

PHYSICS, CHEMISTRY & MATHEMATICS**QP CODE: 100715-0****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 (01-03)** 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.
- (ii) **Part-A (04-07)** – 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.
- (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

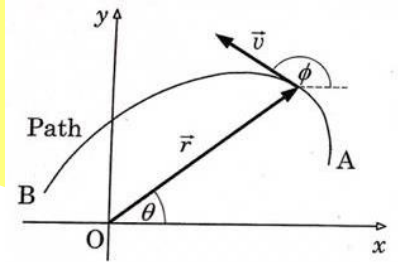
(PART – A)

(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.

1. The pitch of a screw gauge is 1 mm and there are 100 divisions on circular scale. When there is nothing between the two ends (studs) of screw gauge 95th divisions of circular scale is coinciding with screw gauge and in this situation zero of main scale is not visible. When a wire is placed between the studs the linear scale reads 2 division and 20th divisions of circular scale coincides with reference line. For this situation mark the correct statement(s). Each division on the main scale to 1 mm.
 - (A) LC of the instrument is 0.01 mm.
 - (B) Zero correction for the instrument is +0.05 mm.
 - (C) Thickness of wire is 1.20 mm.
 - (D) Thickness of the wire is 2.25 mm.

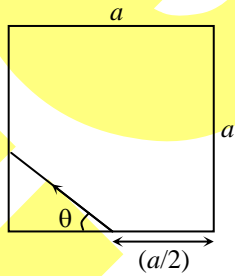
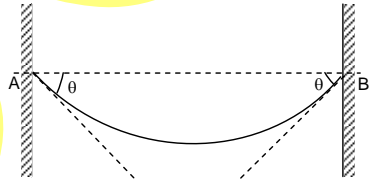
2. At a particular instant of time, position vector \vec{r} , velocity vector \vec{v} and angular position θ of a particle traversing a path AB are shown in the figure. Here ϕ is the angle made by the velocity vector with the positive x-axis. Which of the following statements is/are correct?
 - (A) Modulus of angular velocity is $\frac{d\theta}{dt} = \frac{v \sin(\phi - \theta)}{r}$.
 - (B) Modulus of tangential component of acceleration is $r \frac{d^2\theta}{dt^2}$.
 - (C) Modulus of normal component of acceleration is $v \frac{d\theta}{dt}$.
 - (D) Modulus of normal component of acceleration is $v \frac{d\phi}{dt}$.



Space For Rough Work

(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**.

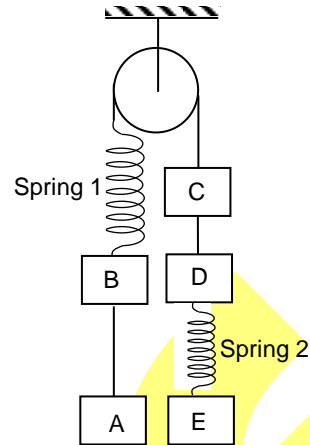
4. A force is given by $F = at + bt^2$ where t is the time. The dimensions of a and b are
 (A) $[MLT^{-4}]$ and $[MLT^{-1}]$ (B) $[MLT^{-1}]$ and $[MLT^0]$
 (C) $[MLT^{-3}]$ and $[MLT^{-4}]$ (D) $[MLT^{-3}]$ and $[MLT^0]$
5. If the vectors $\vec{P} = a\hat{i} + a\hat{j} + 3\hat{k}$ and $\vec{Q} = a\hat{i} - 2\hat{j} - \hat{k}$ are perpendicular to each other, then the positive value of a is :
 (A) 3 (B) 2
 (C) 1 (D) 0
6. There is a square carom board of side a . A striker is projected in hole after two successive collisions. Assuming the collisions to be perfectly elastic and the surface to be smooth. The angle of projection of striker is
 (A) $\cot^{-1}\left(\frac{3}{4}\right)$ (B) $\cos^{-1}\left(\frac{3}{4}\right)$
 (C) $\sin^{-1}\left(\frac{3}{4}\right)$ (D) none of these
- 
7. A heavy string of mass m hangs between two fixed points A and B at an angle θ with the horizontal as shown in the figure. The tension at the lowest point in the string is
 (A) $mg/(2 \sin \theta)$ (B) $mg/(2 \cos \theta)$
 (C) $mg/(2 \tan \theta)$ (D) $mg/(2 \cot \theta)$
- 

