FIITJEE INTERNAL Phase Test

BATCH – NWCMPA425A1-PT-1

PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 100721 | **Paper – 1**

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 – I: PHYSICS

(PART – A)

(Single Correct Answer Type)

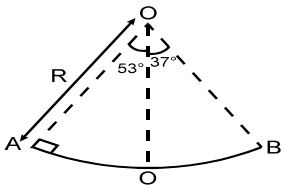
This section contains **4 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. A swimmer crosses a flowing stream of width 'W' to and fro in time t_1. The time taken to cover the same distance up & down the stream is t_2. If t_3 is the time swimmer would take to swim a distance 2W in still water, then:
(A) $t_1^2 = t_2 t_3$ (B) $t_2^2 = t_1 t_3$ (C) $t_3^2 = t_1 t_2$ (D) $t_3 = t_1 + t_2$

2. Two particles of equal mass have velocities $\vec{v}_1 = 2\hat{i}\,m/s$ and $\vec{v}_2 = 2\hat{j}\,m/s$. First particle has an acceleration $\vec{a}_1 = (3\hat{i} + 3\hat{j})\,m/s^2$, while the acceleration of the other particle is zero. The centre of mass of the two particles moves in a:
(A) Circle (B) Parabola (C) Straight line (D) Ellipse

3. A cart moves with a constant speed along a horizontal circular path. From the cart a particle is thrown up vertically with respect to cart.
(A) The particle will land somewhere on circular path
(B) The particle will land inside the circular path
(C) The particle will follow an elliptical path
(D) The particle will follow a parabolic path.

4. A section of fixed smooth circular track of radius R in vertical plane is shown in the figure. A block is released from position A and leaves the track at B. The radius of curvature of its trajectory when it just after leaving the track at B is:

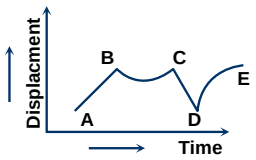


(A) R (B) $\frac{R}{4}$ (C) $\frac{R}{2}$ (D) none of these

(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. The figure shows the displacement of a particle, moving along X-axis, as a function of time. The force acting on the particle is zero in the region.



(A) AB (B) BC
(C) CD (D) DE

Space For Rough Work

6. If the kinetic energy of a body is directly proportional to time 't', the magnitude of the force acting on the body is (Body is moving on straight line path)

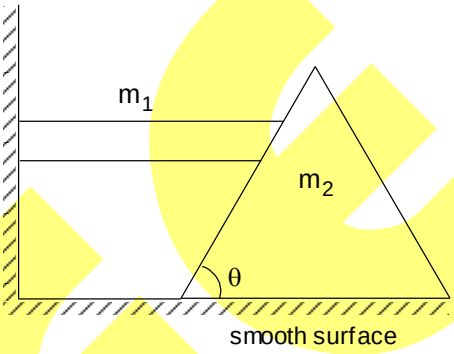
(A) directly proportional to $\sqrt{t}$

(B) inversely proportional to $\sqrt{t}$

(C) directly proportional to the speed of the body

(D) inversely proportional to the speed of the body

7. A horizontal bar of mass m_1 and prism of mass m_2 can move as shown. There is no friction at any contact point. During the motion, the length of rod is always horizontal. Now magnitude values of



(A) acceleration of $m_1$is $\frac{g}{\left(1+\eta\cot^2\theta\right)}$, when $\eta=\frac{m_2}{m_1}$

(B) acceleration of m_1 is $\frac{g}{\eta\left[1+\tan^2\theta\right]}$, where $\eta=\frac{m_2}{m_1}$

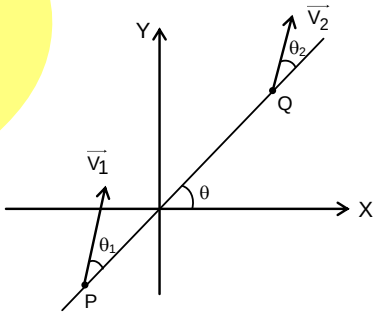
(C) acceleration of $m_2$is $\frac{g}{\left(\tan\theta+\eta\cot\theta\right)}$, where $\eta=\frac{m_2}{m_1}$

(D) acceleration of m_2 is $\frac{g\tan^2\theta}{\eta\left[1+\tan^2\theta\right]}$, where $\eta=\frac{m_2}{m_1}$

(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. Two particle P and Q moving with velocities $\vec{V_1}$ and $\vec{V_2}$ in the direction as shown in fig. From figure answer the given questions.



