FIITJEE (JEE-Advanced)

BATCHES – NWCM721O1S, NWCM921X1W, NWCM921A1W & PANINI921-XIIG1

PHYSICS, CHEMISTRY & MATHEMATICS

QP Code: **Test- 5**

Time Allotted: 3 Hours **Maximum Marks: 198**

- 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. Each **Section** is further divided into **Three Parts**: **Part-A, B & Part-C** in the 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 HB pencil 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 Three Parts.

(i) **Part-A (01-06) –** Contains seven (06) multiple choice questions which have **One or More** 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*: –2 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 **–2** marks, as a wrong option is also darkened.

(ii) **Part-B (07-12)** contains Six (06) Numerical based questions with single digit integer as answer, ranging from 0 to 9 (both inclusive) and each question carries **+3 marks** for correct answer and **-1 marks** for wrong answer.

(iii) **Part-C (13-18)** contains Six (06) Numerical based questions, the answer of which maybe positive or negative numbers or decimals (e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) and each question carries **+4 marks** for correct answer and **there will be no negative marking.**

Name of the Candidate :_____

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

Enrolment Number :_____

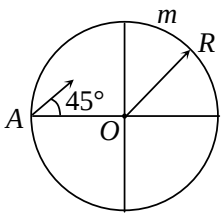
SECTION-1 : PHYSICS

PART – A

(Multi Correct Choice Type)

This section contains 6 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

1. A ring of mass *m* and radius *R* is placed on a frictionless horizontal surface. A particle of mass *m* is projected from point *A* with velocity *v* at an angle of 45° with *AO* as shown(particle is projected along the surface). The correct statements are



(A) The particle reaches the same point *A* on the ring after time $\frac{4R\sqrt{2}}{v}$.

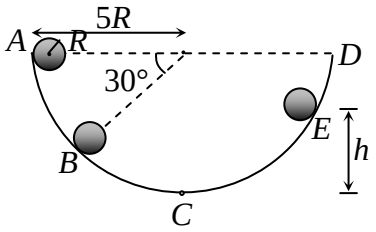
(B) Magnitude of impulse transformed during first collision is $\frac{mv}{\sqrt{2}}$.

(C) Magnitude of impulse transformed during second collision is $\frac{mv}{\sqrt{2}}$.

(D) Particle reaches diametrically opposite point on the ring in time $\frac{2R}{v}$.

1. **ABC**

2. A solid sphere of radius *R* and mass *m* is released from point *A* on a vertical circular surface of radius 5*R* 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) $h = \frac{31}{7}R$

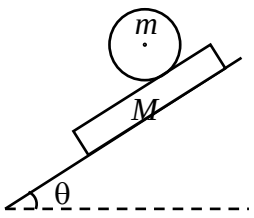
(B) $T = 5mgR$

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

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

2. **ABC**

3. A solid sphere of mass *m* is released on the plank of mass *M* which lies on an inclined plane of inclination θ as shown in figure. There is sufficient frictional force between sphere and plane and the minimum value of co-efficient of friction between plank and surfaces is μ to keep the plank at rest. Then



(A) frictional force between sphere and plank is $\frac{2}{7}mg\sin\theta$, when plank is at rest.

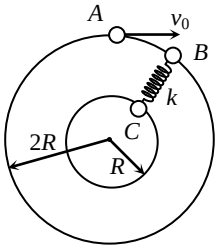
(B) the value of μ is $\frac{7M+2m}{7(M+m)}\tan\theta$.

(C) If there is no friction between the plank and inclined plane, then acceleration of plank is less than *g* sin θ.

(D) If there is no friction between plank and inclined plane, then friction force on the sphere is zero.