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 system shown below is initially in equilibrium
 $m_A = m_B = 3\text{kg}$
 $m_C = m_D = m_E = 2\text{kg}$



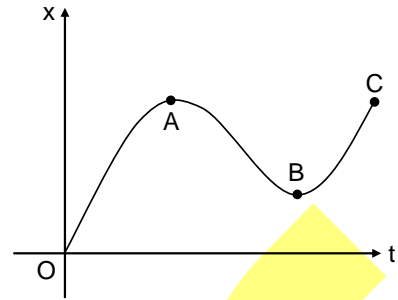
List – I		List – II	
(P)	Just after the spring 2 is cut the block D	(1)	Accelerates up
(Q)	Just after the spring 2 is cut the block B	(2)	Accelerates down
(R)	Just after the spring 1 is cut, the block A	(3)	Momentarily at rest
(S)	Just after the spring 1 is cut, the block D	(4)	Has acceleration g upwards
		(5)	Has acceleration g downwards
		(6)	Has acceleration $g/2$ downwards

The correct option is:

- (A) $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 4, S \rightarrow 5$ (B) $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 2,5, S \rightarrow 2$
 (C) $P \rightarrow 2, Q \rightarrow 1, R \rightarrow 3,4, S \rightarrow 1,6$ (D) $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 2,6, S \rightarrow 4$

Space For Rough Work

9. The displacement time ($x - t$) graph of a body acted by some forces is shown in the figure.



List - I		List - II	
(P)	From 'O' to just before 'A', the physical quantity of the body is	(1)	Zero
(Q)	In between the points 'A' and 'B' the physical quantity of the body is	(2)	Positive
(R)	In between the points 'B' and 'C' the physical quantity of the body is	(3)	Negative
(S)	At the point 'A' the physical quantity of the body is	(4)	First negative then positive
		(5)	First positive then negative
		(6)	Cannot be explained.

If the physical quantity of the body is velocity then the correct match List-I and List-II.

- (A) P \rightarrow 2, Q \rightarrow 3, R \rightarrow 2, S \rightarrow 1 (B) P \rightarrow 3, Q \rightarrow 2, R \rightarrow 1, S \rightarrow 2
 (C) P \rightarrow 6, Q \rightarrow 3, R \rightarrow 2, S \rightarrow 1 (D) P \rightarrow 5, Q \rightarrow 6, R \rightarrow 4, S \rightarrow 1
10. Average speed of a bus measured by six different students is given as follows:

Student number	1 st	2 nd	3 rd	4 th	5 th	6 th
Speed (m/s)	12.5 m/s	12.3 m/s	11.8 m/s	12.4 m/s	12.2 m/s	12.6 m/s

List-I		List-II	
(P)	Mean absolute error	(1)	± 0.2
(Q)	Mean value	(2)	12.3 m/s
(R)	Relative error	(3)	± 0.0163
(S)	Percentage error	(4)	$\pm 1.63 \%$

The correct option is:

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

Space For Rough Work

11. A ball is attached to a string and moves in vertical circle. There is no resistive force. Match the list-I to list-II.

List – I		List – II	
(P)	Minimum	(1)	Tension in the string when ball is at the lowest point.
(Q)	Maximum	(2)	Tension in the string when ball is at the highest point.
(R)	Towards the centre	(3)	The angle between tension and weight of ball when string becomes horizontal.
(S)	Perpendicular	(4)	The direction of tension in the string
		(5)	Magnitude of tangential acceleration when string becomes horizontal.
		(6)	Magnitude of centripetal acceleration when string becomes horizontal.