List-I		List-II	
(P)	Magnitude of relative velocity of P with respect to Q.	(1)	$\lvert V_2\cos(\theta_2+\theta)-V_1\cos(\theta_1+\theta)\rvert$
(Q)	Magnitude of velocity of P relative to Q along the line joining them	(2)	$\lvert V_2\cos\theta_2-V_1\cos\theta_1\rvert$
(R)	Magnitude of velocity of P relative to Q along x-axis	(3)	$\lvert\vec{V_1}-\vec{V_2}\rvert$
(S)	Magnitude to velocity of P relative to Q along Y–axis	(4)	$\lvert V_2\sin(\theta_2+\theta)-V_1\sin(\theta_1+\theta)\rvert$
		(5)	$\lvert\vec{V_2}-\vec{V_1}\rvert$

The correct option is:

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

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

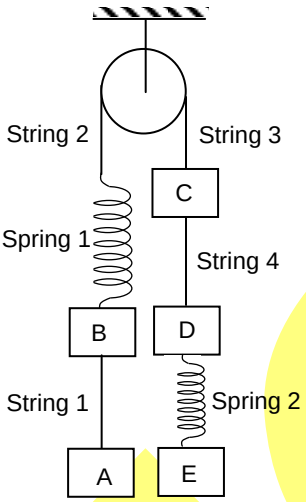
Space For Rough Work

9. The system shown below is initially in equilibrium

$m_A = m_B = 3kg$

$m_C = m_D = m_E = 2kg$

Take g = 10 m/s^2



List–I gives the four strings while List–II the value of the tension in the strings.

List-I		List-II	
(P)	String 1	(1)	10 N
(Q)	String 2	(2)	0 N
(R)	String 3	(3)	30 N
(S)	String 4	(4)	40 N
		(5)	60 N

If the spring 1 is cut, match the correct for the tension in the strings just after the cutting.

(A) P $\rightarrow$ 3 ; Q $\rightarrow$ 5 ; R $\rightarrow$ 5 ; S $\rightarrow$ 1 (B) P $\rightarrow$ 4 ; Q $\rightarrow$ 5 ; R $\rightarrow$ 5 ; S $\rightarrow$ 1

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

10. In a conservative force field we can define he radial component of force from the potential energy function by using F = $-\frac{du}{dr}$. Here, a positive force means repulsion and a negative force means attraction. For the given potential energy function U(r) we can find the equilibrium position where force is zero. We can also find the ionization energy which is the work done to move the particle point at a distance 'r' from he centre of the force. The potential energy of the particle is U = $\frac{A}{r^2}-\frac{B}{r}$, where 'r' is the distance from the centre of the force and A and B are +ve constants. Answer the following questions:

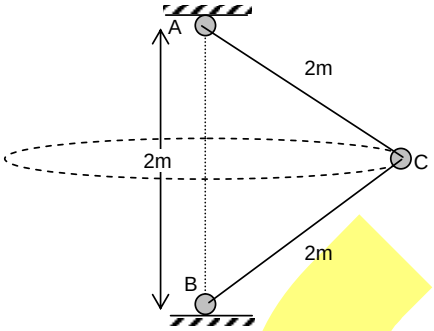
List-I		List-II	
(P)	The equilibrium distance is given by	(1)	$\left[\frac{2A}{r^3}-\frac{B}{r^2}\right]$
(Q)	The equilibrium is	(2)	Stable
(R)	At the state of stable equilibrium, the potential energy is:	(3)	$\left[\frac{-2A}{r^3}+\frac{B}{r^2}\right]$
(S)	Force acting	(4)	Minimum
		(5)	$\frac{2A}{B}$

