# FIITJEE RESHUFFLE TEST

## PHYSICS, CHEMISTRY & MATHEMATICS

**CPT2-2** **PH-I,II,III** **CODE : 102916**

**Time Allotted: 3 Hours** **Maximum Marks: 240**

- 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.

**Batches: NWTR618X01,G01,A01-A05, CAMP618, NWTW618A01-A05,G01,B01-B08, NWTR618B01-B02, PIN618-XIC, PAINI618-G1 & PANINI618-XI1-XI3 RT-1**

## 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 Parts.
3. **Part-I** is Physics, **Part-II** is Chemistry and **Part-III** is Mathematics.
4. Each part is further divided into two sections: **Section A & C.**
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 Three Parts.

**(i)** **Section-A (01 – 08)** contains 8 multiple choice questions which have only one correct answer. Each question carries **+3 marks** for correct answer and **– 1 mark** for wrong answer.

**Section-A (09 – 12)** contains 4 multiple choice questions which have one or more than one correct
answer. Each question carries **+4 marks** for correct answer. There is no negative marking.

**(ii)** **Section-B (01 – 02)** contains 2 Matrix Match Type questions containing statements given in 2 columns. Statements in the first column have to be matched with statements in the second column. Each question carries **+8 marks** for all correct answer. For each correct row **+2 marks** will be awarded. There may be one or more than one correct choice. No marks will be given for any wrong match in any question. There is no negative marking.

(iii) **Section-C (01 – 06)** contains 6 Numerical based questions with single digit integer as answer, ranging from 0 to 9 and each question carries **+4 marks** for correct answer. There is no negative marking

**Name of the Candidate :**_____

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

**Enrolment Number :**_____

# PART - I: PHYSICS

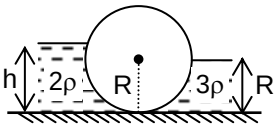
**SECTION – A (Total Marks: 24)**
**(Single Correct Answer Type)**

This section contains **8 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct**.**

1. In a 10 metre deep lake, the bottom is at a constant temperature of 4°C. The air temperature is constant at –4°C. The thermal conductivity of ice is 3 times that water. Neglecting the expansion of water on freezing, the maximum thickness of ice will be
(A) 7.5 m (B) 6 m
(C) 5 m (D) 2.5 m

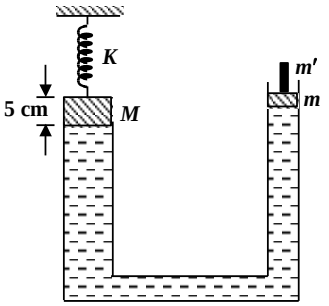
2. A rod of length L with sides fully insulated is made of a material whose thermal conductivity varies with temperature as $K=\frac{\alpha}{T}$ where $\alpha$ is a constant. The ends of the rod are kept at temperatures $T_1$ and $T_2$. The temperature T at x, where x is the distance from the end whose temperature is $T_1$ is
(A) $T_1\left(\frac{T_2}{T_1}\right)^{\frac{X}{L}}$ (B) $\frac{x}{L}\ln\frac{T_2}{T_1}$
(C) $T_1 e^{\frac{T_2 x}{T_1 L}}$ (D) $T_1+\frac{T_2-T_1}{L}x$

3. In the figure shown. The heavy cylinder (radius R) resting on a smooth surface separates two liquids of densities $2\rho$ and $3\rho$. The height h for the equilibrium of cylinder must be




(A) $\frac{3R}{2}$ (B) $R\sqrt{\frac{3}{2}}$
(C) $R\sqrt{2}$ (D) $R\frac{\sqrt{3}}{4}$

4. For the system shown in the figure, the cylinder on left has a mass (*M*) of 25 kg and cross-sectional area 20 cm$^2$ and is connected to a spring of spring constant 1400 N/m. The piston on the right has mass *m* (= 5 kg) and cross-sectional area 4 cm$^2$. The minimum mass *m′* to be kept on *m* so that water spills out from the left is ($g$ = 10 m/s$^2$) (initially water level in both limbs is same).
(A) 1 kg (B) 1.4 kg
(C) 0.7 kg (D) 2.5 kg

