# JEE EXPERT

# STAYHOME#STAYSAFE

## CORONA KO STOP KARNA HAI
## AT LOCKDOWN, UNLOCK YOUR POTENTIAL
## PRACTICE TEST – 09

*Tim*

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

**Instructions:**

**A. Question paper format:**

The question paper consists of **3 Section** (Chemistry, Physics and Mathematics). Each section has 3 parts.

**Part–A:**

(i) It contains **8** multiple choice questions. Each question has 3 choices (A), (B), (C) and (D) for its answer, out of which **only one is correct.**

(ii) It contains **4** multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **one or more is/are correct.**

**Part–B:** It 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** statements(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 that particular question, against statement B, darken the bubbles corresponding to q and r in the OMR sheet.

**Part–C:** It contains **6** questions. The answer to each of the questions is a single–digit integer, ranging from 0 to 9. The answer will have to appropriately bubbled in the OMR sheet as per the instructions given at the beginning of the section.

**B. Marking scheme:**

The question paper consists of **3 parts** (Chemistry, Mathematics and Physics). Each section consists **of four types questions.**

(i) **Single Correct Choice:** You will be awarded **3 marks (Total Marks: 24)** if you darken only the bubble corresponding to the correct answer and **zero mark** if no bubbles are darkened. In all other cases, **minus two (−1) mark** will be awarded.

(ii) **Multiple Correct Answers Type:** You will be awarded **4 marks (Total Marks: 16)** if you darken only the bubble corresponding to the correct answers and zero mark if no bubbles are darkened. No negative marks will be awarded in this Section.

(iii) **Matrix– Match Type:** You will be awarded **2 marks (Total Marks: 16)** for each row in which your darkened the bubbles(s) corresponding to the correct answer. Thus each question in this section carries a maximum of **8 marks.** There is **no negative mark** awarded for incorrect answer(s) in this Section.

(iv) **Integer Answer Type:** You will be awarded **4 marks (Total Marks: 24)** if you darken only the bubble corresponding to the correct answer and **zero mark** if no bubbles are darkened. No negative marks will be awarded in this Section.

**Atomic No. :** H=1, He=2, Li=3, Be=4, B=5, C=6, N=7, O=8, F=9, Na=11, Mg=12, Al = 13, Si = 14, P = 15, S = 16, Cl = 17, Ar =18, K=19, Ca=20,Cr=24, Mn=25, Fe=26, Co=27, Ni=28, Cu=29, Zn=30, As=33, Br = 35, Ag = 47, Si = 21, Sn = 50, Ti = 22,I = 53, Xe = 54, Ba = 56, Pb = 82, U = 92, V = 50.

**Atomic masses:** H =1, He=4, Li=7, Be=9, B=11, C=12, N=14, O=16, F=19, Na=23, Mg=24, Al=27, Si=28, P=31, S=32, Cl=35.5, K=39, Ca=40, Cr=52, Mn=55, Fe=56, Co=59, Ni=58.7, Cu=63.5, Zn = 65.4, As = 75, Br = 80, Ag = 108, Sn = 118.7, I = 127, Xe = 131, Ba = 137, Pb = 207, U = 238.

**Enrollment No.:** ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

**Name: …….Centre ……**

**Batch : …… Date …….**

# CHEMISTRY

## SECTION–1 (PART– A) (Total Marks: 24) (3, – 1)

### Single Correct Choice Type

This section contains 8 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. The radioactive potassium–40 isotope decays to Argon–40 with a half life of $1.2 \times 10^9$ years. A sample of moon rock is found to contain 10 percent potassium–40 and 90-percent Argon–40 by mass. The age of the rock in years is

   (A) $1.73 \times 10^9$ (B) $4 \times 10^9$ (C) $2.76 \times 10^9$ (D) $1.2 \times 10^9$

2. In the precipitation titration of KCl against $AgNO_3$, $K_2CrO_4$ is used as an indicator since, AgCl is white coloured. End point is detected by appearance of deep yellow coloured precipitate of $Ag_2CrO_4$. The minimum concentration of chromate ion required for detection of end point is [$K_{sp}$ of AgCl = $2.5 \times 10^{-10}$ and $K_{sp}$ of $Ag_2CrO_4$ = $1.8 \times 10^{-12}$]

   (A) $7.3 \times 10^{-3}$ M (B) $7.3 \times 10^{-4}$ M (C) $7.3 \times 10^{-5}$ M (D) $2.3 \times 10^{-4}$ M.