3. **ABD**

4. Three particles each of mass *m*, can slide on fixed frictionless circular tracks in the same horizontal plane as shown. Particle *A* moves with velocity v_0 and hits particle *B* elastically. Assuming that *B* and *C* are initially at rest and lie along a radial line and the spring is initially relaxed before impact, then



(A) the velocity of *B* immediately after impact is v_0

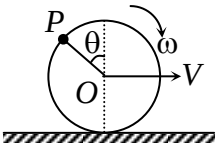
(B) the velocity of *C* when the stretch in the spring is maximum is $\frac{2v_0}{5}$

(C) the velocity of *B* when the stretch in the spring is maximum is $\frac{4v_0}{5}$

(D) the maximum stretch in the spring in the spring is $\sqrt{\frac{m}{5k}}v_0$

4. **ABCD**

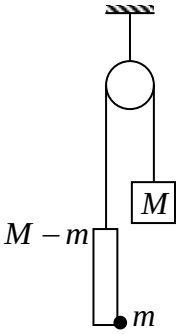
5. A disc of radius *R* rolls on a horizontal surface with linear velocity *V* and angular velocity ω. There is a point *P* on circumference of disc at angle θ with upward vertical diameter measured anticlockwise see figure, which has a vertical velocity. Here θ is equal to



(A) $\pi+\sin^{-1}\frac{V}{R\omega}$ (B) $\frac{\pi}{2}-\sin^{-1}\frac{V}{R\omega}$ (C) $\pi-\cos^{-1}\frac{V}{R\omega}$ (D) $\pi+\cos^{-1}\frac{V}{R\omega}$

5. **CD**

6. A rod of mass '$M-m$' carries an insect of mass '*m*' at its bottom end and its top end is connected with a string which passes over a smooth pulley and the other end of the string is connected to a counter mass *M*. Initially the insect is at rest. Choose the correct option(s).



(A) As insect starts moving up relative to rod, the acceleration of centre of mass of the system (insect + rod + counter mass) becomes non-zero

(B) As insect starts moving up relative to rod, tension in the string remains constant and is equal to *Mg*.

(C) As insect starts moving up relative to rod, the tension in the string becomes more than *Mg*.

(D) Acceleration of centre of mass of the system (insect + rod +counter mass) is zero when insect moves with constant velocity.

6. **ACD**

PART – B

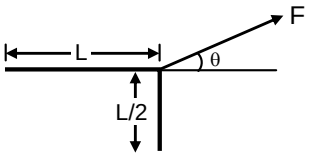
Integer Answer Type

This section contains **6 questions**. The answer to each of the questions is a single digit integer, ranging from **0 to 9**.

7. A thin uniform rod of mass 'm', length 'ℓ' rotates uniformly about a vertical axis ω, form a conical pendulum, the upper end of the rod is hinged and θ is angle between rod and vertical. If the change of angular momentum of the rod about hinge is $\frac{m\ell^2}{x}\omega^2\sin 2\theta$ then the value of 'x' will be

7. **6**

8. A uniform thin L shaped rod is placed on the rough horizontal surface and its corner is pulled by a string as shown in the figure. If it moves only translationally then the value of cot θ will be

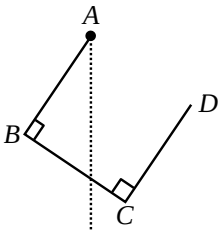


8. **4**

9. A chain of length $\frac{\pi}{2}R$ and mass 'm' lies on the surface of a fixed and smooth sphere of radius 'R' with one end tied with a string and held in such a way that the string is horizontal and tied end of chain is at the top of the sphere. If the tension in the string is $\frac{xmg}{\pi}$ then the value of 'x' will be

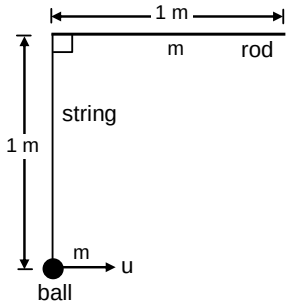
9. **2**

10. Three identical rods are joined and hinged at *A* as shown. If the angle made by the rod *AB* with the vertical in equilibrium is θ then the value of 10 sinθ will be



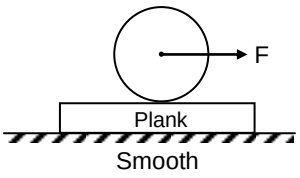
10. **6**

11. As situation shown in figure the ball has been given a velocity u. Find the ratio of magnitude of the acceleration of left end of the rod to the magnitude of acceleration of the ball.



11. **5**

12. A solid cylinder of mass m is placed over a plank of same mass as shown in figure. The plank is placed on smooth horizontal surface. There is sufficient friction between cylinder and plank to prevent slipping. If a force is applied at the centre of the cylinder then find the ratio of magnitude of acceleration of cylinder to magnitude of the acceleration of the plank.