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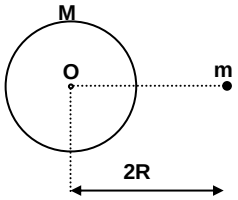
5. A particle of mass m is at a distance 2R from the centre of a thin shell of mass M and having radius R as shown in figure. The gravitational field at the centre of shell is




(A) zero (B) $\frac{GM}{R^2}$

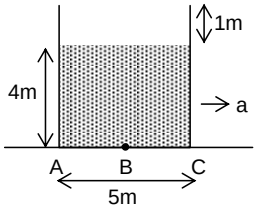
(C) $\frac{G(M+m)}{4R^2}$ (D) $\frac{Gm}{4R^2}$

6. A block of mass m is suspended by a light thread from an elevator. The elevator initially at rest, starts moving upward with uniform acceleration 'a'. Work done on the block during first t sec by the tension in the thread with respect to ground frame is

(A) $\frac{m}{2}(g+a)at^2$ (B) $\frac{m}{2}(g-a)at^2$

(C) $\frac{m}{2}gat^2$ (D) zero

7. A cubical open vessel of side 5m filled with liquid upto a height of 4m is accelerated with an acceleration a. The minimum value of a so that pressure at mid point of AC is equal to atmospheric pressure is




(A) g (B) 2g

(C) g/2 (D) 2g/5

8. Consider the two identical particles shown in the given figure. They are released from rest and can move forwards each other under the influence of their mutual gravitation forces.


Speed of each particle, when the separation reduces to half of initial value equals

(A) $\sqrt{\frac{GM}{d}}$ (B) $\sqrt{\frac{2GM}{d}}$

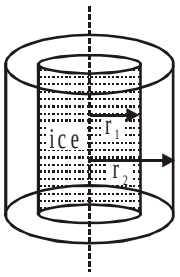
(C) $\sqrt{\frac{GM}{2d}}$ (D) none of these

***Space for rough work***

## SECTION – A (Total Marks: 16)
## (Multiple Correct Answers Type)

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

9. A 100 cm long cylindrical flask with inner and outer diameters 2 cm and 4 cm respectively is completely filled with ice as shown in the figure. The constant temperature outside the flask is 40ºC. (Thermal conductivity of the flask is 0.693 W/mºC, $L_{ice}$ = 80 cal/gm).



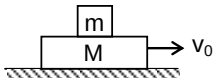

(A) Rate of heat flow from outside to the flask is $80\pi$ J/s.

(B) The rate at which ice melts is $\frac{\pi}{4200}$Kg/s.

(C) The rate at which ice melts is $100\pi$ Kg/s.

(D) Rate of heat flow from outside to flask is 40 $\pi$ J/s.

10. A block of mass m is placed gently onto a long plank of mass M moving with a velocity $v_0$ on a smooth horizontal floor. If friction is present between M and m




(A) velocity of centre of mass of the system (block + plank) $v_c = \frac{mv_0}{M+m}$

(B) work done by the friction force on block till slipping between block and plank stops, is positive

(C) work done by the friction force on the plank till slipping between block and plank stops, is negative

(D) work done by the friction force on the system (block + plank) till slipping between block and plank stops, $= -\frac{Mmv_0^2}{4(M+m)}$

11. A point moves with deceleration along the circle of radius R so that at any moment of time its tangential and normal accelerations are equal in magnitude. At the initial moment t = 0, the velocity of the point is $V_0$. The velocity of point will be: (S is the distance travelled)

(A) $V = \frac{V_0}{1+\frac{V_0 t}{R}}$ at t second

(B) $V = V_0 e^{-S/R}$ after s meter

(C) $V = V_0 e^{-R/S}$

(D) None of these

12. A particle moves along positive branch of the curve $y = \frac{x}{2}$ where $x = \frac{t^3}{3}$, x and y are measured in metres and t in seconds, then

(A) the velocity of particle at t = 1s is $\hat{i} + \frac{1}{2}\hat{j}$ (B) the velocity of particle at t = 1s is $\frac{1}{2}\hat{i} + \hat{j}$

(C) the acceleration of particle at t=1s is $2\hat{i} + \hat{j}$ (D)the acceleration of particle at t=2s is $\hat{i} + 2\hat{j}$