3. An aluminium block of 27 gm having the total heat capacity at constant pressure of 496.2 J/K at 100°C is placed in a lake at 10°C. The $\Delta S_{universe}$ is given by

   (A) 20.77 $JK^{-1}$ (B) 36.82 $JK^{-1}$ (C) 10.88 $JK^{-1}$ (D) 5.32 $JK^{-1}$

4. Ka for picolinic acid (a weak monoprotic acid) at 3°c is $2 \times 10^{-5}$. The pH of a 0.1 M aqueous solution of the acid at 53°c is (Given : enthalpies of neutralization of HA and $HNO_3$ with a strong base are – 27 and -57 KJ respectively); [Antilog (0.86) = 7.42, log (3.85) = 0.58]
   (Assume that $\Delta H$ remains constant in the given temperature range).
   (Given $2\times10^{-5} \times 10^{0.87} = 1.48\times 10^{-4}$, $\sqrt{Ka.c} = 3.85\times10^{-3}$)

   (A) 2.41 (B) 2.88 (C) 3.88 (D) 3.42

5. A 0.500 L reaction vessel equipped with a movable piston is filled completely with a 3.00 % (W/W) aqueous solution of hydrogen peroxide. The decomposition of $H_2O_2$ into water and $O_2$ gas is a first – order reaction that has a half – life of 10.7 hours. As the reaction proceeds, the gas formed pushed the piston against a constant external atmospheric pressure of 738 mm Hg. The pressure volume work done (in joules) after a reaction time of 4.02 hours is (Assume that the density of the solution is 1.00 g/ml and that the temperature of the system is maintained at 20°c). [Antilog (0.113) = 1.297]

   (A) – 38.3 J (B) -196.7 J (C) – 49.8 J (D) -122 J

6. The ionization constant of $\left[NH_4^+\right]$ in water is $5.6 \times 10^{-10}$ at 25°c. The rate constant for the reaction of $\left[NH_4^+\right]$ and $\left[\overline{O}H\right]$ to form $NH_3$ and $H_2O$ is $3.4 \times 10^{10}$ lit $mol^{-1}sec^{-1}$ at 25°c. The rate constant for the proton transfer from water to $NH_3$ in lit $mol^{-1}$ $sec^{-1}$ is

   (A) $6.07 \times 10^{-5}$ (B) $6.07 \times 10^5$ (C) $6.07 \times 10^{-4}$ (D) $6.07 \times 10^4$

7. The dissociation constants for aniline, acetic acid and ionic product of water at 25°c are $3.83 \times 10^{-10}$, $1.75 \times 10^{-5}$ and $1.008 \times 10^{-14}$ respectively. The degree of hydrolysis of aniline acetate in a decinormal solution is

   (A) 55 % (B) 0.56 % (C) 5.6 % (D) 2.8 %

8. Given that

$2C(S)+2O_2(S)\rightarrow 2CO_2(g);\Delta H=-787\,KJ$,

$H_2(g)+\frac{1}{2}O_2(g)\rightarrow H_2O(l);\Delta H=-286\ KJ$

$C_2H_2(g)+2\frac{1}{2}O_2(g)\rightarrow 2CO_2(g)+H_2O(l);\Delta H=-1301KJ$

Heat of formation of acetylene is

(A) -228 KJ (B) -114 KJ (C) + 228 KJ (D) + 114 KJ

**Multiple Correct Answers Type (Total Marks : 16) (4, 0)**

This section contains 4 multiple correct answer(s) type questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONE OR MORE is/are correct.

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9. For the binary ideal solution having 1 mole of A and 2 moles of B at 298 K which one is correct?

