic field (in Tesla) should be (take acceleration due to gravity = 10 m/s^2)

6. There are two infinitely long & broad sheets, one is lying on xz plane and another one is lying on yz plane. In both the sheets, current is moving in positive z direction having linear density (current per unit perpendicular length) equal to $\frac{\sqrt{2}}{\pi}\times10^7$ Ampere/meter. Find the magnitude of magnetic field (in Tesla) at point P shown in the figure.



Space For Rough Work

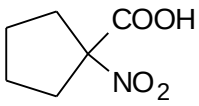
SECTION – I : CHEMISTRY

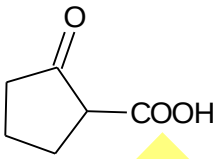
(PART – A)

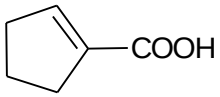
(Single Correct Answer Type)

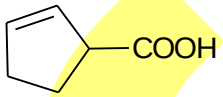
This section contains **4 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

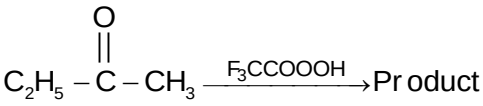
1. Which of the following compound undergo decarboxylation relatively less as compared to other compounds?

(A) 

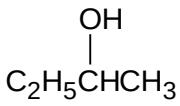
(B) 

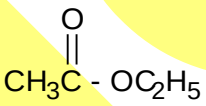
(C) 

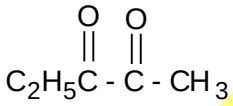
(D) 

2. 

The organic product of above reaction is:

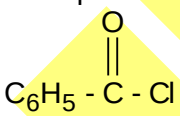
(A) 

(B) 

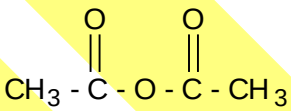
(C) 

(D) $CH_3CH_2COOCH_3$

3. Which one of the following compounds gives carboxylic acid with HNO_2? But not with water at room temperature or on mild heating?

(A) 

(B) $C_6H_5CONH_2$

(C) 

(D) $CH_3COOC_2H_5$

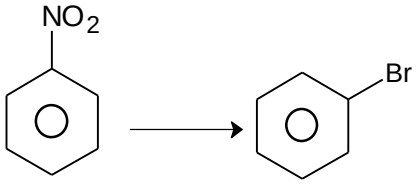
4. Which of the following polymers of glucose is stored by animals?
(A) Cellulose (B) Amylose (C) Amylopectin (D) Glycogen

Space For Rough Work

(One or More Than One Options Correct Type)

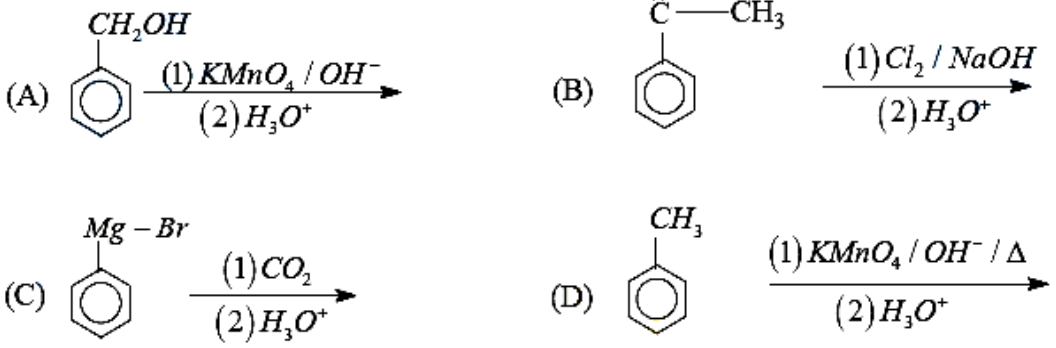
This section contains **3 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE is correct.**

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



(A) $NaNO_2/HCl$ (B) Sn/HCl
(C) H_3PO_2 (D) Br_2/Fe

6. In which of the following reactions benzoic acid is the product?



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

(A) $H_2N – CH_2 – CONH – CH_2 – COOH$ (B) $CH_3COOC_2H_5$

(C) $C_{12}H_{22}O_{11}$ (sucrose) (D) $H_2N - CHCONHCH_2COOH$ (CH3 branch)

Space For Rough Work

(Matching List Sets)

This section contains **FOUR (04)** 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 substance mentioned in list-I with the characteristic of their products produced on heating them as mentioned in list-II.

