FIITJEE   INTERNAL TEST

PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 101013   **RIT-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 (08-10) –** 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)
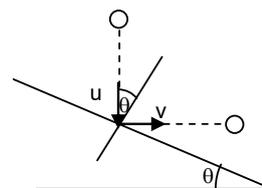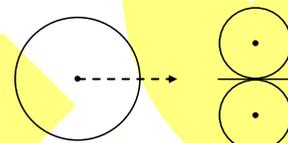
(Single Correct Answer Type)

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 solid sphere of mass m is lying at rest on a rough horizontal surface. The coefficient of friction between surface and sphere is μ. The maximum value of force F applied at centre of mass of sphere, so that sphere will not slip, is equal to
     (A) 7μmg/5   (B) 4μmg/7   (C) 5μmg/7   (D) 7μmg/2

2.   Two equal discs initially at rest are in contact on a smooth horizontal table. A third disc of same mass but of double radius strikes them symmetrically and comes to rest after impact. the coefficient of restitution is

     (A) $\dfrac{3}{4}$ (B) $\dfrac{9}{16}$ (C) $\dfrac{3}{16}$ (D) $\dfrac{4}{9}$

3.   A thin uniform rod of mass 'm' and length 'ℓ' is standing on a smooth horizontal surface.

     A slight disturbance causes the lower end to slip on the smooth surface. The velocity of centre of mass of the rod at the instant when it makes an angle 60° with vertical will be

     (A) $\sqrt{\dfrac{9g\ell}{26}}$ downward   (B) $\sqrt{\dfrac{g\ell}{13}}$, 30° with downward vertical

     (C) $\sqrt{\dfrac{3g\ell}{26}}$ horizontal   (D) $\sqrt{\dfrac{3g\ell}{13}}$, 60° with downward vertical

4.   A ball is dropped on an inclined plane and is observed to move horizontally after the impact. The coefficient of restitution between plane and ball is e. The angle θ is:
     (A) 45°   (B) $\tan^{-1}e$
   (C) $\tan^{-1}\sqrt{e}$ (D) $\tan^{-1}\dfrac{e}{2}$

*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 ball P collides elastically with an another identical ball Q at rest with velocity 10 m/s at an angle of 30° from the line joining their centres c_1 and c_2. Select the correct alternative(s)
    (A) Velocity of ball P after collision is 5 m/s
    (B) Velocity of ball Q after collision is $5\sqrt{3}$ m/s
    (C) both the ball move at right angle after collision
    (D) kinetic energy will not be conserved since collision is not a head-on collision.
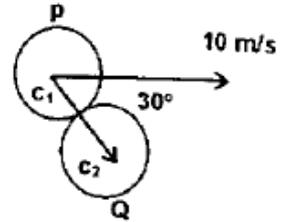
6. A solid sphere of radius R and mass m is released from point A on a vertical circular surface of radius $5R$ which has sufficient friction in part AB. Part BCD is smooth. h is the maximum height attained by the centre of the sphere from point C in part CD. Total energy and kinetic energy at this height is T and K respectively (assume lowest point C of the circular path as reference point for potential energy). Then
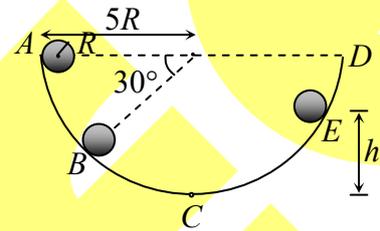
    (A) $h = \dfrac{31}{7}R$

    (B) $T = 5mgR$

    (C) $K = \dfrac{4}{7}mgR$

   (D) Friction force on the sphere just before point $B = \dfrac{2\sqrt{3}mg}{5}$

7. Choose the correct statement or statements regarding elastic collision.
    (A) The kinetic energy of the system is conserved.
    (B) Momentum of the system is conserved
    (C) Mechanical energy of the system is conserved
    (D) Total energy of the system is conserved