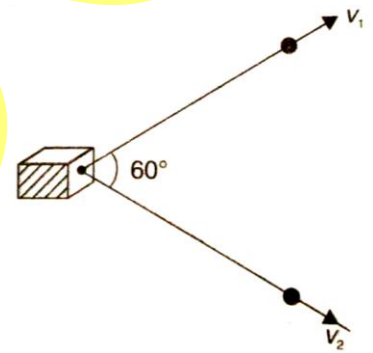
The correct option is:

- (A) P → 2, Q → 1, R → 6, S → 3,4 (B) P → 5, Q → 3, R → 4,6, S → 2
 (C) P → 2, Q → 1,5, R → 4,6, S → 3 (D) P → 2, Q → 1,5, R → 4, S → 5

(PART – B)

(Non – Negative Integer)

1. Two persons are pulling a heavy block with the help of horizontal inextensible strings. At the instant shown, the velocities of the two persons are v_1 and v_2 directed along the respective strings with the strings making an angle of 60° between them. Find the speed of the block at the instant shown.
 (Given $v_1 = 2\text{m/sec}$ $v_2 = 1\text{m/s}$)



2. If angle between \vec{A} & \vec{B} is $n\frac{\pi}{12}$ radians and $\vec{A}\cdot\vec{B} + |\vec{A} \times \vec{B}| = \frac{AB\sqrt{3}}{\sqrt{2}}$ then minimum value of 'n' is

Space For Rough Work

3. At what angle θ_0 (is π/n) should a shell be fired if at the top of its trajectory its path has a radius of curvature equal to twice the maximum height of the trajectory. Then 'n' is
4. A screw gauge with pitch 1 mm and 100 divisions on circular scale used to measure the thickness of a glass-slab. When there is no object between the studs and the faces of the screw gauge touch each other, the 40th division of circular scale coincides with the reference line. Now, the glass plate is held between the studs and reading of linear scale is found to be 5 and that of circular scale is 26. If the thickness of glass plate is $\frac{2}{n}$ then find the value of 'n'.
5. A block of mass 1 kg is placed on a truck which accelerates with an acceleration 5 m/s^2 . The coefficient of static friction between the block and the truck is 0.6. Find the frictional force (in newton) acting on the block
6. A block of mass 2kg is gently placed over a massive plank moving horizontally over a smooth surface with velocity 6 m/s. The coefficient of friction between the block and plank is 0.2. The distance traveled by the block till it slides on the plank is ($g = 10 \text{ m/s}^2$)

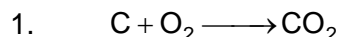
Space For Rough Work

SECTION – II : CHEMISTRY

(PART – A)

(One or More Than One Options Correct Type)

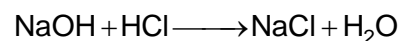
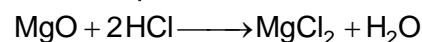
This section contains **3 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONE or MORE THAN ONE is correct**.



The identical characteristic(s) of all the species in above reaction is/are

- (A) n-factor (B) equivalent mass
(C) molar mass (D) gram-equivalent

2. An unknown quantity of MgO is added to a vessel containing 500 mL of 5 M HCl solution. After complete reaction the excess acid required 400 mL of 1.25 M NaOH for neutralization



Choose correct statement(s) from the following.

- (A) the mass of the unknown compound is 40 g
(B) after completion of all reactions, the concentration of Cl^- ions in the vessel is $\frac{20}{9}$ M
(C) the concentration of H^+ ions before reaction is equal to that after reaction
(D) After completion of first reaction (between MgO and HCl) the moles of HCl left unreacted is 1.5

3. The electronegativity values of some main group or non-transition elements are given below. The elements display regular variation in properties.

Elements	Electronegativity
P	0.3
Q	1.2
R	1.8
S	0.8

Choose the correct statements.

- (A) the oxide of R is most acidic than that of other elements if the stoichiometric ratio of the elements and oxygen in the oxides are identical.
(B) if all the elements are present in the same period of the periodic table, then the first ionization energy of 'R' will be the highest
(C) if the elements are present in the same group, 'P' will have the largest atomic size
(D) the oxide of 'P' will be more soluble in acids than the oxide of R

Space For Rough Work

(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**.