***Space for rough work***

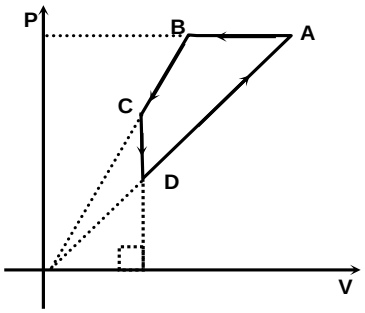
## SECTION – B (Total Marks: 16)
## (Matrix-Match Type)

This section contains **2 questions**. Each question has **four statements** (A, B, C and D) given in **Column I** and **five statements** (p, q, r, s and t) in **Column II.** Any given statement in **Column I** can have correct matching with one or more statement(s) in **Column II.** For example, if for a given question, statement B matches with the statements given in q and r, then for that particular question, against statement B, darken the bubbles corresponding to q and r in the ORS.

1. Match the standing waves formed in column – II due to plane progressive SHM waves in column - I.

| **Column – I** | | **Column – II** | |
|---|---|---|---|
| (A) | Incident wave is $y = A \sin (kx - \omega t)$ | (p) | $y = 2A \cos kx \sin \omega t$ |
| (B) | Incident wave is $y = A \cos (kx - \omega t)$ | (q) | $y = 2A \sin kx \sin \omega t$ |
| (C) | $x = 0$ is rigid support. | (r) | $y = 2A \sin kx \cos \omega t$ |
| (D) | $x = 0$ is flexible support. | (s) | $y = 2A \cos kx \cos \omega t$ |
| | | (t) | None |

2. A thermodynamic cyclic process of an ideal gas is shown in the given indicator diagram. For the cyclic process match the column I (containing process) with Column II (containing physical quantities)




| **Column-I** | | **Column-II** | |
|---|---|---|---|
| (A) | In the process, $A \rightarrow B$ | (p) | $\Delta W = 0$ |
| (B) | In the process, $B \rightarrow C$ | (q) | $\Delta U > 0$ |
| (C) | In the process, $C \rightarrow D$ | (r) | $\Delta Q > 0$ |
| (D) | In the process, $D \rightarrow A$ | (s) | $\Delta Q < 0$ |
| | | (t) | $\Delta W > 0$ |

***Space for rough work***

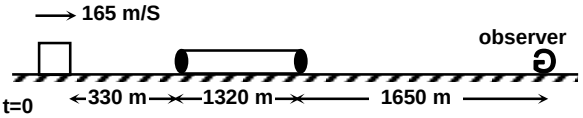
## SECTION –C (Total Marks: 24)
## (Integer Answer Type)

This section contains **6 questions**. The answer to each of the questions is a **single-digit integer**, ranging from 0 to 9. The correct digit below the question number in the ORS is to be bubbled.

1. Two particles A and B are located at points (0, $-10\sqrt{3}$) and (0, 0) in xy plane. They start moving simultaneously at time t = 0 with constant velocities $\vec{v}_A = 5\hat{i}$ m/s and $\vec{v}_B = -5\sqrt{3}\hat{j}$ m/s, respectively. Time when they are closest to each other is found to be $\frac{3}{K}$ second. Find K. All distances are given in meter.

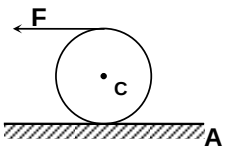
2. A horizontal telephone cord is 4 m long and has a mass of 0.2 kg. A transverse wave pulse is produced by plucking one end of the taut cord. The pulse makes four trips back and forth along the cord in 0.8 sec. The tension in the cord is 80K. Find the value of K.

3. A small block of mass 1 kg is moving on a frictionless horizontal table. It collides with a solid rod of equal mass, elastically as shown in the figure.



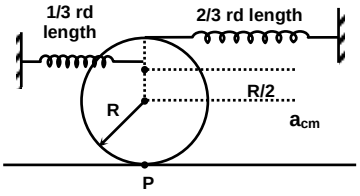

At t = 0 block is at 330 m from left end of the rod. Rod has cross-sectional area 0.001 $m^2$ and Young's modulus $3.3 \times 10^5$ $N/m^2$. Find the minimum time t at which observer hears sound produced by collision (Velocity of sound is 330 m/s).