*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. A uniform rod of mass m and length ℓ released from the position shown in figure and it start rotating in vertical plane about hinge. (g = 10 m/sec^2)
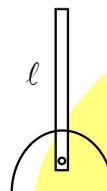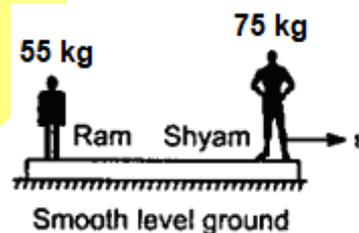
	List-I		List-II
(P)	Angular velocity of rod.	(1)	15
(Q)	Normal reaction in vertical direction.	(2)	3
(R)	Velocity of point P at distance r from hinge.	(3)	4
(S)	Centripetal force on centre of mass	(4)	2.5
		(5)	6.5

Mass of rod 1 kg, length $\ell = \dfrac{10}{3}$ meter, angular displacement θ = 90°, $r = \dfrac{4}{3}$ meter

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

9. Two men of mass 55 kg and 75 kg stand on a plank of mass 25 kg. Both of them can jump with a velocity of 1 m/s relative to the plank. In each event shown in List-I, find the velocity of plank after the event. Sign of right direction is (+ve) and (–ve) for left direction.
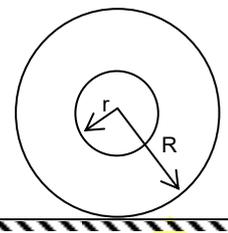
	List-I		List-II
(P)	Ram alone jumps to the left	(1)	$-\dfrac{49}{124}$ m/s
(Q)	Shyam alone jumps to the right	(2)	$-\dfrac{16}{31}$ m/s
(R)	Ram jumps to left and Shyam jumps to right simultaneously	(3)	$\dfrac{11}{31}$ m/s
(S)	Ram jumps to left and after that Shyam jumps to right.	(4)	$-\dfrac{4}{31}$ m/s
		(5)	$\dfrac{1}{31}$ m/s

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

10.   A heavy spool of mass M and radii r and R of axle and spool respectively is resting on rough surface so that there is no any relative motion between points of contact. An ideal string is wound on the axle. The string is continuously pulled by applying force F. There is no slipping between string and axle friction. Match the list-I with list-II. ($I = MR^2$)

|	List – I		List – II
(P)	Force F is applied to string towards left and spool rolls without slipping	(1)	$\alpha = \dfrac{F(r+R)}{2MR^2}$
(Q)	Force F = Mg is applied vertically upwards	(2)	$\alpha = \dfrac{F(R-r)}{2MR^2}$
(R)	Force F applied at angle θ_0 with vertical so that line of force passes through point of contact	(3)	$\alpha \neq 0, a_{cm} = 0$
(S)	Force F is applied to string towards left and spool rolls without slipping	(4)	$\alpha \neq 0, a_{cm} \neq 0$ or $\alpha = 0, a_{cm} = 0$
		(5)	$\alpha \neq 0, a_{cm} \neq 0$