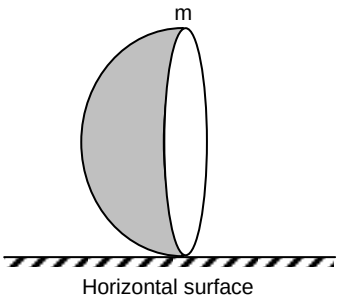


12. **3**

PART – C
(Numerical based)

This section contains **6 questions**, numerical based questions, (answer of which maybe positive or negative numbers or decimals).

1. A solid hemisphere of mass 'm' is released from rest from a position shown in figure. If there is no slipping then the magnitude of the friction on the sphere at just after the released will be K mg , then K is

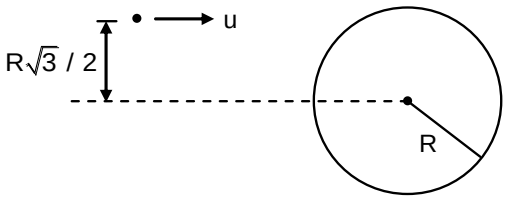


1. **0.26**
Range: 0.26 to 0.27

2. A wire of length ℓ and mass m is bent in the form of a rectangle ABCD with $\frac{AB}{BC} = 2$. If the moment of inertia of this wire frame about the side BC is $X\, m\ell^2$, then find the value of '81X'.

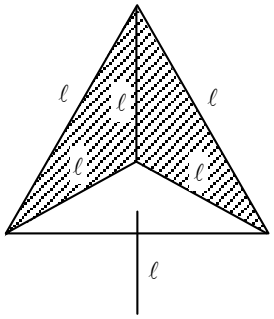
2. **3.5**

3. A small particle travelling with a speed u towards right collides with a spherical body of equal mass as shown in figure. The centre of this spherical body is located a distance $\frac{\sqrt{3}}{2}$R away from the direction of motion of the particle. The coefficient of restitution between them is $\frac{1}{2}$. Then speed of the sphere after the collision will be ? (u = 1m/sec)



3. **0.37**

4. Moment of inertia of thin regular pyramidal shell of mass m, length ℓ about an axis passing through apex and centre of open base as shown in figure will be $X\, m\ell^2$, then find the value of 'X'.



4. **0.08**
Range: 0.06 to 0.09

5. A rod collides elastically with smooth horizontal surface after falling from a height. For maximum angular speed of the rod just after impact, the rod should be released in such a way that it makes an angle α with horizontal, the value of α will be $cos^{-1}\frac{1}{K}$, Then K is

5. **1.73**
Range: 1.730 to 1.735

6. A rod of length $R\sqrt{3}$ is kept vertically inside a fixed smooth spherical shell of radius R such that its both ends are contact with the shell. If the rod is released then the angular speed of the rod, when it becomes horizontal will be "$K\sqrt{\frac{g}{R}}$", then K is

6. **1.41**
Range: 1.41 to 1.42

SECTION-2 : CHEMISTRY

PART – A

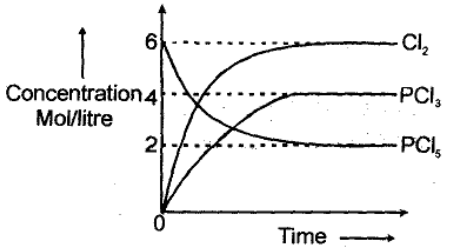
(Multi Correct Choice Type)

This section contains 6 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

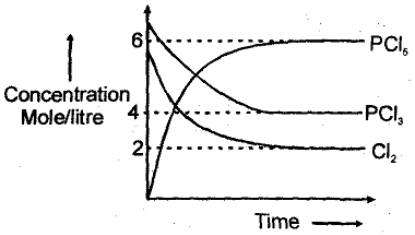
1. For the equilibrium, $PCl_3 \rightleftharpoons PCl_3(g) + Cl_2(g)$

Which of the following sketch may represent above equilibrium. Assume equilibrium can be achieved from either side and by taking any one or more components initially. (Given K_c for the reaction < 2)