4. A massless string is wrapped around a hollow cylinder having mass m and radius r. The cylinder is kept on a rough horizontal surface (coefficient of friction is $\mu$). A constant force F is applied as shown in the figure. In case of pure rolling, the friction force acting on the bottom most point of the cylinder is K ($\mu$mg). Find the value of K.




5. An organ pipe $P_1$ closed at one end vibrating in its first overtone and another pipe $P_2$ open at the both ends vibrating in its third overtone are in resonance with a given tuning fork. The ratio of the length of $P_1$ to that of $P_2$ is x / 8. Find x

6. A spring of spring constant k (= $\pi^2$) is cut into two parts of length $\frac{1}{3}$rd and $\frac{2}{3}$rd of initial length and connected with the cylinder as shown in the figure. Find the time period for small oscillation (mass of the cylinder = 34 kg, assume pure rolling for small oscillation.)

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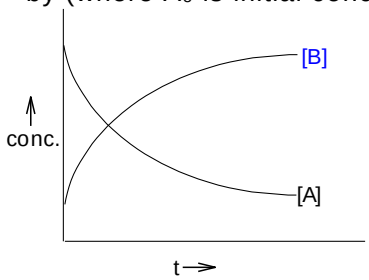
# PART – II : CHEMISTRY

## SECTION – A : (Single Correct Answer Type)

This section contains **8 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. A gas absorbs photon of 300nm and re-emits 2 photons, if one of it has wavelength 450nm; the other has
(A) 750nm (B) 150nm (C) 900nm (D) none

2. For the reaction A → nB, at the point of intersection of 2 curves show, the [B] can be given by (where $A_o$ is initial concentration of A)




(A) $\frac{nA_o}{2}$ (B) $\frac{A_o}{n-1}$ (C) $\frac{nA_o}{n+1}$ (D) $\left[\frac{n-1}{n+1}\right]A_o$

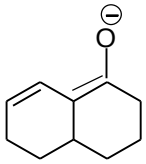
3. Increase in the concentration of reactant leads to the change in
(A) Heat of reaction (B) Activation energy
(C) Collision frequency (D) Threshold energy

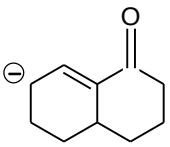
4. Three moles of an ideal monoatomic gas at 300 K expand isothermally and reversibly from 10 $dm^3$ to 30 $dm^3$. Then the heat change (q) will be:
(A) 8. 22 kJ (B) 10.8 kJ (C) 108.2 kJ (D) - 8.22 kJ

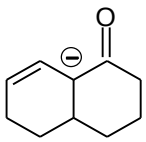
5. $2CO(g) + O_2(g) \longrightarrow 2CO_2(g)$
Which relationship among the given term for reactant and product is correct for given reaction ?
W = Mass of reacting species react or produced
M = Molecular mass of the reacting species react or produced
E = Equivalent mass of reacting species react or produced
n = Valence factor of the reacting species react or produced
(A) $\frac{M}{n}$ (B) $\frac{W}{M}$ (C) $\frac{W}{E}$ (D) E × n

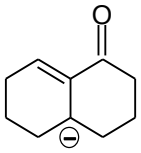
***Space for rough work***

6. Which of the following in not a resonance structure of the ion ?

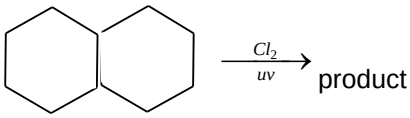
(A) 

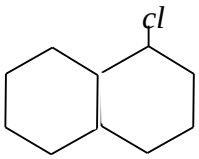
(B) 

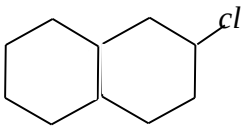
(C) 

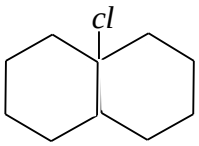
(D) 