List – I (Heating of the reactant)		**List– II (Characteristic of product)**	
(P)	CH_3CHCH_2COOH (OH on 2nd C)	(1)	The product exists in more than one isomeric form in water
(Q)	$CH_3CHCOOH$ (OH on 2nd C)	(2)	The product can add H_2/Ni and decolourise bromine water
(R)	$CH_3 - C(=O) - CH_2 - COOH$	(3)	Reaction of product with Zn-Hg/Conc.HCl form cyclohexane
(S)	$HOOC - (CH_2)_5 - COOH$	(4)	A cyclic compound is formed which shows geometrical isomerism
		(5)	The product is formed by dehydration reaction

(A) P → 2; Q → 4; R → 1; S → 3
(B) P → 4; Q → 1; R → 3; S → 5
(C) P → 4; Q → 2; R → 1; S → 3
(D) P → 2; Q → 3; R → 1; S → 4

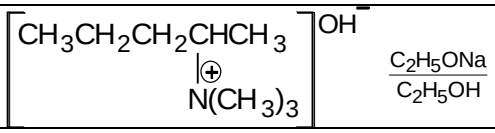
9. Match the substance mentioned in list-I with the characteristic of their products produced on heating them as mentioned in list-II.

List – I (Test reagents for glucose)		**List– II (Confirmation of the structure)**	
(P)	Br_2/H_2O	(1)	Presence of five OH groups
(Q)	Conc.HI/red phosphorus	(2)	Presence of primary alcoholic group
(R)	$(CH_3CO)_2O$	(3)	Presence of aldehyde group
(S)	HNO_3	(4)	Presence of a straight chain of six carbon atoms
		(5)	Presence of four secondary OH groups

(A) P → 2; Q → 4; R → 3; S → 2
(B) P → 2; Q → 5; R → 4; S → 1
(C) P → 3; Q → 4; R → 1; S → 2
(D) P → 3; Q → 5; R → 2; S → 1

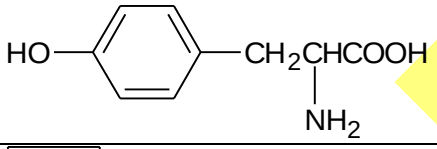
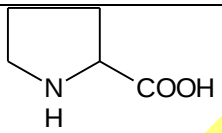
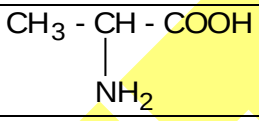
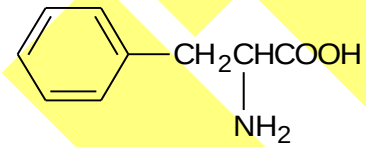
Space For Rough Work

10. Match the reactions in list-I with their products in list-II.

List – I		List– II	
(P)	$CH_3CH_2CONH_2 \xrightarrow{Br_2/KOH}$	(1)	C_2H_5CN
(Q)	$CH_3CH_2CONH_2 \xrightarrow{P_4O_{10}}$	(2)	CH_3NH_2
(R)		(3)	$C_2H_5NH_2$
(S)	$CH_3CH_2CH_2CONHCH_3 \xrightarrow{OH^-}$	(4)	C_5H_{10}
		(5)	$N(CH_3)_3$

(A) P → 2; Q → 1; R → 5; S → 3
(B) P → 3; Q → 2; R → 1; S → 4
(C) P → 3; Q → 1; R → 4; S → 2
(D) P → 2; Q → 3; R → 4; S → 2

11. Match lists.

List – I (Amino acids)		List– II (Chemical properties)	
(P)		(1)	Heating with sodalime followed by treatment with HNO_2 forms a nitroso compound
(Q)		(2)	Reaction with excess CH_2N_2/hv forms a product which contains ether and ester functional groups in addition of NH_2 group
(R)		(3)	Treatment with HNO_2 forms an α-hydroxy acid which undergoes cyclisation on heating
(S)		(4)	Heating with sodalime results in the formation of a primary amine
		(5)	Heating results in a keto acid

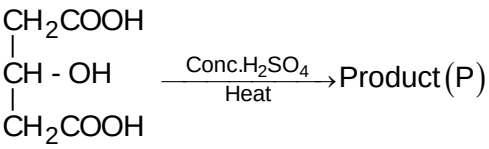
(A) P → 2; Q → 3; R → 5; S → 4
(B) P → 2; Q → 1; R → 3; S → 4
(C) P → 5; Q → 2; R → 1; S → 4
(D) P → 4; Q → 1; R → 5; S → 3