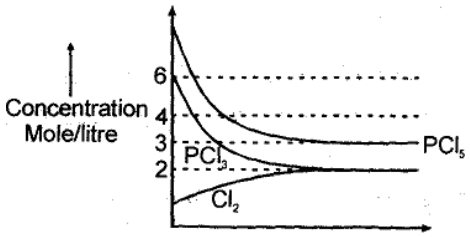
(A)



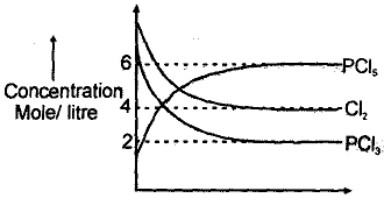
(B)



(C)



(D)

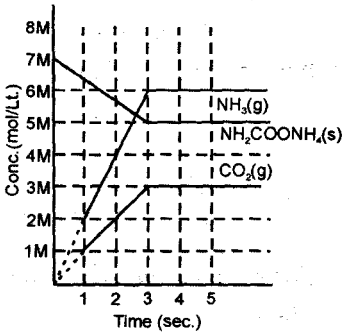


1. BD

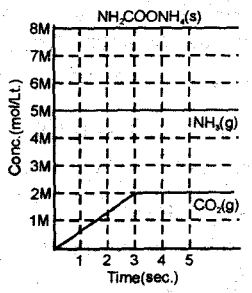
2. Solid ammonium carbamate dissociate to give ammonia and carbon dioxide as follows $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$

Which of the following graph incorrectly represents the equilibrium.

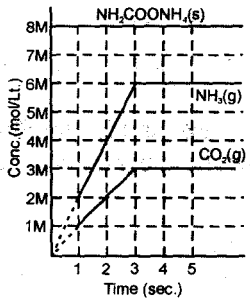
(A)



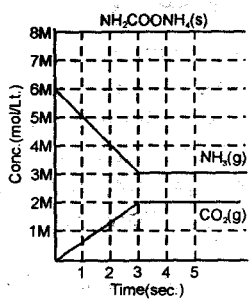
(B)



(C)



(D)



2. ABD

3. A closed jar having waters vapours in equilibrium with liquid suddenly all the vapours of the jar is transferred to another, identical jar and is subjected to compression. Assume initial temperature to be the same and negligible volume occupied by the liquid water. Select the observation in the record jar
(A) liquid water will Start forming in the jar
(B) vapour will undergo gradual compression without any condensation.
(C) temperature of the vapour will increases.
(D) final pressure will be the same as initial pressure.

3. AD

4. If two gases AB_2 and BC are mixed the following equilibria are readily Established

$$AB_2(9) + B_2C(g) \rightarrow AB_3(g) + BC\ (g)$$
$$BC(g) + B_2C(g) \rightarrow B_3C_2\ (g)$$

It the reaction is started only with AB_2 with B_2C, then which of the following is necessarily true at equilibrium:
(A) $[AB_3]_{eg} = [BC]_{eq}$ (B) $[A6_2]_1 = [B_2C]_{eg}$
(C) $(AB_3]_{eq} > [B_3C_2]_{eq}$ (D) $[AB_3]_{aq} > [BC]_{eq}$

4. CD

5. The solubility of a sparingly soluble salt A_xB_y in water at 25°C 1.4×10^{-4} M. The solubility product is 1.1×10^{-11}. The possibilities are :
(A) x = 1, y = 2 (B) x = 2, y = 1
(C)x = 1,y = 3 (D) x = 3, y = 1

5. AB

6 The variation of pH during the titration of 0.5 N Na_2CO3 with 0.5 N HCI is shown in the given graph. The following table indicates the colour and pH ranges of different indicators :

Indicator	Range of colour change	Colour in acid	Colour in base
Thymol blue	1.2 to 2.8	Red	Yellow
Bromocresol red	4.2 to 6.3	Red	Yellow
Bromothymol blue	6.0 to 7.6	Yellow	Blue
Cresolphethalein	8.2 to 9.8	Colouriess	Red

Based on the graph and the table, which of the following statements are true?
(A) The first equivalence point can be detected by cresolphthalein.
(B) The complete neutralisation can be detected by bromothymol blue
(C) The second equivalence point can be detected by bromocresol red.
(D) The volume of HCI required for the first equivalence point is half the volume of HCI required for the second equivalence point.