(A) $\Delta H_{mix}=(+)ve$ (B) $\Delta H_{mix}=o$

(C) $\Delta s_{mix}=-R\sum xi\ln xi$ (D) $\Delta G_{mix}=RT\sum xi\ln xi$

10. The conditions for spontaneity of a process are

(A) $(dG)_{T,P} < 0$ (B) $(dE)_{S,V} < 0$

(C) $(dH)_{S,P} < 0$ (D) $(dS)_{E,V} < 0$

11. Which of the following is/are a false statement (s) ?

(A) $BH_3$ is not a stable compound

(B) Boron hydrides are formed when dilute HCl reacts with $Mg_3B_2$

(C) All the B – H bond distance in $B_2H_6$ are equal

(D) The boron hydrides are readily hydrolysed

12. A radioactive element, X, decays by the sequence and with half lives, given below;

$x(t_{1/2}=30\,\text{min})\xrightarrow{\lambda_1} y+\propto$

$y(t_{1/2}=2\,days)\xrightarrow{\lambda_2} z+2\beta$

Which of the following statement (s) is/are incorrect?

(A) Disintegration constant $\lambda_2 > \lambda_1$

(B) Atomic number of X and Y are same

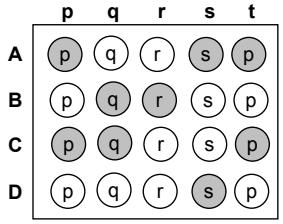
(C) The mass number of Y is greater than that of X.

(D) Y and Z are isotopes.

## SECTION–1 (PART– B) (Total Marks: 16) (8, 0)

### Matrix– Match Type

This section contains 2 questions. Each questions contains statements given in two columns which have to be matched. Statements in Column-I are labeled as A,B,C and D whereas statements in Column-II labeled as p, q, r and s. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct match are A-p, A-s, B-q, B-r, C-p, C-q and D-s, then the correctly bubbled 4×4 matrix should be as follows.




**01.**

| | ***Column – I*** | | ***Column – II*** |
|---|---|---|---|
| (A) | Physical equilibrium | (P) | $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ |
| (B) | Chemical equilibrium | (Q) | $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ |
| (C) | Heterogeneous equilibrium | (R) | $S_{(s)_{r\,hom\,bus}} \rightleftharpoons S_{(s)\ monoclinic}$ |
| (D) | Homogeneous equilibrium | (S) | $C_{(s)_{diamond}} \rightleftharpoons C_{(s)graphite}$ |
| | | (T) | $CH_3COOH(l) + CH_3OH(l) \rightleftharpoons CH_3COOCH_3(l) + H_2O(l)$ |

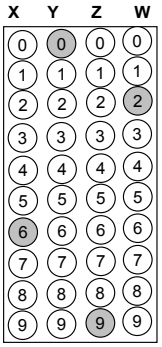
**02.**

| | ***Column – I*** | | ***Column – II*** |
|---|---|---|---|
| (A) | J.T. Coefficient | (P) | $2.3030\ nRT \log \frac{V_1}{V_2}$ |
| (B) | Inversion temperature | (Q) | $P_1 V_1^{\nu} = P_2 V_2^{\nu}$ |
| (C) | Work done in isothermal process | (R) | $c_v d_T = -p\Delta v$ |
| (D) | Reversible adiabatic expansion | (S) | $\frac{2a}{Rb}$ |
| | | (T) | $\frac{dT}{dP}$ |

## SECTION–1 (PART– C) (Total Marks : 24) (4, 0)

### (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 appropriate bubbles below the respective question numbers in the ORS have to darkened. For example, if the correct answers to question numbers X, Y and W (say) are 6, 0, 9 and 2, respectively, then the correct darkening of bubbles will look like the following:




1. Clothings washed in water that has a manganese concentration exceeding 0.1 mg $L^{-1}$ ($1.8 \times 10^{-6}$ M) may be stained by the manganese, but the amount of $Mn^{+2}$ in water can be reduced by adding base. If a laundry wishes to add a buffer to keep the pH high enough to precipitate manganese as the hydroxide, $Mn(OH)_2$, with pH required to keep $[Mn^{+2}]$ equal to $1.8 \times 10^{-6}$ M is 2x. Find x (nearest integral value). Ksp of $Mn(OH)_2$ is $4.5 \times 10^{-14}$.