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

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 vertical jet of water coming out of a nozzle with velocity 20 m/s supports a plate of mass M at a height h = 10m, as shown in the figure. If the rate of water flow is 1 litre per second then find the mass of the plate in kg. (assume the collision to be inelastic)
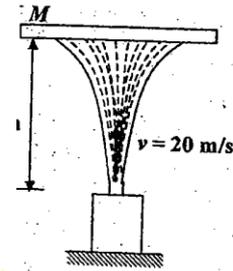
2.   Moment of Inertia of the given isosceles triangular plate in figure-1, about an axis passing through O and perpendicular to plate I. If the moment of Inertia of the given plate is figure-2, about an axis passing through C and perpendicular to the plate as shown in the figure is kI then find k. (mass per unit area of both the plate is same).
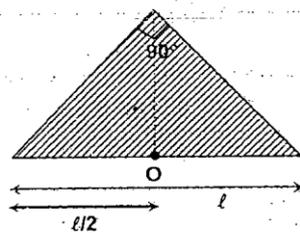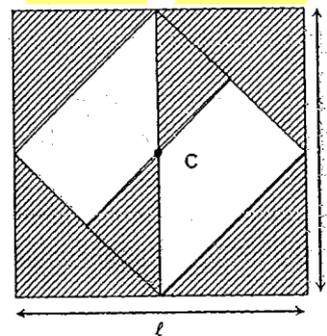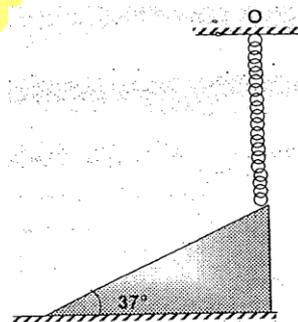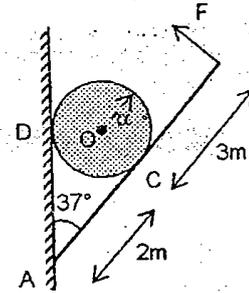

Figure -1

Figure -2

3.   A thin flexible uniform chain of mass m and length l is suspended from point O so that its lower end just touches a smooth inelastic fixed plane of inclination 37 degree. Now the chain is released from point O then find the total Impulse on the plane while the complete chain falls is $km\sqrt{g\ell}$ then find k.

Space For Rough Work

4.   A cylinder of radius r and mass m is wedged between a vertical wall and a light hinged (at point) bar as shown in the figure. The coefficient of friction between cylinder and wall is 0.2 and between bar and cylinder is 0.4. Then find the minimum force which is just sufficient to cause the cylinder to slip upward, when applied at the end of the bar and at right angles to the bar. (take m = 1kg, g = 10m/s²).

5.   The uniform cubical slab of side a is released from rest in the position shown in the figure. For what value of x is the angular acceleration maximum (friction between the surface and the cube is sufficient to prevent any slipping). Take a = 6 m.
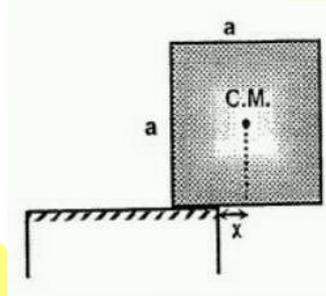
6.   A hollow hemispherical bowl of mass m, radius R is placed on a smooth horizontal surface. A particle (also of mass m) strikes to it with speed u as shown in figure. The velocity of particle just after the collision in vertically upward direction is ku find k.
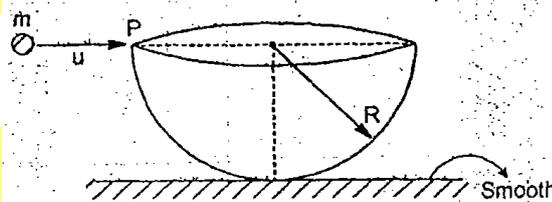
Space For Rough Work

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. For the reversible reaction, $A(g) \rightleftharpoons 2B(g)$, the following concentration versus time graph is given.
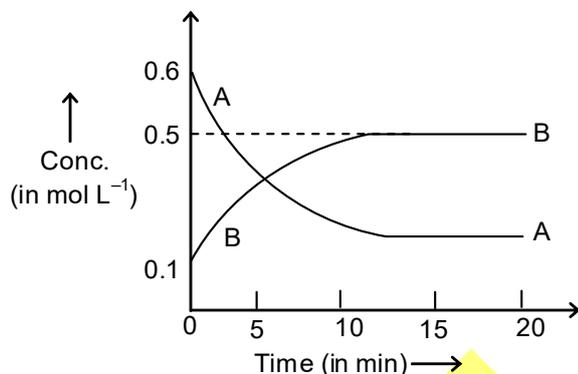

   What is the equilibrium constant of the reaction?
   (A) 60.5×10^{-2} (B) 6.25×10^{-2} (C) 62.5×10^{-2} (D) 625×10^{-2}