The correct option is:

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

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

11. Particle of mass m is attached with two string AC and BC. When particle rotates in horizontal plane with $\omega = \sqrt{10}$ rad/s, tension in strings AC and BC are T_1, and T_2 respectively. Then match the tension in List-I so values in List-II (g = 10 m/s^2)



List-I		List-II	
(P)	$T_1 + T_2$	(1)	Zero
(Q)	$T_1 - T_2$	(2)	(10 m) Newton
(R)	T_1	(3)	(20 m) Newton
(S)	T_2	(4)	(20 m) Newton
		(5)	(40 m) Newton

The correct option is:

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

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

(PART – B)

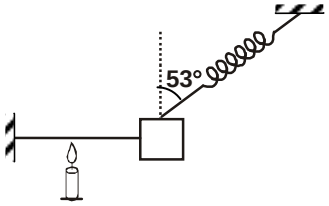
(Non – Negative Integer)

1. Power applied to a particle varies with time as P = ($3t^2 - 2t + 1$) W where t is in second. The change in its kinetic energy between time t = 2s and t = 4s is 23 K joule. Find the value of K.

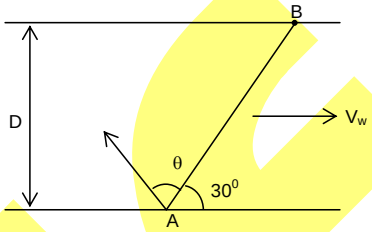
2. A particle moves in a straight line whose acceleration depends on the velocity v of the particle as $a = -\alpha\sqrt{v}$, α is positive constant. At the initial moment, velocity of particle is v_0. If average speed before it stops is $\frac{v_0}{x}$ then find the value of 'x'.

Space For Rough Work

3. The block shown in the figure is in equilibrium. The acceleration of the block just after the string burns is $\frac{ng}{3}$. Find the value of n.

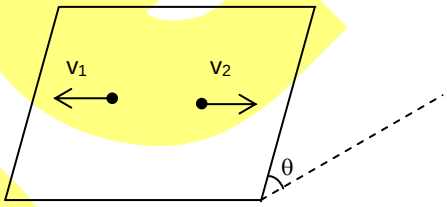


4. Two ports A and B are separated by a river of width D. Water in the river flows with speed V_W. A boat crosses the river form port A to port B. The speed of the boat relative to water is V_B. Given $V_W = \sqrt{3}\ V_B$. if at angle $\theta = \frac{\pi}{n}$ (in radian) with AB in which the boat should start relative to water so that it moves along AB, then find the value of 'n'.



5. If the area of a parallelogram whose diagonals are represented by $(3\hat{i}+\hat{j}+\hat{k})$ and $(\hat{i}-\hat{j}-\hat{k})$ is $\frac{y}{\sqrt{2}}$ then y is

6. Two particles are projected horizontally with velocities v_1 = 1 m/s, v_2 = 3 m/s in opposite direction form a point on a smooth inclined plane of inclination $\theta = 60^0$ with the horizontal as shown in the figure. If the separation between the particles on the inclined plane when their velocity becomes perpendicular to each other., is k/10 meter, then the value of the k =



Space For Rough Work

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.**

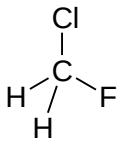
1. A proton accelerates from rest through a potential difference of 'V' volts has a de-Broglie wavelength 'λ' associated with it. An alpha particle in order to have the same wavelength must be accelerated from rest through a potential difference of:

(A) V volts (B) $\frac{V}{4}$ volts (C) 2 V volts (D) $\frac{V}{8}$ volts

2. The rate constant of the production of 2B(g) by the reaction $A(g) \xrightarrow{\Delta} 2B(g)$ is $2.48 \times 10^{-4}\ s^{-1}$. After how many minutes from the start of the reaction, a 1:1 molar ratio of A to B is obtained?