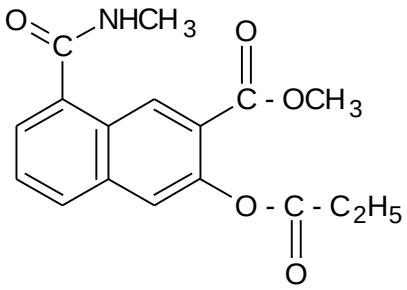
Space For Rough Work

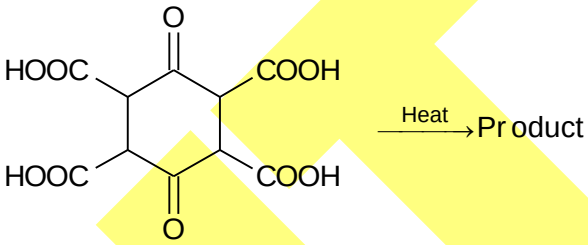
(PART – B)

(Non – Negative Integer)

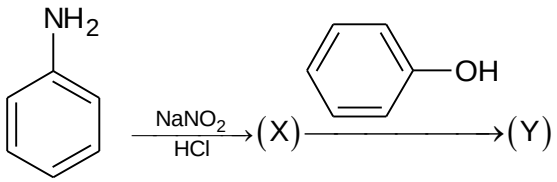
1. Total number of compounds which are soluble in hot aq. NaOH are
(i) Salicyclic acid (ii) Aspirin (iii) Carboxylic acid (iv) Acetic acid
(v) Succinic anhydride (vi) Cyclohexanone (vii) Benzene sulphonamide
(viii) Cyclo hexane

2. 
If x = number of hydrogen atoms present in (P)
& y = number of sp^2-hybridised carbon atoms present in (P)
What is the value of (x + y)?

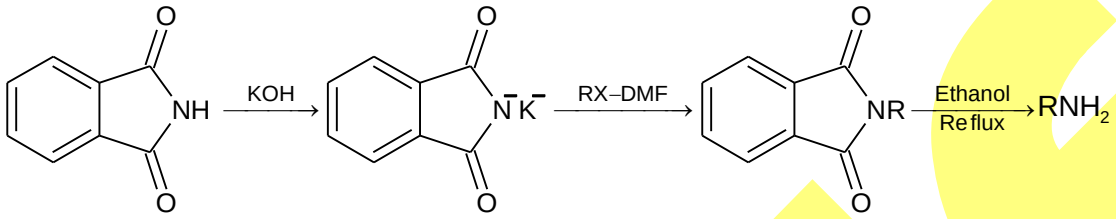
3. 
What is the molar mass of the simplest product which is formed when above compound undergoes acidic hydrolysis?

4. 
How many oxygen atom(s) is/are present in the organic product of above reaction?

Space For Rough Work

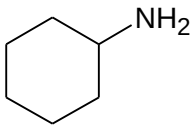
5. 

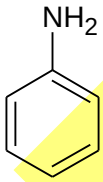
How many pi(π)- bond(s) is/are present in a molecule of (Y)?

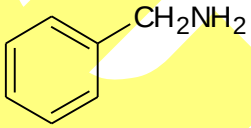
6. 

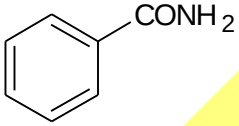
Out of the given amines, how many cannot be prepared by this method

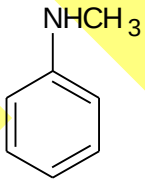
(i) $CH_3CH_2NH_2$ (ii) CH_3NHCH_3 (iii) $CH_2 = CH - NH_2$

(iv) 

(v) 

(vi) 

(vii) 

(viii) 

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. The value of $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx$ is equal to :

(A) $x\,e^{\tan^{-1}x}+C$ (B) $x^2\,e^{\tan^{-1}x}+C$ (C) $\frac{1}{x}e^{\tan^{-1}x}+C$ (D) none of these

2. If $\int\frac{1}{1+\sin x}dx=\tan\left(\frac{x}{2}+a\right)+b$, then

(A) $a=-\frac{\pi}{4},b\in R$ (B) $a=\frac{\pi}{4},b\in R$ (C) $a=\frac{5\pi}{4},b\in R$ (D) none of these