4. The principal quantum number of an atomic orbital is 4. What should be its azimuthal quantum number so that the angular component of its wave function will be zero?
(A) Zero (B) One
(C) Two (D) Three
5. $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \longrightarrow 3\text{BaSO}_4 + 2\text{AlCl}_3$
20 mL of 0.1 M BaCl_2 is mixed with 30 mL of 0.2 M $\text{Al}_2(\text{SO}_4)_3$. What is the weight of BaSO_4 formed? [At. mass of Ba = 137 g mol^{-1}]
(A) 0.295 g (B) 0.826 g
(C) 0.466 g (D) 0.614 g
6. What is the ratio of $\lambda_{4 \rightarrow 1}$ to $\lambda_{4 \rightarrow 2}$ in the emission spectrum of hydrogen atom?
(A) $\frac{3}{4}$ (B) $\frac{1}{4}$
(C) $\frac{1}{5}$ (D) $\frac{3}{5}$
7. I_2 reacts with NaOH to produce NaI, NaIO_3 and H_2O . If 0.1 mole of I_2 undergoes complete reaction how many moles of NaI will be formed?
(A) $\frac{1}{6}$ (B) $\frac{3}{50}$
(C) $\frac{1}{2}$ (D) $\frac{3}{10}$

Space For Rough Work

(Matching List Sets)

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8. Match List-I to List-II.

List – I (Reactions)		List – II (Normality of the underlined species in terms of molarity(M))	
(P)	$2\text{NO}_3^- + 6\text{Cl}^- + 8\text{H}^+ \longrightarrow 2\text{NO} + 3\text{Cl}_2 + 4\text{H}_2\text{O}$	(1)	$\frac{3\text{M}}{4}$
(Q)	$4\text{P} + 3\text{NaOH} + 3\text{H}_2\text{O} \longrightarrow 3\text{NaH}_2\text{PO}_2 + \text{PH}_3$	(2)	$\frac{5\text{M}}{3}$
(R)	$\text{I}_2 + 5\text{H}_2\text{O}_2 \longrightarrow 2\text{HIO}_3 + 4\text{H}_2\text{O}$	(3)	$\frac{4\text{M}}{3}$
(S)	$3\text{Cl}_2 + 6\text{KOH} \longrightarrow \text{KClO}_3 + 5\text{KCl} + 3\text{H}_2\text{O}$	(4)	3M
		(5)	10 M

The correct option is:

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

9. Match List-I to List-II.

List – I (Atoms)		List – II (Characteristics)	
(P)	Na	(1)	It is diamagnetic and the orbital angular momentum of the valence electrons is zero.
(Q)	Al	(2)	Two outermost orbit electrons have $\ell = 0$ and one electron of this orbit has $\ell = 1$
(R)	Ca	(3)	A maximum number of six electrons of the atom have $\ell = +\frac{1}{2}$
(S)	S	(4)	A maximum of nine orbitals of the atom are occupied with electrons
		(5)	Total spin value of the atom is zero

The correct option is:

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

Space For Rough Work

10. Match List-I to List-II.

List – I (Ionization energies)		List – II (Order of atoms)	
(P)	First ionization energy	(1)	Mn > Cr
(Q)	Second ionization energy	(2)	P > S
(R)	Third ionization energy	(3)	Fe > Co
(S)	Fourth ionization energy	(4)	Al > Mg
		(5)	Ca > Mg

The correct option is:

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

11. Match List-I to List-II.

List – I (Addition of Quantum numbers)		List – II (Maximum number of electrons that are accommodated in the possible orbitals)	
(P)	$n + l = 5$	(1)	8
(Q)	$(n + l + m) = 4, m \geq 0$	(2)	32
(R)	$(n + l + m) = 3, m \leq 0$	(3)	18
(S)	$\left(\frac{n+l-3}{2}\right) = 2$	(4)	6
		(5)	14

The correct option is:

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

Space For Rough Work

(PART – B)**(Non – Negative Integer)**

1. One litre aqueous solution of H_2O_2 liberates 33.6 litre of O_2 gas at NTP due to the decomposition reaction, $2\text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$. What is the normality(N) of the solution.
2. The de-Broglie wavelength of a particle of mass 18×10^{-30} kg is 2 \AA . If the kinetic energy of the particle is expressed as ' y ' $\times 10^{-20}$ joule, what is the value of ' y '? [$h = 6 \times 10^{-34}$ Js]
3. The bond energy of Cl_2 gas is 432 kJ mol^{-1} . 2934 kJ of energy was supplied to ionize one mole of Cl_2 into chlorine cation(Cl^+) ions. What is the ionization energy of the Cl atom in kJ mol^{-1} unit?
4. The threshold wavelength for the photoelectric emission of tungsten is 2300 \AA . What is the wavelength of light in \AA unit which will be required to release the electrons with the maximum kinetic energy 2 eV?
5. How much volume in mL of 0.4 M HCl is required to titrate one litre of a mixture containing 0.4 mole each of NaOH and Na_2CO_3 in presence of phenolphthalein indicator?
6. $\text{Al} + \text{Fe}_3\text{O}_4 \longrightarrow \text{Al}_2\text{O}_3 + \text{Fe}$
Balance the above chemical equation and state the number of electrons transferred from reductant to oxidant.