7. The major mono halogenation product of the reaction is



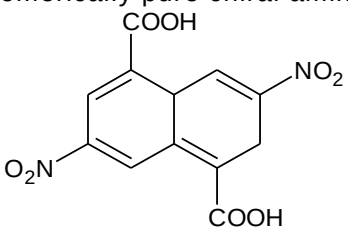

(A) 

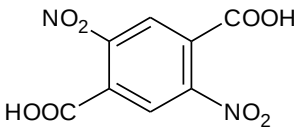
(B) 

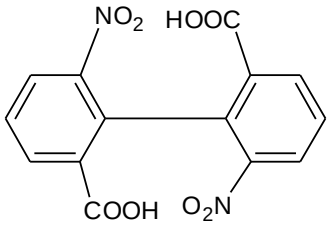
(C) 

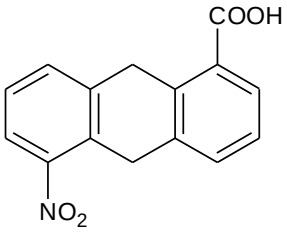
(D) None of these

8. Which of the following carboxylic acid could be resolved by reaction with an enantiomerically pure chiral amine?

(A) 

(B) 

(C) 

(D) 

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**(Multi Correct Answer Type)**

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

9. Which is **incorrect** order for net dipole moment -
(A) HF > HCl > HBr > HI
(B) $CH_3$– F > $CD_3$ – F
(C) $SO_3$ > $SO_2$
(D) $CH_3$ – CH = CHCl (cis) > $CH_3$ – CH = CHCl (trans)

10. For the first order reaction
(A) The degree of dissociation is equal to $(1 - e^{-kT})$
(B) A plot of reciprocal concentration of the reactant vs. time gives a straight line
(C) The time taken for the completion of 75% reaction is thrice the $t_{1/2}$ of the reaction
(D) The pre-exponential factor in the Arrhenius equation has the dimension of time $T^{-1}$

11. $H_3PO_3 + 2NaOH \longrightarrow Na_2HPO_3 + 2H_2O$
Which of the following statement(s) is/are correct for the above reaction?
(A) The equivalent mass of $H_3PO_3$ is 41 (B) $Na_2HPO_3$ is an acidic salt
(C) It is an exothermic reaction (D) It is a redox reaction

12. The decomposition of $H_2O_2$ is retarded by
(A) acetanilide (B) $H_3PO_4$
(C) sodium bicarbonate (D) NaOH

***Space for rough work***

## SECTION – B : Matrix–Match Type

This Section contains **2 questions.** Each question has **four statements** (A, B, C and D) given in **Column I** and **five statements** (p, q, r, s and t) in **Column II.** Any given statement in Column I can have correct matching with **ONE** or **MORE** statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in q and r, then for the particular question, against statement B, darken the bubbles corresponding to q and r in the ORS.

1. Match the following column I with column II

| Column – I | | Column – II | |
|---|---|---|---|
| (A) | 0.1 M $CH_3COOH$ $K_a = 10^{-5}$ at 25°C | (P) | degree of ionization changes with temperature |
| (B) | 0.1 M $NH_4OH$ $K_{a\left(NH_4^+\right)} = 10^{-9}$ at 25°C | (Q) | pH = 3 |
| (C) | 0.1 M $CH_3COONa$ $\left(K_a\right)_{CH_3COOH} = 10^{-5}$ at 25°C | (R) | pOH = 3 |
| (D) | 0.1 M $A^+B^-$ (aqueous) $(K_a)_{HB} = 10^{-4}$, $K_{b(AOH)} = 10^{-12}$ at 25°C | (S) | pH > 7 at 25°C |
| | | (T) | pH < 7 at 25°C |

2. Match the following column I with column II

| Column – I (Ions) | | Column – II (Hybridization) | |
|---|---|---|---|
| (A) | $BrF_4^+$ | (P) | Octahedral |
| (B) | $XeO_6^{4-}$ | (Q) | Seesaw |
| (C) | $SF_5^+$ | (R) | Square planer |
| (D) | $ClO^-$ | (S) | Trigonal bipyramidal |
| | | (T) | Linear |

***Space for rough work***

## SECTION – C (Integer Answer Type)

This section contains **6 questions**. The answer to each question is a **single-digit integer**, ranging from 0 to 9. The correct digit below the question number in the ORS is to be bubbled.