2. One litre aqueous solution contains 0.01 mole of NaCl and 0.001 mole of NaOH. What is the pH of the solution? [Assume complete ionization of NaCl and NaOH in the solution]
   (A) 10   (B) 9   (C) 11   (D) 8

3. In a first order chemical reaction, $A(g) \longrightarrow Products$, the value of $\dfrac{[A]_t}{[A]_0} = \dfrac{1}{16}$ after 80 sec from the start of reaction. What is the half-life period of the reaction in sec unit? [log2 = 0.3]
   (A) 15   (B) 20   (C) 16.4   (D) 18.2

4. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

   According to above reversible reaction, the formation of SO_3 is favoured by which of the following changes at equilibrium?
   (A) Increasing pressure   (B) Decreasing pressure
   (C) Removing oxygen   (D) Adding SO_3

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.   For a reversible reaction, $A(s) + 2B(g) \rightleftharpoons C(g)$, the following relations are given

$\Delta G° = -2.303RT\log K_p$

$\Delta G° = \Delta H° - T\Delta S°$

Choose the correct statement(s).

(A) The slope of the graph between $\log K_p$ versus $\dfrac{1}{T}$, gives the value of $\Delta H°$

(B) If $\Delta G° = -36.848$ kJ mol^{-1}, R = 8 JK^{-1} mol^{-1} and T = 1000K, the value of equilibrium constant K_p becomes 100.

(C) At equilibrium, the temperature of the system is equal to $\dfrac{\Delta H°}{\Delta S°}$

(D) The rate versus time graph of the reaction can be given as
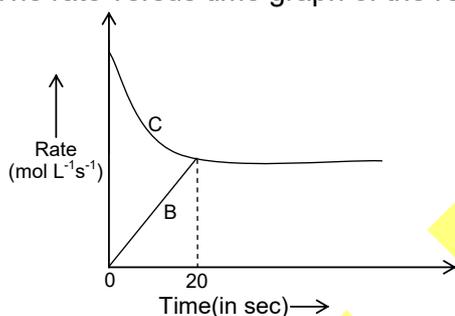
6.   Which of the following is/are correct for the solubility of AB(s) in water?

$AB(s) \rightleftharpoons A^{2+}(aq) + B^{2-}(aq); K_{sp} = 1 \times 10^{-8}$
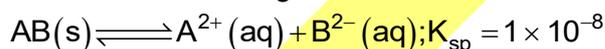
(A) If the molar mass of AB is M g mol^{-1}, then the mass of AB needed to form 100 mL of saturated solution with water is $(M \times 10^{-5})$g.

(B) The normality and molarity of the saturated solution of AB have different values.

(C) Both the solubility(s) and solubility product(K_{sp}) of AB increases by increasing temperature when $\Delta H°_{solution} > 0$.

(D) The saturated solution of AB contains equal number of A^{2+} and B^{2-} ions

7.
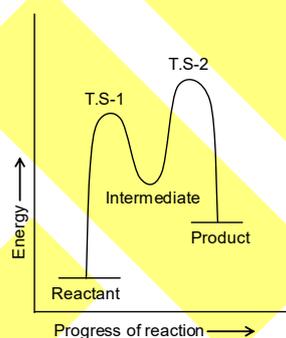
Choose correct statement(s) from the following for a chemical reaction which contains one reactant and one product in gaseous state.

(A) The reaction is endothermic.

(B) Since a reaction intermediate is formed, the reaction takes place in two steps.

(C) The activation energy of the first step is higher than that of the second step.