[log 2 = 0.3010 and log 3 = 0.4770]

(A) 18.19 (B) 22.61 (C) 27.25 (D) 28.35

3. 

Which of the following bond angle of above molecule has largest value?

(A) ∠ HCF (B) ∠ HCH (C) ∠ HCCl (D) ∠ FCCl

4. The value of ℓnK_p of a reversible reaction is -0.5 at 1000 K. What is the standard free energy change (ΔG^o) of the reaction in KJ mol^{-1} unit?

[R = 8.314 JK^{-1} mol^{-1}]

(A) 4.175 (B) 2.78 (C) 5.196 (D) 6.02

(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. In which of the following both the species of iron (Z = 26) have same value of spin only magnetic moment?

(A) Fe and Fe^{2+} (B) Fe^{2+} and Fe^{4+}

(C) Fe^{+} and Fe^{3+} (D) Fe^{3+} and Fe

Space For Rough Work

6. Which of the following statement(s) is/are correct for the compound PCl_3F_2?
(A) It's dipole moment is zero
(B) The central atom undergoes sp^3d^2 hybridization
(C) Three different types of bond angles are observed in the molecule
(D) The central atom contains a lone pair of electrons

7. Which of the following statement(s) is/are correct for a zero order reaction?
(A) The unit of rate constant is mol L^{-1} sec^{-1}
(B) The unit of half-life is $time^{-1}$
(C) The half-life time is directly proportional to the initial concentration of reactant
(D) The rate of reaction is directly proportional to temperature

(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 acids and bases which are given in certain molar ratio in list – I with their pH range mentioned in list – II. (Volume of the mixture of acids and bases = 1 L)
pK_a of $CH_3COOH = 5$
pK_b of $NH_4OH = 5$
pK_a of $HCN = 10$

List – I		List – II	
(P)	CH_3COOH and NaOH(2 : 1)	(1)	pH is less than 7
(Q)	CH_3COOH and NH_4OH(1 : 1)	(2)	pH is greater than 7
(R)	NH_4OH and HCl(1 : 2)	(3)	pH is 7
(S)	HCN and KOH (1 : 3)	(4)	Buffer is formed
		(5)	No buffer is formed

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

9. Match the lists

	List – I		List – II
(P)	Order of reaction	(1)	May be positive, negative, zero or decimal
(Q)	Rate of reaction	(2)	Decreases by increasing temperature
(R)	Rate constant of reaction	(3)	Depends on temperature, concentration and reaction conditions
(S)	Half-life period of reaction	(4)	Depends only on temperature
		(5)	Always negative

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

Space For Rough Work

10. Match the lists

	List – I (Atomic orbitals)		List – II (Number of nodes)
(P)	4s	(1)	Has one radial node and two angular nodes
(Q)	$4p_z$	(2)	Has three radial nodes
(R)	$4d_{x^2-y^2}$	(3)	Has two radial and one angular nodes
(S)	4f(any one)	(4)	Has no radial nodes
		(5)	No radial and angular nodes

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

11. Match the lists

	List – I (Molecules)		List – II (Hybridization of central atom)
(P)	NF_3	(1)	sp^2
(Q)	XeO_3F_2	(2)	sp^3
(R)	$N[Si(CH_3)_3]_3$	(3)	sp^3d^3
(S)	IF_7	(4)	sp^3d
		(5)	sp

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

(PART – B)

(Non – Negative Integer)

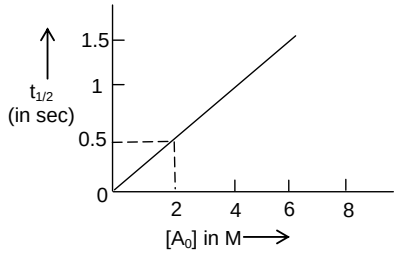
1. 60 g of CH_3COOH and 82 g of CH_3COONa were added to one litre water to form a buffer solution. What would be the maximum pH of the buffer above which it cannot display it's buffer action?
(K_a of $CH_3COOH = 1 \times 10^{-5}$) [Atomic mass: Na = 23, C = 12, O = 16, H = 1]

2. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$; $K_p = 25 \times 10^{-2} atm^{-1}$. What would be the partial pressure of oxygen in atm unit if the equilibrium partial pressures of SO_2 and SO_3 are same?