1. A mixture of $N_2$ and $H_2$ in the molar ratio 1 : 3 attains equilibiurm when 50% of mixture has reacted. If P is the total pressure of the mixture, the partial pressure of $NH_3$ formed is P/y. The value of y is:

2. The pOH of 0.1 M KB (salt of weak acid and strong base) at 25°C (Given: $K_a = 10^{-7}$ and $K_w = 10^{-14}$) is _____

3. A commercial sample of $H_2O_2$ is labeled as '10 volume'. What is its percentage strength?

4. 4.48 L of an ideal gas at STP requires 12 cal to raise the temperature by 15°C at constant volume. Find the $C_P$ of the gas in cal.

5. In the icosahedron structure of boron, each boron is linked with how many other boron atoms?

6. How many alkene on catalytic hydrogenation gives isopentane as a product?

***Space for rough work***

# PART – III : MATHEMATICS

**SECTION – A : (Single Correct Answer Type)**

This section contains **8 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. If diagonals of a square be the lines y = x and y = – x, and area of square be 4 sq. units then combined equation of two adjacent sides of the square can be
   (A) xy =1 (B) xy – x – y + 1 = 0
   (C) xy – y = 0 (D) none of these

2. The point P (2, 1) is shifted through a distance $3\sqrt{2}$ units measured parallel to the line x + y = 1 in the direction of decreasing ordinates, to reach at Q. The image of Q with respect to given line is;
   (A) (3, -4) (B) (-3, 2)
   (C) (0, -1) (D) none of these

3. With respect a variable point on the line x + y = 2a chords of contact of the circle $x^2 + y^2 = a^2$ passes through a fixed point F, then chord of the circle with F as mid point is
   (A) parallel to the line x + y = 2a
   (B) perpendicular to the line x + y = 2a
   (C) cuts the line x + y = 2a
   (D) none of these

4. The circles having radii $r_1$ and $r_2$ intersect orthogonally. The length of their common chord is.
   (A) $\frac{2r_1r_2}{\sqrt{r_1^2+r_2^2}}$ (B) $\frac{2r_1^2r_2}{(r_1+r_2)^2}$
   (C) $\frac{r_1r_2}{\sqrt{r_1^2+r_2^2}}$ (D) $\frac{2r_2^2r_1}{(r_1^2+r_2^2)}$

***Space for rough work***

5. The number of ordered pairs (m, n, p) such that $2^m + 2^n + 2^p$ is divisible by 3, where $1 \le m \le 100$, $1 \le n \le 50$, $1 \le p \le 25$ is/are (where m, n, p $\in$ I)
(A) 30250 (B) 1250
(C) 31250 (D) 23150

6. If $\cos x = \frac{(2\cos y - 1)}{(2 - \cos y)}$, x, y $\in (0, \pi)$ then $\tan\frac{x}{2} . \cot\frac{y}{2}$ is equal to
(A) $\sqrt{2}$ (B) $\sqrt{3}$
(C) $\frac{1}{\sqrt{2}}$ (D) $\pm 3$

7. Solution of the equation $\tan^{-1}\left(\frac{x+1}{x-1}\right) + \tan^{-1}\left(\frac{x-1}{x}\right) = \tan^{-1}(-7)$ is
(A) 2 (B) 1/2
(C) 4 (D) None of these

8. In triangle ABC, the complex numbers representing the vertices A, B, C are 2i, $-1 - \sqrt{3}$ i, $1 - \sqrt{3}$ i respectively the the altitude from B on AC intersects the 'circum-circle' of $\Delta$ABC at D($z_d$). Then the complex number ($z_d$) is
(A) 3 + 2i (B) 2 + 3i
(C) $\sqrt{3} - i$ (D) none of these

***Space for rough work***

**(Multi Correct Answer Type)**

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

9. If from a point P representing the complex number $z_1$ on the curve $|z| = 2$, pair of tangents are drawn to the curve $|z| = 1$, meeting at point $Q(z_2)$ and $R(z_3)$, then

