FIITJEE INTERNAL TEST

PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 101101 | **Common Test-5**

Time Allotted: 3 Hours | **Maximum Marks: 180**

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 (08-10)** – 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.

(iii) **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: _____

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 mirror of parabolic shape as shown in figure the equation of mirror surface is $y^2 = 8x$. An inclined ray of inclination 15° is incident on the mirror at a point (2, 4). The co-ordinate of the point of the intersection of x-axis and reflected ray will be

    (A) $4\sqrt{3} - 6$
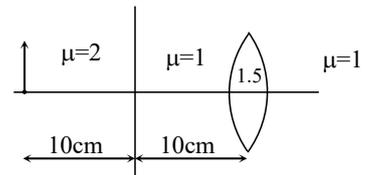
    (B) $2 - \sqrt{3}$

    (C) 1

    (D) none of these
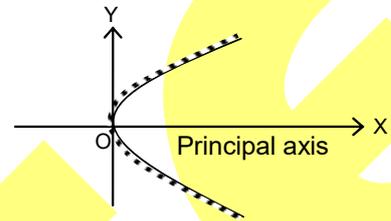
2. As situation shown in figure, the angle of deviation of the ray when the ray is moving away from the mirror

    (A) 120°

    (B) 90°

    (C) 180°

    (D) none of these
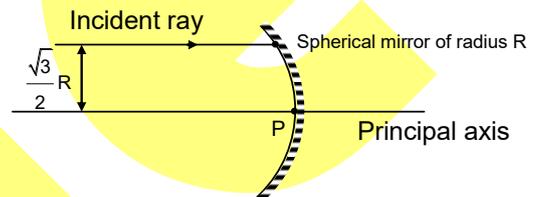
3. An object of length 1 cm is placed on the principle axis of an equiconvex lens of radius 5 cm. Distance between the lens and object is 20 cm. Space between the lens and object is filled with medium of two different refractive indices 2 and 1 as shown in the figure. Refractive index is 1 on the left of the object and on the right side of the lens. Boundary of both medium is mid-way between the object and lens.
    (A) The image will be formed at distance of 7.5 cm from the optical centre of lens
    (B) The image will be formed at distance of 10 cm from the optical centre of lens
    (C) The image will be formed at distance of 15.0 cm from the optical centre of lens
    (D) The image will be formed at distance of 12.5 cm from the optical centre of lens

4. An observer can see through a pinhole the top end of a thin rod of height h, placed as shown in the figure. The beaker height is 3h and its radius h. When the beaker is filled with a liquid upto a height 2h, he can see the lower end of the rod. Then the refractive index of the liquid is
    (A) 5/2   (B) $\sqrt{5/2}$

   (C) $\sqrt{3/2}$ (D) 3/2
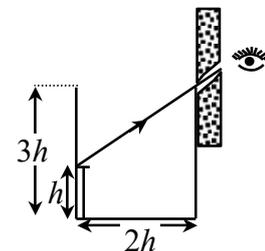
Space For Rough Work

(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.   A ray of light travelling in a transparent medium falls on a surface separating the medium from air at an angle of incidence 45^0. The ray undergoes total internal reflection. If n is the refractive index of the medium with respect to air, select the possible value(s) of n from the following
      (A) 1.3   (B) 1.4   (C) 1.5   (D) 1.6

6.   The distance between a screen and an object is 120 cm. A convex lens is placed closed to the object and is moved along the line joining object and screen, towards the screen. Two sharp images of the object are found on the screen. The ratio of magnification of two real images is 1 : 9. Then,
      (A) focal length of the lens is 22.5 cm
      (B) smaller image is brighter than the larger one
      (C) larger image is brighter than the smaller one
      (D) brightness of both the images is same

7.   The distance d between two identical concave mirrors of radius of curvature R. So, as to coincide the image I on the object O itself, which is placed at the mid point can be
      (A) R   (B) 2R
      (C) 3R   (D) R/2
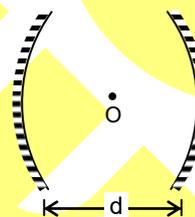
(Matching List Sets)

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.   If a real point object is moving with speed V_o away from a mirror perpendicular to its reflecting surface then its image is moving with speed v_i. u, v and R are object distance, image distance and radius of curvature of the mirror respectively. List-I has the information about image and list-II has information about position of object. Then match the list-I and list-II.