Space For Rough Work

SECTION – III : MATHEMATICS

(PART – A)

(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**.

1. The equation $(\log_{10} x + 2)^3 + (\log_{10} x - 1)^3 = (2\log_{10} x + 1)^3$ has
 (A) no natural solution (B) two rational solutions
 (C) no prime solution (D) one irrational solution

2. The curve $y = ax^3 + bx^2 + cx + 5$, touches the x – axis at $p(-2, 0)$ and cuts the y – axis at a point Q where the slope of tangent is 3. Then
 (A) $a = -\frac{1}{2}$ (B) $b = \frac{3}{4}$
 (C) $c = 3$ (D) $a = \frac{1}{2}$

3. The value of $\lim_{x \rightarrow 0} \frac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}$ is greater than
 (A) $\frac{1}{2}$ (B) 1
 (C) 2 (D) $-\frac{1}{4}$

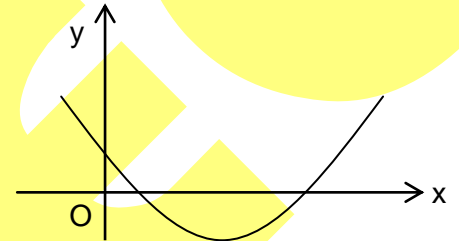
(Single Correct Answer Type)

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

4. In which one of the following intervals the inequality $\sin x < \cos x < \tan x < \cot x$ can hold good?
 (A) $\left(\frac{7\pi}{4}, 2\pi\right)$ (B) $\left(\frac{3\pi}{4}, \pi\right)$
 (C) $\left(\frac{5\pi}{4}, \frac{3\pi}{2}\right)$ (D) $\left(0, \frac{\pi}{4}\right)$

Space For Rough Work

5. If $8f(x) + 6f\left(\frac{1}{x}\right) = x + 5$ and $y = x^2f(x)$, then $\frac{dy}{dx}$ at $x = -1$ is equal to
- (A) 0 (B) $\frac{1}{14}$
(C) $-\frac{1}{14}$ (D) 1
6. If $\cos(\alpha + \beta) = \frac{3}{5}$, $\sin(\alpha - \beta) = \frac{5}{13}$ and $0 < \alpha, \beta < \frac{\pi}{4}$, then $\tan(2\alpha)$ is equal to
- (A) $\frac{63}{52}$ (B) $\frac{63}{16}$
(C) $\frac{21}{16}$ (D) $\frac{33}{52}$
7. The graph of $y = ax^2 + bx + c$ is shown. Which of the following does NOT hold good?
- (A) $ab^2c^3 > 0$ (B) $ab^3c^2 < 0$
(C) $ab^3c^5 > 0$ (D) $b^2 > 4ac$



(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 **Four** entries (1), (2), (3) and (4). **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 following

	List - I		List - II
(P)	The maximum value of $12\sin\theta - 9\sin^2\theta$ is	(1)	$-\sqrt{2}$
(Q)	Minimum value of $5\sin^2\theta + 4\cos^2\theta$	(2)	$4 - \sqrt{10}$
(R)	The minimum value of $\cos\theta - \sin\theta$ is	(3)	$4 + \sqrt{10}$
(S)	The least value of $\cos^2\theta - 6\sin\theta\cos\theta + 3\sin^2\theta + 2$	(4)	4

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

Space For Rough Work

9. Match the column:

	List - I		List - II
(P)	If $\ x-1 -2\ \geq 3$, then $x \in$	(1)	$[-2, -1] \cup [5, 6]$
(Q)	If $\ x-1 -2\ \leq 3$, then $x \in$	(2)	$[-4, 6]$
(R)	If $2 \leq x-3 \leq 3$, then $x \in$	(3)	$(-\infty, -4] \cup [6, \infty)$
(S)	If $2 \leq \ x-2 -1\ \leq 3$, then $x \in$	(4)	$[0, 1] \cup [5, 6]$