(A) complex number $\frac{z_1+z_2+z_3}{3}$ will lie on the curve $|z| = 1$

(B) $\left(\frac{4}{\bar{z}_1}+\frac{1}{\bar{z}_2}+\frac{1}{\bar{z}_3}\right)\left(\frac{4}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}\right) = 9$ (C) $\left|\arg\left(\frac{z_2}{z_3}\right)\right| = \frac{2\pi}{3}$

(D) orthocentre and circumcentre of $\Delta PQR$ will coincide

10. 'n' locks and 'n' corresponding keys are available. But the actual combination is not known. The maximum numbers of trials that are needed to **assign** the keys to their corresponding locks are

(A) ${}^{n}C_2$ (B) $\sum_{k=2}^{n}(k-1)$

(C) n! (D) ${}^{n+1}C_2$

11. Let $a_1, a_2, a_3, \ldots, a_n$ are in G.P. such that $3a_1 + 7a_2 + 3a_3 - 4a_5 = 0$, then common ratio of G.P can be

(A) 2 (B) $\frac{3}{2}$

(C) $\frac{5}{2}$ (D) $-\frac{1}{2}$

12. The directrix of a parabola is $2x - y = 1$. The focus lies on $y$-axis. The locus of one end of the latus rectum is

(A) $7x - y - 1 = 0$ (B) $2x - y - 1 = 0$

(C) $2x + y + 1 = 0$ (D) $3x + y + 1 = 0$

***Space for rough work***

## SECTION – B : Matrix–Match Type

This Section contains **2 questions.** Each question has **four statements** (A, B, C and D) given in **Column I** and **five statements** (p, q, r, s and t) in **Column II.** Any given statement in Column I can have correct matching with **ONE** or **MORE** statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in q and r, then for the particular question, against statement B, darken the bubbles corresponding to q and r in the ORS.

1. Match the following:

| Column – I | Column – II |
|---|---|
| (A). The equation of tangent to the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ which cuts off equal intercepts on axes is x – y = a where a can be | (P). $\sqrt{2}$ |
| (B). The normal $y = mx - 2am - am^3$ to the parabola $y^2 = 4ax$ subtends a right angle at the vertex if m equals to | (Q). $\sqrt{3}$ |
| (C). The equation of the common tangent to parabola $y^2 = 4x$ and $x^2 = 4y$ is $x + y + \frac{k}{\sqrt{3}} = 0$, then k is equal to | (R). $\sqrt{8}$ |
| (D). An equation of common tangent to parabola $y^2 = 8x$ and the hyperbola $3x^2 - y^2 = 3$ is $4x - 2y + \frac{k}{\sqrt{2}} = 0$, then k is equal to | (S). $\sqrt{41}$ |
| | (T) $\sqrt{6}$ |

2. Match the following:

| Column – I | Column – II |
|---|---|
| (A) In a $\Delta ABC$ if $\cos A + \cos B + \cos C = \frac{5}{3}$, then $\frac{3r}{R}$ | (P) 1 |
| (B) If a chord of length unity subtends an angle $\theta$ at the circumference of a circle whose radius is R, then $2R \sin\theta$ = | (Q) 3 |
| (C) In a $\Delta ABC$ if $r = \frac{1}{4}$ and $\alpha, \beta, \gamma$ are length of altitudes in a $\Delta ABC$ then $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}$ = | (R) 2 |
| (D) Incircle of radius 4 of a triangle ABC touches the side BC at D. If BD = 6cm, DC = 8cm and $\Delta$ be the area of triangle then $(\Delta - 3)^{1/4}$ | (S) 4 |
| | (T) 5 |

***Space for rough work***

## SECTION – C (Integer Answer Type)

This section contains **6 questions**. The answer to each question is a **single-digit integer**, ranging from 0 to 9. The correct digit below the question number in the ORS is to be bubbled.