	List-I		List-II
(P)	Real image and $v_i > v_o$	(1)	$O < \|u\| < \left\|\dfrac{R}{2}\right\|$
(Q)	Real image and $v_i < v_o$	(2)	$\left\|\dfrac{R}{2}\right\| < \|u\| < \|R\|$
(R)	Virtual image and $v_i > v_o$	(3)	$\|R\| < \|u\|$
(S)	Virtual image and $v_i = v_o$	(4)	$O < \|u\|$
		(5)	$\|u\| = \left\|\dfrac{R}{2}\right\|$

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

Space For Rough Work

9.   In concave mirror match the graphs of $\dfrac{1}{|V|}$ vs $\dfrac{1}{|u|}$ where V is the image distance and u is the object distance for an object which could be real or virtual, under the conditions given below:

	List-I		List-II
(P)	When object is real and image is real	(1)	
(Q)	When object is real and image is virtual	(2)	
(R)	When object is real and image is real or virtual	(3)	
(S)	When object is virtual and image is real	(4)	

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

10. A thin prism of angle 6°, ω = 0.07 and μ_y = 1.5 IS combined with another thin prism having ω = 0.08 and μ_y = 1.60. The combination produces no deviation in the mean ray, then match the following:

|	List-I		List-II
(P)	The angle of second prism	(1)	0.03°
(Q)	Net angular dispersion produced by the combination when a beam of white light passes through it.	(2)	6°
(R)	If the prisms are similarly directed then the deviation in the mean ray will be	(3)	0.45°
(S)	The angular dispersion in the situation described in C	(4)	5°

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

Space For Rough Work

(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 bulb is placed at a depth of $2\sqrt{7}$ m in water and a floating opaque disc is placed over the bulb so that the bulb is not visible from above the water surface. The radius (in meter) of the disc should be at least (μ_{water} = 4/3)

2. A ray of light falls normally on a refracting face of a prism of refractive index 1.5. If the ray just fails to emerge from the prism. If the angle of prism is $\sin^{-1}\dfrac{k}{3}$ then find the value of k.

3. A plane mirror of length 2 m is kept along the line y = –x as shown in the figure. An insect having velocity of $4\hat{i}$ cm/s is moving along the x-axis. The time span (in Sec) for which the insect can see its image is :
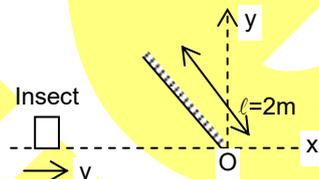
4. A spherical surface of radius of curvature R separates air (refractive index 1.0) from glass (refractive index 1.5). The centre of curvature is in the glass. A point object P placed in air on principle axis is found to have a real image Q in the glass. The line PQ cuts the surface at a point O and PO = OQ. Find the value of $\dfrac{PO}{R}$.

5. A quarter cylinder of radius R and refractive index 1.5 is placed on two sides of a thin transparent table. A point object P is kept at a distance of mR from it. If the value of m for which a ray from P will emerge parallel to the table as shown in figure, is $\dfrac{x}{3}$, then x = (the distance between two half is 0.01 cm)
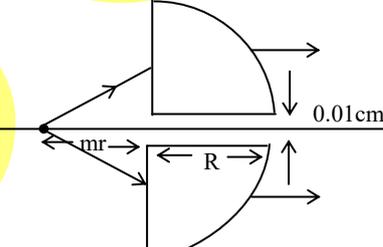
6. A fish rising vertically to the surface of water in a lake uniformly at the rate of 3 m/s observes a king-fisher (bird) diving vertically down at a rate of 11 m/s vertically above it. If the refractive index of water is (4/3), find the actual velocity of the dive of the bird.