(D) It is an elementary reaction

Space For Rough Work

(Matching List Sets)

This section contains **Three (03)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. List-I has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

8.   Match the lists.

|	List – I (Molar ratio of acid and base taken in the solution of volume one litre, p^{K_w} of $H_2O = 14$)		List – II (pH of the solution after reaction)
(P)	$CH_3COOH : NaOH = 2 : 1$ [K_a of $CH_3COOH = 10^{-5}$]	(1)	8
(Q)	$CH_3COOH : NH_4OH = 1 : 1$ [K_b of $NH_4OH = 10^{-5}$]	(2)	7
(R)	$NH_4OH : HCl = 11 : 10$	(3)	5
(S)	$CH_3COOH : NaOH = 11 : 10$	(4)	6
		(5)	4

The correct option is:

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

9.   Consider the following reaction taking place in a one litre container

$A(s) \rightleftharpoons 2B(g) + C(g)$
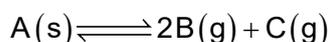
The degree of dissociation of A(s) is 0.2 at 1000K and initially one mole of A(s) was taken in a one litre container. [Assume: R = 0.08 L atm K^{-1} mol^{-1}]

	List – I (Characteristics of the reaction)		List – II (Values of the characteristics properties)
(P)	Equilibrium constant(K_C)	(1)	219.64
(Q)	Equilibrium constant(K_P)	(2)	16384
(R)	Mole fraction of (B) at equilibrium	(3)	1/2
(S)	Ratio of equilibrium partial pressures of C to B, i.e. $p_C : p_B$	(4)	3.2×10^{-2}
		(5)	2/3

The correct option is:

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

Space For Rough Work

10.

	List – I (First order reactions)		List – II (Characteristics)
(P)	$A(g) \underset{k_2}{\overset{k_1}{\rightleftharpoons}} B(g)$	(1)	$\dfrac{d[B]}{dt} = k_1[A] - k_2[B]$
(Q)	$A(g) \xrightarrow{k_1} B(g) \xrightarrow{k_2} C(g)$	(2)	$\dfrac{[B]}{[C]} = \dfrac{k_1}{k_2}$
(R)	$A(g) \overset{k_1}{\nearrow} B(g)$ $A(g) \underset{k_2}{\searrow} C(g)$	(3)	$K_{eq} = \dfrac{k_1}{k_2}$
(S)	$A(g) + B(g) \underset{k_2}{\overset{k_1}{\rightleftharpoons}} C(g)$	(4)	$\dfrac{d[C]}{dt} = k_1[A][B] - k_2[C]$
		(5)	$\dfrac{d[C]}{dt} = k_2[A]$

The correct option is:

(A) (P) → (1), (Q) → (1, 5), (R) → (2), (S) → (4)
(B) (P) → (1, 3), (Q) → (1), (R) → (2, 5), (S) → (3, 4)
(C) (P) → (1, 3), (Q) → (2), (R) → (2), (S) → (3, 4)
(D) (P) → (1), (Q) → (1, 2), (R) → (2, 5), (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. $A(g) \rightleftharpoons B(g) + C(g)$
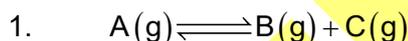
In a one litre container 8 moles of A, 4 moles of B and 8 moles of C are added to study a reversible reaction. Total number of moles of A, B and C at equilibrium is 24. How many moles of A(g) should be added at equilibrium so that the concentration of B(g) becomes 9 mol L^{-1} at the new equilibrium?

2.   The molar mass of NH_4NO_3 is 80 g mol^{-1}. If one litre aqueous solution was prepared by adding 8 g of NH_4NO_3 in water, what will be the pH of the solution at 298 K?

[p^{k_b} of NH_4OH = 5][p^{k_w} of H_2O = 14 at 298K]

Space For Rough Work

3.   The half-life period of a first order reaction is 40 sec. How much time in sec is needed for 75% completion of the reaction?

4.   The frequency factor 'A' in the Arrhenius equation for a first order chemical reaction is 10^3 s^{-1}. If 10% of the reactant molecules cross the energy barrier in the reaction, what is the rate constant of the reaction in s^{-1} unit?