6. ACD

PART – B

Integer Answer Type

This section contains **6 questions**. The answer to each of the questions is a single digit integer, ranging from **0 to 9**.

7. A closed container has excess of $CaCO_3$ and $BaCO_3$. The K_P for the equilibriums $CaCO_3$ (s) $\rightleftharpoons$ CaO (s) + CO_2 (g) is 4 atm and that of $BaCO_3$ (s) $\rightleftharpoons$ BaO (s) + CO_2 (g) is 5 atm. The final pressure of CO_2 in the container will be

7. 5

8. For H_2SO_4, K_{a_1} = infinite and $K_{a_2} = 1.2 \times 10^{-2}$. The molarity of H_2SO_4 solution of pH 2.0 is 'xM'. The value of '1000000x' is

8. 1

9 When equal volumes of 0.2 M $AgNO_3$ and 1 M KCN solutions were mixed then at equilibrium, concentration of Ag was found to be 10^{-6}M. While when equal volumes of 0.2 M $Zn(NO_3)_2$ solution and of 1 M KCN solution were mixed then at equilibrium, concentration of Zn^2 ion was found to be 10^{-12}M. If the equilibrium constant of following is ABCD, then calculate X = A+B+C+D

$$2[Ag(CN)_2]^- (aq.) + Zn^2 (aq.) \rightleftharpoons [Zn(CN)_4]^{2-} (aq.) + 2Ag^+ (aq.).$$

9. 9

10. The equilibrium constants for amino acids are given in terms of succesive ionization constants of the protonated form for example, equilibrium constants for Glycine (NH_2CH_2COOH) are $K_{a1} = 5 \times 10^{-3}$ M and $K_{a2} = 2 \times 10^{-10}$ M. If the pH at the Isoelectric point for this amino acid is X and pH of 0.02 M protonated Glycine in pure water is Y respectively, then calculate X+Y. [Take log 2 = 0.30]

10. 8

11. The acid ionization of hydrated aluminium ion is

$$Al(H_2O)_6^{3+}(aq) + H_2O(l) \rightleftharpoons Al(H_2O)_5$$

$OH^{2+}(aq) + H_3O^+(aq)$; $K_a = 1.0 \times 10^{-5}$

How many milligrams of $AlCl_3$ should be dissolved in sufficient water to get 400 mL of solution of pH 3.0?

11. 4

12. Equimolar mixture of two gases A_2 and B_2 is taken in a rigid vessel at constant temperature 300 K. The gases achieve equilibrium as:

$$A_2(g) \rightleftharpoons 2A(g), K_P = x \text{ atm}$$

$$B_2(g) \rightleftharpoons 2B(g), K_P = y \text{ atm}$$

$$A_2(g) + B_2(g) \rightleftharpoons 2AB(g), K_P = 2$$

If the initial pressure in the container was 2 atm and the final pressure at equilibrium is 2.75 atm in which the partial pressure of AB(g) is 0.5 atm, the value of y : x is

12. 8

PART – C
(Numerical based)

This section contains **6 questions**, numerical based questions, (answer of which maybe positive or negative numbers or decimals).

13. 200 mL of 0.2 M H_2SO_4 is diluted to 900 ml by adding water. Solution is then reacted with 100 mL, 0.6 M NaOH solution. The resulting sample is further reacted with 100 mL of 0.2 M $Ca(OH)_2$ solution and then 100 mL H_20 was vaporised. Calculate final pH.

13. 12.3

14 The K_s of Barium oxalate is 1×10^{-8}. K_1, K_2 of oxalic acid are 1×10^{-3} and 1×10^{-5} respectively. Find the solubility of BaOx in water and the pH of the saturated solution formed.

14. 7.5

15. What is the solubility(in 10^{-2} mol/L) of T ℓN_3 in a solution prepared by shaking excess of T ℓN_3 and T ℓ_3PO_4.The solution produced contains 1 mmol of PO_4^{3-} per 200 mL solution. K_{sp} (T ℓN_3) = 5.6875×10^{-4}.