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 sodium salt of ternary acid of a metal(M) having atomic mass = 96 g mol^{-1} has the formula Na_2MO_n. When an acidified solution of Na_2MO_n is electrolyzed, O_2 gas is liberated corresponding to a volume of 0.112 L at STP and 0.32 g of M is deposited. Find the formula of salt.
    (A) Na_2MO_3 (B) Na_2MO_4 (C) Na_2MO_2 (D) Na_2MO_6

2. Out of the following which is industrial method of preparation oxygen?
    (A) By heating oxygen containing salts such as chlorates, nitrates and permanganates e.g.

    $$2KClO_3 \xrightarrow{\text{Heat}} 2KCl + 3O_2$$

    (B) By thermal decomposition of oxides of metals low in electrochemical series and higher oxides of some metals e.g.

    $$2Ag_2O(s) \longrightarrow 4Ag(s) + O_2(g)$$

    $$2Pb_3O_4(s) \longrightarrow 6PbO(s) + O_2(g)$$

    (C) Hydrogen peroxide is readily decomposed into H_2O & O_2
    (D) Fractional distillation of air

3. Which halogen has the highest bond dissociation energy?
    (A) F_2 (B) Cl_2 (C) Br_2 (D) I_2

4. The resistance of a solution A is 50 ohm and that of solution B is 100 ohm, both solutions are taken in the same conductance cell. If equal volumes of solution A and B are mixed, what is the resistance of the mixture using the same cell? (Assume there is no change or increase in the α of A and B on mixing)
    (A) 62 ohm   (B) 67 ohm   (C) 70 ohm   (D) 80 ohm

### (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. Out of the following which statement is correct?
    (A) Orthophosphorous acid on heating disproportionates, to give orthosphosphoric acid and phosphine.
    (B) The acids which contain P – H bonds have reducing properties

    $$4AgNO_3 + 2H_2O + H_3PO_2 \longrightarrow 4Ag + 4HNO_3 + H_3PO_4$$

    (C) Out of H_3PO_2, H_3PO_3, H_3PO_4 only H_3PO_4 shows reducing property
    (D) Out of H_3PO_2, H_3PO_3, H_3PO_4 only H_3PO_4 do not show any reducing property

6. Which substance(s) react(s) with phenol by electrophilic aromatic substitution reactions?
    (A) ICl   (B) $KClO_3$ (C) NO_2ClO_4 (D) $(NH_4)_2SO_4$

Space For Rough Work

7.
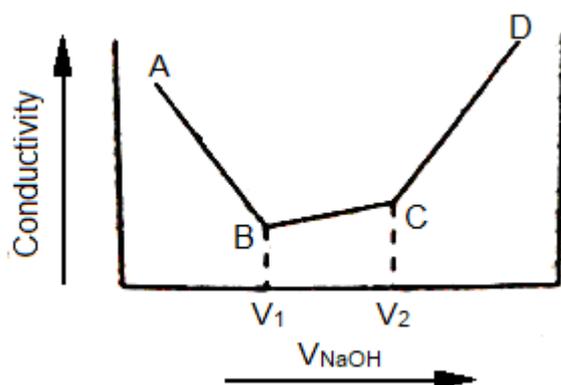
Choose correct statement(s) regarding the above conductivity graph. (B and C represent the end points of titration)

(A) A tribasic acid is neutralized by NaOH.
(B) The line AB represents the neutralization of a stronger acid than that is represented by the line BC.
(C) CD does not represent the neutralization curve of any acid.
(D) The graph represents neutralization of $NaHCO_3$ by NaOH.