Space For Rough Work

3. $2X(g) \longrightarrow Product$

For the above elementary reaction the half -life is 4 sec if the reaction starts with 80 M of X(g). What will be the half-life in sec unit if the reaction starts with 40 M of X(g)?

4. 

What will be the rate constant k in mol $L^{-1}s^{-1}$ unit for the reaction which graph is given above?

5. The electronic configuration of an atom is
$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$
If x = the number of electrons present in orbital(s) which has(ve) two radial nodes and one angular node.
y = the number of electrons present in orbital(s) which has(ve) two angular nodes and zero radial node and
z = the number of electrons present in the orbitals which has only radial node and no angular node,
then the value of (x + y + z) is

6. How many maximum number of electrons of an atom have $n + \ell = 8$?

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. A mapping $f:A\to[-1,1]$ defined by $f(x)=\sin x,\forall x\in R,$ where A is a subset or R (the set of all real numbers) is one – one and onto if A is the interval, then A can be

(A) $[0,2\pi]$ (B) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ (C) $[-\pi,\pi]$ (D) $[0,\pi]$

2. The inverse of $f(x)=\left(5-(x-8)^5\right)^{\frac{1}{3}}$ is

(A) $5-(x-8)^5$ (B) $8+(5-x^3)^{1/5}$ (C) $8-(5-x^3)^{1/5}$ (D) $\left(5-(x-8)^{1/5}\right)^3$

3. $\underset{n\to\infty}{Lt}\left[\left(1+\frac{1}{n}\right)^n-\left(1+\frac{1}{n}\right)\right]^{-n}=$

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

4. If the functions of *f* and *g* are defined by $f(x)=3-x, g(x)=2+3x$ *for* $x\in R$ respectively, then $g^{-1}(f^{-1}(2))=$

(A) 1 (B) $-\frac{1}{3}$ (C) $-\frac{4}{3}$ (D) $\frac{1}{4}$

(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. Consider the function 'ϕ' defined in $[0,1]$ as $\phi(x)=\begin{cases}x^2.\sin\left(\frac{1}{x}\right) & ;\ \text{if } x\neq 0\\ 0 & ;\ \text{if } x=0\end{cases}$. Then

(A) $\phi(x)$ has right derivate at $x=0$ (B) $\phi^1(x)$ is discontinuous at $x=0$

(C) $\phi^1(x)$ is continuous at $x=0$ (D) $\phi^1(x)$ is differentiable at $x=0$

Space For Rough Work

6. If $f(x)=\text{maximum}\{4,1+x^2, x^2-1\}\ \forall\ x\in R$. Then the points where $f(x)$ is not – differentiable is/are

(A) $\sqrt{3}$ (B) $-\sqrt{3}$ (C) Two irrational points (D) none

7. In the interval $0<x<2\pi$ the function $f(x)=|\sin 2x|$ is not differentiable at

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$ (C) π (D) $\frac{3\pi}{2}$

(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. $f: R-\{0\}\to R$. Let $f(x)=ax+\frac{b}{x}(ab\neq 0)$,

List – I		List – II	
(P)	$a>0, b>0$	(1)	$f(x)$ is a bijective
(Q)	$a>0, b<0$	(2)	$f(x)$ is onto function
(R)	$a<0, b>0$	(3)	$f(x)$ is one – one function
(S)	$a<0, b<0$	(4)	$f(x)$ is neither onto nor one – one function
		(5)	One – one but not onto