3. $\int_0^1\frac{\tan^{-1}x}{1+x^2}dx$ is equal to

(A) $\frac{\pi}{4}$ (B) $\frac{\pi^2}{32}$ (C) 1 (D) None

4. $\int\frac{(2x+1)}{(x^2+4x+1)^{3/2}}dx$

(A) $\frac{x^3}{(x^2+4x+1)^{1/2}}+C$ (B) $\frac{x}{(x^2+4x+1)^{1/2}}+C$

(C) $\frac{x^2}{(x^2+4x+1)^{1/2}}+C$ (D) $\frac{1}{(x^2+4x+1)^{1/2}}+C$

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. $\int \frac{dx}{x\left(x^4-1\right)}$ equals

(A) $\ell n\left|1-\frac{1}{x^4}\right|+C$

(B) $\frac{1}{4}\ell n\left|1-\frac{1}{x^4}\right|+C$

(C) $\frac{1}{8}\ell n\left|\frac{x^8-2x^4+1}{x^8}\right|$

(D) $\ell n\left|x^4-1\right|+C$

6. Which of the following is/are correct?

(A) $\int_0^{\frac{\pi}{2}} \frac{\cos x}{\cos x+\sin x}dx=\frac{\pi}{4}$

(B) $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\tan x}}=\frac{\pi}{6}$

(C) $\int_0^{\frac{\pi}{2}} \cos\left(\pi \sin^2 x\right)dx=0$

(D) $\int_0^a \frac{f(x)}{f(x)+f(a-x)}dx=\frac{a}{2}$

7. Let $F(x)=\int_0^x (t-1)(t-2)^2\,dt$, then

(A) $\left(1,-\frac{17}{12}\right)$ is a point of minimum

(B) $\left(2,\frac{-4}{3}\right)$ is a point of inflexion

(C) $\left(\frac{4}{3},\frac{-112}{81}\right)$ is a point of inflexion

(D) $(1,-3)$ is a point of minimum

Space For Rough Work

(Matching List Sets)

This section contains **FOUR (04)** 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. The anti derivative of

	List - I		List – II
(P)	$f(x)=\frac{1}{(a^2+b^2)-(a^2-b^2)\cos x}$	(1)	$\frac{1}{ab}\tan^{-1}\left(\frac{a}{b}\tan\frac{x}{2}\right)+C$
(Q)	$f(x)=\frac{1}{a^2\sin^2 x+b^2\cos^2 x}$	(2)	$\frac{1}{a^2\sin\alpha}\tan^{-1}\left(\frac{\tan x}{\sin\alpha}\right)+C,\ \alpha=\cos^{-1}\frac{b}{a}$
(R)	$f(x)=\frac{1}{a\cos x+b\sin x}$	(3)	$\frac{1}{ab}\tan^{-1}\left(\frac{a}{b}\tan x\right)+C$
(S)	$f(x)=\frac{1}{a^2-b^2\cos^2 x}$	(4)	$\frac{1}{\sqrt{a^2+b^2}}\log\left\lvert\tan\frac{1}{2}\left(x+\tan^{-1}\frac{a}{b}\right)\right\rvert+C$
		(5)	$\frac{1}{ab}\tan^{-1}\left(\frac{a}{b}\sec x\right)+C$

(A) P→4; Q → 3; R→1; S→2
(B) P →1; Q→3; R→4; S→2;
(C) P→3; Q → 1; R→4; S→ 2
(D) P→3; Q → 4; R→2; S→1

9. The anti derivative of

	List – I		List – II
(P)	$\frac{\sec x}{(\sec x+\tan x)^2}$	(1)	$\log\left\lvert\frac{\sin x-2}{\sin x-1}\right\rvert+C$
(Q)	$\frac{\cos x}{(\sin x-1)(\sin x-2)}$	(2)	$-\frac{1}{1+\sin x}+C$
(R)	$\sin^{-1}\frac{2x}{1+x^2}$	(3)	$2x\tan^{-1}x-\log(1+x^2)+C$
(S)	$\sqrt{\tan x}+\sqrt{\cot x}$	(4)	$-\frac{1}{2}(\sec x+\sin x)^{-2}+C$
		(5)	$\sqrt{2}\tan^{-1}\left(\frac{\tan x-1}{\sqrt{2\tan x}}\right)+C$