5.   50 mL of 0.1 M H_3PO_4 solution was titrated with 0.2 M NaOH solution. The volume of NaOH consumed in the reaction is 50 mL. After complete titration, what will be the pH of the reaction mixture?
      [Assume that K_{a_1}, K_{a_2} and K_{a_3} of H_3PO_4 are 10^{-7}, 10^{-9} and 10^{-12} respectively]

6.   The half-life of a zero order reaction is 20 sec. How much time in sec is required to complete the reaction?

SECTION – III: MATHEMATICS
(PART – A)
(Single Correct Answer Type)
This section contains **4 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1.   Let α, α^2 be the roots of $x^2 + x + 1 = 0$, then the equation whose roots are α^{31}, α^{62} is:
      (A) $x^2 - x + 1 = 0$ (B) $x^2 + x - 1 = 0$ (C) $x^2 + x + 1 = 0$ (D) $x^{60} + x^{30} + 1 = 0$

2.   Minimum value of $y = x^2 - 3x + 5, x \in [-4, 1]$ is:

      (A) 3   (B) $\dfrac{11}{4}$ (C) 0   (D) 9

3.   If $\log_a(10) + \log_a(10^2) + ... + \log_a(10^{10}) = 110$, then a equals:

      (A) $\sqrt{10}$ (B) 10   (C) 20   (D) $10^{1 + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{10}}$

4.   If a, b, x, y are positive natural numbers such that $\dfrac{1}{x} + \dfrac{1}{y} = 1$ then $\dfrac{a^x}{x} + \dfrac{b^y}{y}$ is

      (A) equal to ab   (B) greater than or equal to ab
      (C) less than or equal to ab   (D) none of these

Space For Rough Work

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

5. If exactly two integers lie between the roots of equation $x^2 + ax - 1 = 0$. Then integral value(s) of 'a' is/are:
    (A) –1   (B) –2   (C) 1   (D) 2

6. If $\log_3\left(\log_2 x\right) + \log_{\frac{1}{3}}\left(\log_{\frac{1}{2}} y\right) = 1$ and $xy^2 = 9$, then:

    (A) $xy = 81$
    (B) $xy = 9$
    (C) number of possible ordered pairs (x, y) is 2
    (D) number of possible ordered pairs (x, y) is 1

7. Let A_1 denotes arithmetic mean of two numbers $a = 1$ and $b = 2$. A_2 denotes arithmetic mean of A_1 and b. For $n \geq 3$, let A_n is arithmetic mean of A_{n-1} and b, then

    (A) $A_{10} = \dfrac{1023}{512}$ (B) $A_{10} = \dfrac{2047}{1024}$ (C) $\sum\limits_{n=1}^{10} A_n > 19$ (D) $\sum\limits_{n=1}^{10} A_n < 19$

(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. Consider the quadratic trinomial $f(x) = 2x^2 - 10px + 7p - 1$, where p is a parameter. Find the range of p in the following conditions given in column I

	List – I		List – II
(P)	If both roots of $f(x) = 0$ are confined in (–1, 1) then	(1)	$\left(\dfrac{2}{5}, \infty\right)$
(Q)	Exactly one root of $f(x) = 0$ lies in $\left(-1, 1\right)$	(2)	ϕ
(R)	Both roots of $f(x) = 0$ are greater than 1	(3)	$\left(-\dfrac{1}{17}, \dfrac{1}{3}\right)$
(S)	One root of $f(x) = 0$ is greater than 1 and other root of $f(x) = 0$ is less than –1	(4)	$\left(-\infty, -\dfrac{1}{17}\right] \cup \left[\dfrac{1}{3}, \infty\right)$
		(5)	$\left(-\infty, -\dfrac{1}{17}\right) \cup \left(\dfrac{1}{3}, \infty\right)$