(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 (Oxo-acids)		List– II (Characteristics)
(P)	HNO_3	(1)	Loses H_2O on heating to form a pyro acid
(Q)	H_3PO_4	(2)	Reacts with P_4O_{10} to form the acid anhydride
(R)	$HClO_4$	(3)	Central atom is in +6 oxidation state
(S)	$H_2S_2O_8$	(4)	Produced by electrolysis of another oxy-acid with same oxidation number of the central atom
		(5)	Undergoes disproportionation reaction

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

9.   Match the lists.

	List – I (compounds of Xenon)		List– II (Characteristics)
(P)	XeO_4	(1)	Is the partial hydrolysis product of a fluoride of xenon
(Q)	XeF_4	(2)	Has triangular pyramidal shape
(R)	$XeOF_4$	(3)	Contains no lone pair on central atom
(S)	XeO_3	(4)	Reacts with water forming xenon as one of the hydrolysis products
		(5)	Xenon undergoes sp^3d hybridization

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

Space For Rough Work

10.   Match the lists.

	List – I (Electrolytes)		List– II (Electrolysis using inert-electrodes)
(P)	Aqueous NaCl	(1)	pH of the solution decreases after electrolysis
(Q)	Aqueous CuSO$_4$	(2)	H$_2$ is evolved at anode and metal is deposited at the cathode
(R)	Molten NaH	(3)	pH of the solution increases after electrolysis
(S)	Molten NaOH	(4)	pH of electrolyte becomes 7 after electrolysis
		(5)	Metal deposited at anode and Cl$_2$ gas evolved at the cathode

(A) P → 2; Q → 3; R → 1; S → 4   (B) P → 2; Q → 3; R → 4; S → 5
(C) P → 3; Q → 5; R → 2; S → 1   (D) P → 3; Q → 1; R → 2; S → 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.   A hydrogen electrode is placed in two separate solution containing both CH$_3$COOK and CH$_3$COOH in the ratio of a : b in one system and b : a in other system has electrode potential values of -1.59 and +1.0 V, respectively. Calculate pK$_a$ of CH$_3$COOH.

2.   The half cell potential of a half cell A^{x+}, A$^{(x+n)+}$ | Pt is found to be as follows
      a. Percent of reducing form   25   50
      b. Cell potential/V   0.10   0.115
      Determine the value of n

3.   The molar conductance of acetic acid at infinite dilution is 390.7 and for 0.01 M acetic acid is 3.907 S cm^2 mol^{-1}. Calculate the pH of solution.

4.   The standard potential of a cell using the reaction:

      $2MnO_4^-(aq) + 3Hg(l) + H_2O \rightleftharpoons 2MnO_2(s) + 3HgO(s) + 2(\overline{OH})(aq)$ is 0.489V at 25°C. If the equilibrium constant of reaction is 4.4×10^{xy}. Find y - x?

5.   Reaction of P$_4$ with O$_2$ in the molar ratio of 1:5 forms (A). Reaction of (A) with (B) form SO$_3$ and (C). Reaction of one mole of (A) with x moles of (C) forms H$_3$PO$_4$. If the molar mass of (B) is y g mol^{-1} and the mass of x moles of (C) is z gram, what is the value of (y + z)?

6. $Zn(s) | Zn^{2+}(C_1) || Cu^{2+}(C_2) | Cu(s)$

      The standard electrode potential of the above electrochemical cell is 1.1 Volt. What will be the cell

      potential in volt unit when the ratio of C$_1$:C$_2$ = 1:100? $\left[\text{Assume } \dfrac{2.303RT}{F} = 0.06 \right]$

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 system of linear equations $x + y + z = 2,\ 2x + y - z = 3,\ 3x + 2y + kz = 4$ has a unique solution if
   (A) $k \neq 0$ (B) $-1 < k < 1$ (C) $-2 < k < 2$ (D) $k = 0$