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

10. Match the column:

	List - I		List - II
(P)	$\lim_{x \rightarrow 0} \frac{x + 2 \sin x}{\sqrt{x^2 + 2 \sin x + 1} - \sqrt{\sin^2 x - x + 1}}$	(1)	1
(Q)	$\lim_{x \rightarrow 0} \frac{\sqrt{2} \sin^2 x}{\sqrt{2} - \sqrt{1 + \cos x}}$ equals	(2)	2
(R)	$\lim_{x \rightarrow \frac{\pi}{4}} \frac{\cot^3 x - \tan x}{\cos\left(x + \frac{\pi}{4}\right)}$ is	(3)	8
(S)	$\lim_{x \rightarrow 1} \frac{\sqrt{1 - \cos 2(x-1)}}{x-1}$	(4)	Does not exist

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

11. Match the column:

	List - I		List - II
(P)	If $\frac{x-2}{x^2-9} \leq 0$, then	(1)	$x \in (1, 2) \cup (3, \infty)$
(Q)	If $\frac{0.5}{x-x^2-1} < 0$, then	(2)	$x \in (-\infty, -3) \cup [2, 3]$
(R)	If $(1-x)(2-x)^2(3-x) > 0$, then	(3)	$x \in [-1, 0) \cup (0, 2)$
(S)	If $\frac{(x-1)^2(x+1)^3}{x^4(x-2)} \leq 0$, then	(4)	$x \in (-\infty, \infty)$

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

Space For Rough Work

(PART – B)**(Non – Negative Integer)**

1. The sum of the solutions of the equation $|\sqrt{x} - 2| + \sqrt{x}(\sqrt{x} - 4) + 2 = 0$, ($x > 0$) is equal to _____.
2. The number of integral solutions of the inequality $\frac{(x - 0.5)(3 - x)}{\log_2 |x - 1|} > 0$ is _____.
3. The value of b, if $\lim_{x \rightarrow 0} \left[\frac{ae^x - b \cos x + ce^{-x}}{x \sin x} \right] = 2$ is _____.
4. If $x = \cos \theta, y = \sin^3 \theta$, then the absolute value of $\left(\frac{dy}{dx}\right)^2 + y \frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$ is _____.
5. The expression $\sqrt[3]{5^{\frac{1}{\log_7 5}} + \frac{1}{\sqrt{-\log_{10}(0.1)}}$ reduces to _____.
6. The value of $\sin^2 12^\circ + \sin^2 21^\circ + \sin^2 39^\circ + \sin^2 48^\circ - \sin^2 9^\circ - \sin^2 18^\circ$ is _____.

Space For Rough Work

FIITJEE INTERNAL TEST

BATCHES: PANINI426-XI & PANINI426-A1-A2

PHASE – 1 (PAPER-1)

Code: 100715-0

JEE ADVANCED LEVEL

ANSWER KEY

ANSWER KEYS

Physics

PART – A

- | | | | |
|--------|-------|--------|------|
| 1. ABD | 2. AD | 3. ABC | 4. C |
| 5. A | 6. A | 7. C | 8. B |
| 9. A | 10. B | 11. C | |

PART – B

- | | | | |
|------|------|------|------|
| 1. 2 | 2. 1 | 3. 4 | 4. 3 |
| 5. 5 | 6. 9 | | |

Chemistry

PART – A

- | | | | |
|-------|-------|---------|------|
| 1. AD | 2. AB | 3. ABCD | 4. A |
| 5. C | 6. C | 7. A | 8. B |
| 9. C | 10. C | 11. B | |

PART – B

- | | | | |
|---------|-------|---------|---------|
| 1. 6 | 2. 25 | 3. 1251 | 4. 1682 |
| 5. 2000 | 6. 24 | | |

Mathematics

PART – A

- | | | | |
|--------|-------|--------|------|
| 1. BCD | 2. AC | 3. ABD | 4. D |
| 5. C | 6. B | 7. C | 8. A |
| 9. C | 10. C | 11. C | |

PART – B

- | | | | |
|-------|------|------|------|
| 1. 10 | 2. 0 | 3. 2 | 4. 3 |
| 5. 2 | 6. 1 | | |