The correct option is

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

Space For Rough Work

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

List – I		List – II	
(P)	$\sqrt[4]{5^{\frac{1}{\log_7 5}} + \dfrac{1}{\sqrt{-\log_{10}(0.1)}}}$ simplifies to	(1)	2
(Q)	If $\log_b 3 = 4$ and $\log_{b^2} 27 = \dfrac{3a}{2}$, then the value of $\left(a^2 - b^4\right)$ is equal to	(2)	3
(R)	If number of digits in 12^{11} is 'd', and number of ciphers after decimal before significant figure starts in $(0.2)^9$ is 'c' then (d – c) is equal to	(3)	5
(S)	If $N = \text{antilog}_3\left(\log_6\left(\text{antilog}_{\sqrt{5}}\left(\log_5 1296\right)\right)\right)$, then the characteristic of $\log N$ to the base, is equal to	(4)	6
		(5)	13

The correct option is

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

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

List - I		List – II	
(P)	If a, b, c are in G.P. then $\log_a 10, \log_b 10, \log_c 10$ are in	(1)	A.P.
(Q)	If $\dfrac{a + be^x}{a - be^x} = \dfrac{b + ce^x}{b - ce^x} = \dfrac{c + de^x}{c - de^x}$, then a, b, c, d are in	(2)	H.P.
(R)	If a, b, c are in A.P., a, x, b are in G.P., and b, y, c are in G.P. then x^2, b^2, y^2 are in	(3)	G.P.
(S)	If x, y, z are in G.P., $a^x = b^y = c^z$, then $\log a, \log b, \log c$ are in	(4)	A.G.P.
		(5)	None of these

The correct option is

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

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.   The number of values of k for which the equation $x^2 - 3x + k = 0$ has two real and distinct roots lying in the interval (0, 1), are:

2.   If $\dfrac{1+\alpha}{1-\alpha}, \dfrac{1+\beta}{1-\beta}, \dfrac{1+\gamma}{1-\gamma}$ are roots of the cubic equation $f(x) = 0$ where α, β, γ are the roots of the cubic equation $3x^3 - 2x + 5 = 0$, then the number of negative real roots of the equation $f(x) = 0$ is:

3.   If $\log_x y + \log_y x^2 = 3$, then find the sum of all possible values of $\log_x y^3$.

4.   Let 'p' be the greatest integer for which $5m^2 - 16m, 2m, p^2$ are distinct consecutive terms of an A.P. where $m \in R$. If common difference of the A.P. is $\left(\dfrac{A}{B}\right), A, B \in N$ then find the least value of $(26B - A)$

5.   Let $a_1 a_2 a_3 a_4$ be a four digit natural number such that a_1, a_2, a_3 are in arithmetic progression and a_2, a_3, a_4 are in geometric progression. If $a_4 = a_1 - 5$ and $d + 4r = 0$ then find $\sum_{i=1}^{4} a_i$.
      [Note: d represent common difference of arithmetic progression and r represent common ratio of geometric progression.]

6.   Let $<a_n>$ be an arithmetic sequence such that arithmetic mean of $a_1, a_3, a_5, \ldots \ldots a_{97}, a_{99}$ is 1. Find the value of $\left| \sum_{r=1}^{50} (-1)^{\frac{r(r+1)}{2}} . a_{2r-1} \right|$

Space For Rough Work

FIITJEE INTERNAL TEST

BATCHES – Class – XII (CTY426 Batches)

RIT – 3
Code: 101013
JEE ADVANCED LEVEL
ANSWER KEY
ANSWER KEYS
Physics
PART – A

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

PART – B

1.	1.41	2.	6.50	3.	1.13
4.	14.67 (range: 14.60 to 14.70)		5.	3.87 (range: 3.86 to 3.88)	
6.	0.12				

Chemistry
PART – A

1.	C	2.	C	3.	B	4.	A
5.	AB	6.	ABCD	7.	ABC	8.	C
9.	B	10.	B				

PART – B

1.	1.87(range 1.7 to 1.9)		2.	5	3.	80
4.	100	5.	10.5 (Range: 10.2 to 10.8)		6.	40

Mathematics
PART – A

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

PART – B

1.	0	2.	1	3.	9	4.	2
5.	13	6.	2				