2. If $a_1, a_2, a_3, \ldots, a_n, \ldots$ are in G.P. and $a_i > 0$ for each i, then the value of the determinant
   $$\Delta = \begin{vmatrix} \log a_n & \log a_{n+2} & \log a_{n+4} \\ \log a_{n+6} & \log a_{n+8} & \log a_{n+10} \\ \log a_{n+12} & \log a_{n+14} & \log a_{n+16} \end{vmatrix} \text{ is equal to}$$
   (A) 1   (B) 2   (C) 0   (D) None of these

3. If $A = \begin{pmatrix} 3 & 2 \\ 0 & 1 \end{pmatrix}$, then $\left(A^{-1}\right)^3$ is equal to
   (A) $\dfrac{1}{27}\begin{pmatrix} 1 & -26 \\ 0 & 27 \end{pmatrix}$ (B) $\dfrac{1}{27}\begin{pmatrix} -1 & 26 \\ 0 & 27 \end{pmatrix}$ (C) $\dfrac{1}{27}\begin{pmatrix} 1 & -26 \\ 0 & -27 \end{pmatrix}$ (D) $\dfrac{1}{27}\begin{pmatrix} -1 & -26 \\ 0 & -27 \end{pmatrix}$

4. If a matrix A is such that $3A^3 + 2A^2 + 5A + I = 0,$ then its inverse is
   (A) $-\left(3A^2 + 2A + 5I\right)$ (B) $3A^2 + 2A + 5I$ (C) $3A^2 - 2A - 5I$ (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 value of x in the following determinant equation $\begin{vmatrix} a+x & a-x & a-x \\ a-x & a+x & a-x \\ a-x & a-x & a+x \end{vmatrix} = 0$ are

   (A) 0   (B) a   (C) 2a   (D) 3a

6. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $\left|A^3\right| = 125,$ then $\alpha =$
   (A) 3   (B) ± 2 (C) –3   (D) 0

7. If the system of equaiton $x - ky - z = 0,\ kx - y - z = 0$ has a non zero solution, then the possible value of k are
   (A) 2   (B) –1   (C) 1   (D) 0

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.   Suppose a, b, c are three distinct real numbers and $f(x)$ is a real quadratic polynomial such that

$$\begin{bmatrix} 4a^2 & 4a & 1 \\ 4b^2 & 4b & 1 \\ 4c^2 & 4c & 1 \end{bmatrix} \begin{bmatrix} f(-1) \\ f(1) \\ f(2) \end{bmatrix} = \begin{bmatrix} 3a^2 + 3a \\ 3b^2 + 3b \\ 3c^2 + 3c \end{bmatrix}$$

	List – I		List – II
(P)	x – coordinate(s) of the point of intersection of $y = f(x)$ with the X – axis is	(1)	–2
(Q)	Area (in sq. units) bounded by $y = \dfrac{3}{2}f(x)$ and the X – axis is	(2)	1
(R)	Maximum value of $f(x)$ is	(3)	2
(S)	Length (in unit) of the intercept made by $y = f(x)$ on the X – axis is	(4)	4
		(5)	–4

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

9.   Let $f(x)$ denotes the determinants

$$f(x) = \begin{vmatrix} x^2 & 2x & 1+x^2 \\ x^2+1 & x+1 & 1 \\ x & -1 & x-1 \end{vmatrix}.$$

On the expansion $f(x)$ is seen to be a 4th degree polynomial given by $f(x) = a_0 x^4 + a_1 x^3 + a_2 x^2 + a_3 x + a_4$. Using differentiation of determinant of otherwise match the entries in List – 1 with one or more entries of the elements of List – II

	List – I		List – II
(P)	$a_0^2 + a_1$ is divisible by	(1)	2
(Q)	$a_2^2 + a_4$ is divisible by	(2)	3
(R)	$a_0^2 + a_2$ is divisible by	(3)	4
(S)	$a_4^2 + a_3^2 + a_1^2$ is divisible by	(4)	5
		(5)	7