15. 1.75. (Range 1.65-1.85)

16. A sample of AgCl was treated with 5.00 ml of 1.5 M Na_2CO_3 solution to give Ag_2CO_3. The remaining solution contained 0.0026 g of Cl^- per litre. Calculate the solubility product of AgCl (in 10^{-10}) (K_{sp} of $Ag_2CO_3 = 8.2 \times 10^{-12}$ M^3).

16. 1.71 (range 1.60-1.80)

17. In a container of constant volume at a particular temperature N_2 and H_2 are mixed in the molar ratio of 9:13.The following two equilibria are found to be coexisting in the container

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

$$N_2(g) + 2H_2(g) \rightleftharpoons N_2H_4(g)$$

The total equilibrium pressure is found to be 3.5 atm while partial pressure of $NH_3(g)$ and $H_2(g)$ are 0.5 atm and 1 atm respectively. Calculate the sum of equilibrium constants of the two reactions given above.

17. 0.8

18. A solution contains 0.1 M H_2S and 0.3 M HCl. Calculate the concentration of S^{2-} ions in solution. The concentration of sulphide ion is $x \times 10^{-20}$. What is the value of x? (Given K_{a_1} and K_{a_2} for H_2S are 10^{-7} and 1.3×10^{-13} respectively)

18. 1.44 (Range 1.40 to1.50)

SECTION-3 : MATHEMATICS

PART – A

(Multi Correct Choice Type)

This section contains 6 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which **ONE OR MORE** may be correct.

1. For the hyperbola $2x^2+12xy-7y^2-16x+2y-3=0$, which of the following is/are true?

   (A) Equation of its conjugate hyperbola is $2x^2+12xy-7y^2-16x+2y+17=0$

   (B) Its asymptotes are given by $2x^2+12xy-7y^2-16x+2y+7=0$

   (C) Its asymptotes are given by $2x^2-2y^2-x+7y-3xy-3=0$

   (D) Orthocentre of triangle formed by any three points on the hyperbola lies on the hyperbola itself

1. ABC

2. Let $A=\left\{xy=c \middle| c\in R-\{0\}\right\}$. Let $E_c=0$ represent locus of point P_c such that sum of slopes of normals drawn from it to xy = c is equal to sum of ordinates of feet of normals. Let F be the set of points of intersection of $E_c=0$ with $xy=c$ (for parameter 'c'), then

   (A) (1, 1) is an element of F

   (B) (2, 1) is not an element of F

   (C) (0, 0) is an element of $E_c \cap F \forall\, c\in R-\{0\}$

   (D) F is a set of hyperbolas

2. ABC

3. Which of the following is/are correct with respect to angle bisectors of pair of lines $3x^2-4y^2-xy-12x+16y=0$

   (A) Angle bisector containing point (2, 1) is the obtuse angle bisector

   (B) Equation of acute angle bisector is $\left(3\sqrt{2}+5\right)x-\left(4\sqrt{2}-5\right)y-20=0$

   (C) Equation of obtuse angle bisector is $\left(3\sqrt{2}+5\right)x-\left(4\sqrt{2}-5\right)y-20=0$

   (D) Angle bisectors are perpendicular with respect to each other

3. ACD

4. For the curves $2x^2+y^2=2$ and $y^2-x^2=-2$ which of the following is/are true?

   (A) Equation of a pair of common tangents is $4x^2+y^2-4xy-6=0$

   (B) Equation of a pair of common tangents is $4x^2+y^2+4xy-6=0$

   (C) Length of common tangent is $\sqrt{\frac{5}{3}}$

   (D) Length of common tangent is $\sqrt{\frac{10}{3}}$

4. ABD

5. Let $E_1 : \frac{x^2}{4} + \frac{y^2}{3} = 1$ and $E_2 : \frac{(x-4)^2}{4} + \frac{y^2}{3} = 1$. If E_2 rolls on E_1, without slipping, then which of the following is/are true?
(A) Locus of centre of E_2 is a polynomial of fourth degree
(B) Locus of one of the focus of E_2 is polynomial of third degree
(C) Locus of centre of E_2 is a closed curve
(D) Locus of one of the focus of E_2 is a closed curve

5. ACD

6. A square is formed such that its opposite sides are tangential to the hyperbola $x^2 - y^2 = 1$. Determine which of the following is/are true?
(A) Side length of largest possible square is 2
(B) Side length of largest possible square is $2\sqrt{2}$
(C) Side length of smallest possible square is $2^{\frac{3}{4}}$
(D) Side length of smallest possible square is $2^{\frac{5}{4}}$

6. AC

PART – B
Integer Answer Type

This section contains **6 questions**. The answer to each of the questions is a single digit integer, ranging from **0 to 9**.