1. The number of values of $n \in Z$ for which $n^2 + n + 2$ is a perfect square is _____

2. The least natural number 'n' for which $(n - 2)x^2 + 8x + n + 4 > \sin^{-1}(\sin 12) + \cos^{-1}(\cos 12)$ $\forall\ x \in R$ is _____

3. At a point A (1, 1) on ellipse equation of tangent is y = x. If one of the foci of ellipse is (0, – 2) and the co–ordinates of centre of ellipse are $(\alpha, \beta)$, then the value of $\alpha + \beta$ is _____. (Given length of major axis of ellipse is $4\sqrt{10}$ units)

4. Let $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (where a > b) be an ellipse such that a and b are middle terms of the series $a_1, a_2, a_3, \ldots a_{10}$ and $a_r\, a_{11-r} = 5\sqrt{3}$ $\forall\ r \in \{1, 2, \ldots, 10|\}$. Triangle SBS′ is an equilateral triangle where B is one of the end of the minor axis and S, S′ are the focii of ellipse respectively, then $|a^2 - 2b^2|$ is _____

5. If the quadratic equation $ax^2 + bx + c = 0$ has equal roots where a, b, c denotes the lengths of the sides opposite to vertex A, B, and C of the $\Delta ABC$ respectively then find the number of integers in the range of $\frac{\sin A}{\sin C}+\frac{\sin C}{\sin A}$ _____

6. ABC is an acute angle triangle, $\angle A = 30°$, H is the orthocentre and M is the midpoint of BC. On the line HM a point T is taken such that HM = MT. If BC = 4cm, then the length of AT is _____

***Space for rough work***

# FIITJEE RESHUFFLE TEST

## BATCHES : Two Year CRP (1618)

## PHASE TEST-I,II,III: PAPER-II

## JEE ADVANCED LEVEL

## ANSWKER KEY

# (SET- A)

| Physics | | | Chemistry | | | Mathematics | | |
|---|---|---|---|---|---|---|---|---|
| Que. | Answers | Concept code | Que. | Answers | Concept code | Que. | Answers | Concept code |
| 1 | **A** | (P111221) | 1 | **C** | C110109 | 1 | **B** | M110723 |
| 2 | **A** | (P111221) | 2 | **C** | C110601 | 2 | **A** | M110715 |
| 3 | **B** | (P111014) | 3 | **C** | C110605 | 3 | **A** | M110809 |
| 4 | **B** | (P111002) | 4 | **A** | C111901 | 4 | **A** | M110820 |
| 5 | **D** | (P110903) | 5 | **C** | C111101 | 5 | **C** | M111214 |
| 6 | **A** | (P110408) | 6 | **D** | C110308 | 6 | **B** | M111909 |
| 7 | **B** | (P110008) | 7 | **B** | C111703 | 7 | **D** | M121404 |
| 8 | **A** | (P110923) | 8 | **C** | C111404 | 8 | **C** | M110402 |
| 9 | **A, B** | (P111221) | 9 | **B,C,D** | C110304 | 9 | **A,B,C,D** | M110310 |
| 10 | **B, C** | (P110604) | 10 | **A,D** | C110606 | 10 | **A, B** | M111202 |
| 11 | **A, B** | (P110319) | 11 | **A,C** | C111101 | 11 | **B, D** | M110503 |
| 12 | **A, C** | (P110307) | 12 | **A,B** | C111006 | 12 | **A, D** | M110902 |
| 1 | **A-(p, r); B-(q, s); C-(q, r); D-(p, s)** | (P111307) | 1 | **A-P,Q,T; B-P,R,S; C-P,S; D-P,Q,T** | C110503 | 1 | **A-(S) B-(P) C-(Q) D-(R)** | M111007 / M110915/ M110903 |
| 2 | **A- (s); B-(s); C-(p, s); D-(q, r, t)** | (P111213) | 2 | **A-Q; B-P; C-S; D-T** | C110305 | 2 | **A-(R) B-(P) C-(S) D-(Q)** | M111510 / M111511 |
| 1 | **2** | (P110320) | 1 | **3** | C111207 | 1 | **2** | M111202 |
| 2 | **1** | (P111303) | 2 | **4** | C110503 | 2 | **5** | M110105 |
| 3 | **8** | (P111303) | 3 | **3** | C111006 | 3 | **6** | M111013 |
| 4 | **0** | (P110811) | 4 | **6** | C111909 | 4 | **5** | M111013 |
| 5 | **3** | (P111309) | 5 | **5** | C111509 | 5 | **3** | M111501 |
| 6 | **4** | (P111111) | 6 | **3** | C111707 | 6 | **8** | M111501 |