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

Space For Rough Work

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

	List – I		List – II
(P)	Coefficient of x in $f(x) = \begin{vmatrix} x & (1+\sin x)^3 & \cos x \\ 1 & \log(1+x) & 2 \\ x^2 & 1+x^2 & 0 \end{vmatrix}$, when each of $\sin x, \cos x$ and $\log(1+x)$ is expanded in power of x.	(1)	10
(Q)	Value of $\begin{vmatrix} 1 & 3\cos\theta & 1 \\ \sin\theta & 1 & 3\cos\theta \\ 1 & \sin\theta & 1 \end{vmatrix}$ is	(2)	0
(R)	If a, b, c are in A.P. and $f(x) = \begin{vmatrix} x+a & x^2+1 & 1 \\ x+b & 2x^2-1 & 1 \\ x+c & 3x^2-2 & 1 \end{vmatrix}$, then $f'(0)$ is	(3)	−12
(S)	If $\begin{vmatrix} x & 2 & x \\ 1 & x & 6 \\ x & x & x+1 \end{vmatrix} = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0$, then x_0 is	(4)	−2
		(5)	−10

The correct option is

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

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

(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 $\begin{vmatrix} 3^2+4 & 4^2 & 3^2+3+k \\ 4^2+k & 5^2 & 4^4+4+k \\ 5^2+k & 6^2 & 5^2+5+k \end{vmatrix} = 0$, the value of $\sqrt{2^k \sqrt{2^k \sqrt{2^k ......\infty}}}$ is

2. Let α, β and γ are three distinct roots of $\begin{vmatrix} x-1 & -6 & 2 \\ -6 & x-2 & -4 \\ 2 & -4 & x-6 \end{vmatrix} = 0$, the value of $\left(\dfrac{1}{\alpha} + \dfrac{1}{\beta} + \dfrac{1}{\gamma}\right)^{-1}$ is

Space For Rough Work

3.   If $0 \le \theta \le \pi$ and the system of equations

$x = (\sin\theta)y + (\cos\theta)z$

$y = z + (\cos\theta)x$

$z = (\sin\theta)x + y$

has a non – trivial solution, then $\dfrac{80}{\pi}$ is equal to

4.   If the matrix $A = \begin{bmatrix} \lambda_1^2 & \lambda_1\lambda_2 & \lambda_1\lambda_3 \\ \lambda_2\lambda_1 & \lambda_2^2 & \lambda_2\lambda_3 \\ \lambda_3\lambda_1 & \lambda_3\lambda_2 & \lambda_3^2 \end{bmatrix}$ is idempotent, the value of $\lambda_1^2 + \lambda_2^2 + \lambda_3^2$ is

5.   If A is an idempotent matrix and I is an identity matrix of the same order, then the value of n, such that $(A + I)^n = I + 127A$ is

6.   Let $A = \begin{bmatrix} 0 & \alpha \\ 0 & 0 \end{bmatrix}$ and $(A + I)^{70} - 70A = \begin{bmatrix} a-1 & b-1 \\ c-1 & d-1 \end{bmatrix}$, the value of $a + b + c + d$ is

Space For Rough Work

FIITJEE INTERNAL TEST

Batches – Two Year CRP(2426) Batches
Common Test – 5
Code: 101101
JEE ADVANCED LEVEL
ANSWER KEY

ANSWER KEYS

Physics

PART – A

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

PART – B

1.	6	2.	2	3.	70.7 (range: 70.0 to 71.0)		
4.	5	5.	4	6.	6		

Chemistry

PART – A

1.	B	2.	D	3.	B	4.	B
5.	ABD	6.	AC	7.	BC	8.	D
9.	C	10.	D				

PART – B

1.	5	2.	2(range 1 - 2)	3.	4	4.	5
5.	206	6.	1.16				

Mathematics

PART – A

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

PART – B

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