2. 1.75 gm of solid NaOH are added to 250 ml of 0.1 M $NiCl_2$ solution. Calculate the approximate pH of final solution. (Ksp of $Ni(OH)_2 = 1.6 \times 10^{-14}$)

3. The solubility of $CaF_2$ in water at 25°c is $1.7 \times 10^{-3}$ g per 100 $cm^3$. The solubility product of $CaF_2$ at 25°c is about $x \times 10^{-11}$ mol $L^{-1}$. The value of x is _____

4. The inversion of cane sugar proceeds with a constant half life of 500 minute at pH = 5, for any concentration of sugar. However the half life changes to 50 minute. What would be the order of reaction with respect to $H^+$ at a given concentration of sugar?

5. The heat of combustion of carbon is 96 KJ $mol^{-1}$. What is the calorific value of carbon?

6. Calculate heat of solution of NaCl from the following data:

   Hydration energy of $Na^+$ = - 389 KJ/mole

   Hydration energy of $Cl^-$ = - 382 KJ/mole

   Lattice energy of NaCl = - 776 KJ/mole

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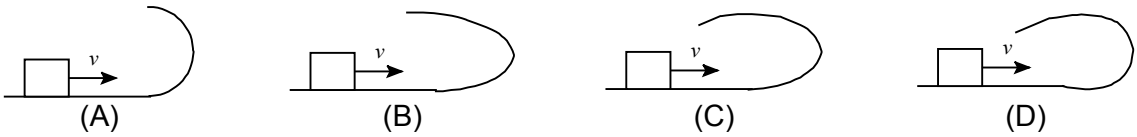
# PHYSICS

## SECTION – II (PART-A) : (Total Marks : 24) (3, – 1)

### (Single Correct Choice Type)

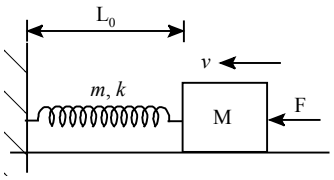
This section contains **8 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. A small block is shot into each of the four tracks as shown below. Each of the tracks rises to the name height. The speed with which the block enter the track is the same in all cases. At the height point of the track, the normal reaction is maximum in:




(A) (B) (C) (D)

2. A block of mass $M$ is attached with a massive spring of mass $m$ and natural length $L_0$ (having spring constant $k$) as shown in the figure. The other end of the spring is hinged on a rigid wall. Now if due to an impulsive force suddenly the block of mass $M$ got a velocity $v$ and start moving on a smooth surface then the maximum compression in the spring is




(A) $v\sqrt{\frac{M}{k}}$ (B) $v\sqrt{\frac{3M+m}{3k}}$ (C) $v\sqrt{\frac{3m+M}{3k}}$ (D) $v\sqrt{\frac{m}{3k}}$

3. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A plumb bob is suspended from the roof of the car by a light string of length 1.0 m. The angle made by the string with the track is

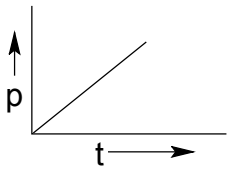
(A) zero (B) 30° (C) 45° (D) 60°

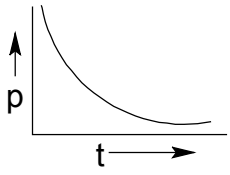
4. A spherical object falling in air attains a terminal speed 15 m/s. Terminal speed of this object when it falls in vacuum will be:

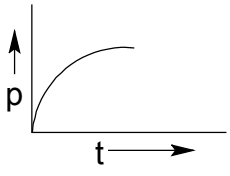
(A) 15 m/s (B) less than 15 m/s

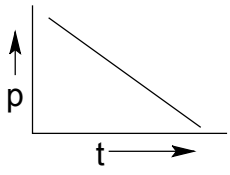
(C) more than 15 m/s (D) there is no terminal speed in this situation

5. A soap bubble is blown slowly at the end of a tube by a pump supplying air at a constant rate. Which one of the following graphs represents the correct variation of the excess of pressure inside the bubble with time?