(A) P→2; Q → 1; R→3; S→5
(B) P→3; Q → 4; R→1; S→2
(C) P→2; Q → 1; R→5; S→3
(D) P→3; Q → 4; R→2; S→1

Space For Rough Work

10. Match the following columns:

List – I		List - II	
(P)	If $f(x)=\int_0^{g(x)}\frac{dt}{\sqrt{1+t^3}}$ where $g(x)=\int_0^{\cos x}(1+\sin t^2)dt$ then the value of $f'\left(\frac{\pi}{2}\right)$	(1)	3
(Q)	If $f(x)$ is a non – zero differentiable function such that $\int_0^x f(t)dt=(f(x))^2$ for all x, then $f(6)$ equals	(2)	2
(R)	If $\int_a^b(2+x-x^2)dx$ is maximum that $(a+b)$ is equal to	(3)	0
(S)	$\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}}\frac{dx}{1+\cos x}$ is equal to	(4)	–1
		(5)	1

(A) P→4; Q → 5; R→1; S→2 (B) P→3; Q → 4; R→1; S→2
(C) P→3; Q → 1; R→4; S→ 2 (D) P→4; Q → 1; R→5; S→2

11. Match the following columns:

List – I		List – II	
(P)	$\int_0^{\pi/2}\ell n(\tan x+\cot x)dx=$	(1)	$\frac{\pi^2}{4}$
(Q)	$\int_0^{\pi/2}\frac{\sin x-\cos x}{(\sin x+\cos x)^2}dx=$	(2)	$\pi\ell n2$
(R)	$\int_0^{2\pi}x(\sin^2 x\cos^2 x)dx=$	(3)	0
(S)	$\int_0^{\pi/2}(2\ell n\sin x-\ell n\sin 2x)dx=$	(4)	$-\frac{\pi}{2}\ell n2$
		(5)	$\frac{\pi}{2}\ell n2$

(A) P→4; Q → 3; R→1; S→2 (B) P→3; Q → 4; R→1; S→2
(C) P→2; Q → 3; R→1; S→4 (D) P→3; Q → 4; R→2; S→1

Space For Rough Work

(PART – B)

(Non – Negative Integer)

1. If $\int \frac{x}{(x-1)(x-2)(x-3)}dx = k_1 \ell n|x-1| + k_2 \ell n|x-2| + k_3 \ell n|x-3| + C$ then $k_1 + k_2 + k_3$ is equal to

2. If $\int_0^{\pi/3} \frac{\cos x}{3+4\sin x}dx = K \log\left(\frac{3+2\sqrt{3}}{3}\right)$, then 8K is:

3. If $\int \frac{dx}{3\cos x + 4\sin x + 5} = \frac{1}{5}\tan\left(\frac{x - \tan^{-1}\alpha}{2}\right) + C$, then $\left|\frac{4}{\alpha}\right|$ is equal to

4. Let f be a positive function, and $I_1 = \int_{1-k}^{k} x f\{x(1-x)\}dx, I_2 = \int_{1-k}^{k} f\{x(1-x)\}dx$, where $2k-1>0$, then $\frac{8I_1}{I_2}$ is:

5. If $\int_0^x f(t)dt = x + \int_x^1 t\, f(t)dt$, then the value of $16f(1)$ is:

6. If the value of the integral $\int_0^{\pi/2} \cos^{2011}x \sin(2013x)dx$ is equal to $\frac{a}{b}$, where a and b are co – prime integers, then find the sum of the digits of $(2a+b)$.

Space For Rough Work

FIITJEE INTERNAL TEST

BATCH: Two Year CRP(2325) Batches

Common Test – 3

Code: 100723

JEE ADVANCED LEVEL

ANSWER KEY

ANSWER KEYS

Physics

PART – A

1.	D	2.	B	3.	A	4.	B
5.	AD	6.	BD	7.	BD	8.	B
9.	D	10.	A	11.	C		

PART – B

1.	3	2.	5	3.	0	4.	6
5.	5	6.	4				

Chemistry

PART – A

1.	C	2.	B	3.	B	4.	D
5.	ABCD	6.	ABCD	7.	BCD	8.	A
9.	C	10.	C	11.	B		

PART – B

1.	6	2.	9	3.	31	4.	2
5.	7	6.	5				

Mathematics

PART – A

1.	A	2.	A	3.	B	4.	B
5.	BC	6.	ACD	7.	ABC	8.	B
9.	A	10.	D	11.	C		

PART – B

1.	0	2.	2	3.	3	4.	4
5.	8	6.	7				