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

9. Match the following

	List - I		List – II
(P)	$\int_1^1 \frac{dx}{1+x^2}$	(1)	$\frac{1}{2}\log\left(\frac{2}{3}\right)$
(Q)	$\int_0^1 \frac{dx}{\sqrt{1-x^2}}$	(2)	$2\log\left(\frac{2}{3}\right)$
(R)	$\int_2^3 \frac{dx}{1-x^2}$	(3)	π
(S)	$\int_1^2 \frac{dx}{x\sqrt{x^2-1}}$	(4)	$\frac{\pi}{2}$
		(5)	$\frac{\pi}{3}$

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

Space For Rough Work

10. Match the following columns:

List – I		List – II	
(P)	$\int_0^{\pi} x \log \sin x \, dx$	(1)	$\left(\frac{\pi}{8}\right)\log 2$
(Q)	$\int_0^{\infty} \log\left(x + x^{-1}\right)\frac{dx}{1+x^2}$	(2)	$\frac{-\pi^2}{2}\log 2$
(R)	$\int_0^{\frac{\pi}{4}} \log(1+\tan x)\,dx$	(3)	$-\pi\log 2$
(S)	$\int_0^{\pi} \log(1-\cos x)\,dx$	(4)	$2\log 2$
		(5)	$\pi\log 2$

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

11. Match the following columns:

List – I		List – II	
(P)	If $L = \underset{x\to -1}{Lt}\frac{\sqrt[3]{7-x}-2}{x+1}$ then $12L =$	(1)	–2
(Q)	If $L = \underset{x\to \frac{\pi}{4}}{Lt}\frac{\tan^3 x - \tan x}{\cos\left(x+\frac{\pi}{4}\right)}$ then $\frac{-L}{4} =$	(2)	2
(R)	$L = \underset{x\to 1}{Lt}\frac{(2x-3)\left(\sqrt{x}-1\right)}{2x^2+x-3}$ then $20L =$	(3)	1
(S)	If $L = \underset{x\to\infty}{Lt}\frac{\log x^n - [x]}{[x]}$ where $n \in N$, ($[x]$ denotes G.I.F. then $-2L =$	(4)	0
		(5)	–1

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

Space For Rough Work

(PART – B)

(Non – Negative Integer)

1. If the acute angles between the curves $y=|x^2-1|$ and $y=|x^2-3|$ at the their points of intersection be θ such that $\tan\theta=\frac{4\sqrt{2}}{k}$ then k is equal to

2. If $\int\frac{(2x+3)}{x(x+1)(x+2)(x+3)+1}dx=C-\frac{1}{f(x)}$, where $f(x)$ is of the form of ax^2+bx+c, then $(a+b+c)$ equals

3. if $k=\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\frac{\cos^2 x}{1+5^x}dx$ then $\frac{16k}{\pi}$ is

4. If $\int_0^4\{\sqrt{x}\}dx=\frac{a}{b}$ (where, $\{.\}$ denotes fractional part of x), then the value of $(a-b)$ is

5. Let $P(x)$ be a real polynomial of least degree which has a local maximum at $x=1$ and a local minimum at $x=3$. If $P(1)=6$ and $p(3)=2$, then $p'(0)$ is

6. If $f(x)$ be a function periodic with period 12 and $f(5)=10$, then the sum of digits of the value of $\sum_{r=0}^{19}f(5+12r)$ is _____

Space For Rough Work

FIITJEE INTERNAL TEST

BATCH – NWCMPA425A1-PT-1

Paper – 1

Code: 100721

JEE ADVANCED LEVEL

ANSWER KEY

ANSWER KEYS

Physics

PART – A

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

PART – B

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

Chemistry

PART – A

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

PART – B

1.	6	2.	4	3.	8	4.	2
5.	19	6.	32				

Mathematics

PART – A

1.	B	2.	B	3.	D	4.	B
5.	AB	6.	ABC	7.	CD	8.	A
9.	A	10.	B	11.	D		

PART – B

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