(A)



(B)



(C)


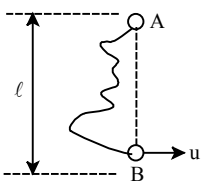

(D)


6. A water drop is divided into 8 equal droplets. The pressure difference between the inner and outer side of the big drop will be:

(A) same as for smaller droplet (B) $\frac{1}{2}$ of that for smaller droplet

(C) $\frac{1}{4}$ of that for smaller droplet (D) twice that for smaller droplet

7. Two balls A & B loch of mass m & connected by a light inextensible string of length $2\ell$. Whole system is on a frictionless horizontal table. Ball B is given a velocity u (as shown) $\perp$r to AB




The velocity of ball a just after the string becomes taut is

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

8. A train of mass M is moving on a circular track of radius R with constant speed v. The length of train is half the perimeter of track. The linear momentum of the train will be

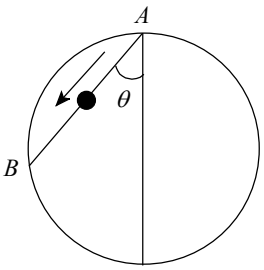
(A) 0 (B) $2Mv/\pi$ (C) MvR (D) Mv.

## (SECTION - II) (PART – A) (Total Marks : 16) (4, 0)

### (Multiple Correct Answers Type)

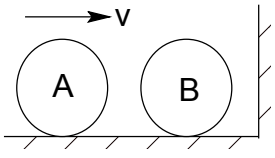
This section contains **4 multiple choice questions.** Each question has four choices (A), (B), (C) and (D), out of which **ONE or MORE** may be correct.

9. A bead is free to slide down a smooth wire tightly stretched between points *A* and *B* on a vertical circle. If the bead starts from rest at *A*, the highest on the circle:




A. Its velocity *v* on arriving at *B* is proportional to cos *θ*
B. Its velocity *v* on arriving at *B* is proportional to tan *θ*
C. Time to arrive at *B* is proportional to cos *θ*
D. Time to arrive at *B* is independent of *θ*.

10. Two balls shown in the figure are identical, the first moving with speed *v* towards right and the second staying at rest. The wall at the extreme right is fixed and smooth. Assuming all collisions to be elastic, which of the following statements are correct?




(A) There are only three collisions;

(B) The speed of first ball is reduced is zero finally after all collisions;

(C) Only two collisions are possible;

(D) The speeds of balls remain unchanged after all collisions have taken place;

11. Which of the following are not correct about centre of mass?

(A) It depends on frame of reference

(B) In centre of mass frame momentum of a system is always zero

(C) Internal forces may affect the motion of centre of mass

(D) Centre of mass and centre of gravity are synonymous

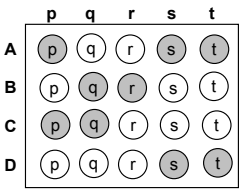
12. In a one dimensional collision between two identical particles A and B, B is stationary and A has momentum P before impact. During impact B gives an impulse J to A. Then coefficient of restitution between the two is :

(A) $\frac{2J}{P}-1$ (B) $\frac{2J}{P}+1$ (C) $\frac{J}{P}+1$ (D) $\frac{J}{P}-1$

## (SECTION - II) (PART – A) (Total Marks : 16) (8, 0)

## (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. A particle is moving along a circle of a fixed radius and gaining speed in a uniform manner. Match Columns–I and II

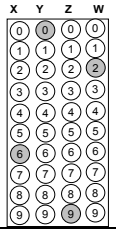
| Column – I | | Column – II | |
|---|---|---|---|
| (A) | Tangential acceleration is | (P) | Zero |
| (B) | Radial acceleration is | (Q) | A non-zero constant value |
| (C) | Angular acceleration is | (R) | Variable |
| (D) | Angular momentum is | (S) | $g\left(10\,m/s^2\right)$ |