7. Let e be the eccentricity of a hyperbola and $f(e)$ be the eccentricity of its conjugate hyperbola then $\int_1^3 \underbrace{f\,f\,f.....f}_{\text{n times}}(e)\,de$ is equal to _____(where n is even)

7. 4

8. The maximum value of the product of the length of chords intercepted by the Auxiliary Circle on two perpendicular tangent of the hyperbola $x^2 - 2y^2 = 2$ is

8. 6

9. If length of smallest path that can be traced from (0, 0) to $\left(\sqrt{2}+1, -1\right)$ without Traversing Inside the curve $x^2 + y^2 - 2\sqrt{2}x + 1 = 0$ is of the form $\frac{a\pi}{16} - b$ where $a,b \in I$. Then value of $a+b$ is

9. 2

10. If there are only two points on the curve $2x^2 - 2y^2 - 4x + 21 = 0$ such that tangent's Drawn to $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 (a,b \in N)$ are perpendicular. Then $a+b$ equal is to

10. 4

11. If the equation of the curve on reflection of the ellipse $\frac{(x-4)^2}{16}+\frac{(y-3)^2}{9}=1$ about the line $x-y-2=0$ is $16x^2+9y^2+k_1x-36y+k_2=0$, Then value of $\frac{(k_1+k_2)}{66}$ is

11. 2

12. On an ellipse $\frac{x^2}{64}+\frac{y^2}{9}=1$, tangents drawn at $P_1,P_2,P_3.....P_n$ intersects the major axis at $T_1,T_2,T_3.....T_n$ respectively, If the value of $\sum_{i=1}^{n}\frac{Area(\Delta P_iT_iS).Area(\Delta P_iT_iS')}{(P_iT_i)^2}=18$, Then value of n is (where S and S' are foci of ellipse)

12. 8

PART – C
(Numerical based)

This section contains **6 questions**, numerical based questions, (answer of which maybe positive or negative numbers or decimals).

13. The curve $(x-1)(y-2)=5$ and $(x-1)^2+(y+2)^2=r^2$ intersect at 4 points A, B, C and D. If centroid of ΔABC lies on $y=3x-4$, and locus of D is $x=\lambda y$, then λ is _____

13. 0.33

14. If $\sqrt{3}x+2y=2$ touches the ellipse $\frac{x^2}{4}+\frac{y^2}{2}=1$, then eccentric angle of point of contact is $\frac{k\pi}{3}$, then k is equal to _____

14. 0.50

15. If P and Q are the feet of the perpendicular from the foci S_1 and S_2 of an ellipse $\frac{x^2}{5}+\frac{y^2}{3}=1$ on the tangent at any point P on the ellipse, then $(S_1P)(S_2Q)$ is k, then $\frac{k}{20}$ is equal to _____

15. 1.50

16. If a chord of rectangular hyperbola parallel to its conjugate axis subtends angles θ_1 and θ_2 at its vertices, then $(\theta_1+\theta_2)$ is _____

16. 3.14

17. The area of the set of points (x, y) in the plane that satisfy the two Inequalities $x^2 + y^2 \le 2$ and $x^4 + x^3y^3 \le xy + y^4$ is

17. 3.14

18. Let points s_1 and s_2 (lying on positive x – axis) be the foci of the curves $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{c^2} = \frac{1}{4}$. If point of the intersection of the two curve is equidistant from s_1 and s_2 and $a : b = \sqrt{7} : \sqrt{6}$ Then if value of a : c is $\sqrt{\lambda} : \sqrt{\mu}$ then $\lambda + \mu$ is

18. 25.00

ANSWERS

SECTION-1 : PHYSICS

PART – A

PART – B

SECTION – 2 : CHEMISTRY

PART – A

PART – B

SECTION – 3 : MATHEMATICS

PART – A

PART – B