2. A solid spherical ball of mass M and radius R rolls without slipping down a surface inclined to the horizontal at angle $\theta$. Considering that the ball is a uniform sphere and that the ball and the surface are perfectly rigid. Match Columns–I and II:

| Column – I | | Column – II | |
|---|---|---|---|
| (A) | Frictional force involved is | (P) | Zero |
| (B) | Minimum value of coefficient of friction for rolling without slipping will be | (Q) | 2/7 Mg sin $\theta$ |
| (C) | Work done against the frictional force and hence loss of kinetic energy as the object rolls down the plane is | (R) | Static friction |
| (D) | Force of kinetic friction is | (S) | 2/7 tan $\theta$ |

## (PART-C) (Total Marks : 24) (4, 0)
## (Integer Answer Type)

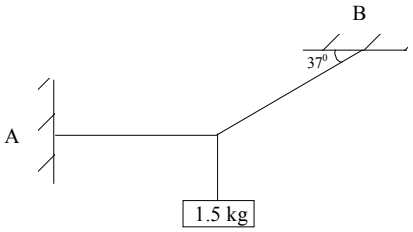
This Section contains **6 questions.** The answer to each question is a **single-digit integer,** ranging from 0 to 9. The bubble corresponding to the correct answer is to be darkened in the ORS.




1. Two particles P and Q move with constant velocities $v_1 = 2m/s$ and $v_2 = 4m/s$ along two mutually perpendicular straight lines towards the intersection point O. At moment $t = 0$ the particles were located at distances $l_1 = 12\ m$ and $l_2 = 19m$ from O respectively. Find the time when the two particles are nearest.

2. A mass M = 1.5 kg is hung with a light inextensible string as shown in fig. Find the tension of horizontal string.

   [ in $10^{-1}\ N\ unit$ ]




3. A solid ball of density half that of water falls freely under gravity from a height of 19.6 m and then enters water. How much time will it take to come gain to the water surface? Neglect air resistance and viscosity effects in water. (g = 9.8 $m/s^2$ )

4. A liquid is kept in a cylindrical vessel which is rotated about its axis. The liquid rises at the sides. If the radius of vessel is 0.05 *m* and the speed of rotation is 2 rev/s, find the difference in the height of the liquid at the centre of the vessel and its sides.

5. A body of mass 3 kg collides elastically with another body at rest and then continues to move in the original direction with one-half of its original speed. What is the mass of the target body?

6. Two particles A and B initially at rest move towards each other under a mutual force of attraction. What is the speed of centre of mass at the instant when the speed of A is *v* and the speed of B is 2*v*?

* * *

# MATHEMATICS

## SECTION– III : (PART-A) (Total Marks: 24) (3, –1)

### (Single Correct Choice Type)

This section contains **8 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. Find the equation of the circle whose radius is 3 and which touch the circle $x^2 + y^2 – 4x – 6y – 12 = 0$ internally at the point (-1, -1).

(A) $x^2 + y^2 – 3x – 4y – 2 = 0$ (B) $5x^2 + 5y^2 – 8x – 14y – 32 = 0$

(C) $5x^2 + 5y^2 + 8x + 14y – 32 = 0$ (D) $5x^2 + 5y^2 – 8x + 14y – 32 = 0$

2. Solution set for the equation $\log_{1/\sqrt{5}}\left(6^{x+1} - 36^{x}\right) \geq -2$ is

(A) $(-\infty, 1] \cup [5, \infty)$ (B) $(-\infty, 1]$ (C) $[\log_6 5, 1]$ (D) $(-\infty, 0] \cup [\log_6 5, 1)$

3. If $\frac{1}{2}$ lies between roots the equation $6x^2 + 3\cos\theta\, x - \sin^2\theta = 0$, then true set of values of $\theta$ in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ is equal to

(A) $\left(\frac{5\pi}{6}, \frac{7\pi}{6}\right)$ (B) $\left(\frac{\pi}{2}, \frac{5\pi}{2}\right)$ (C) $\left(\frac{4\pi}{3}, \frac{5\pi}{3}\right)$ (D) $\left(\frac{2\pi}{3}, \frac{4\pi}{3}\right)$

4. If z is a complex number such that $-\frac{\pi}{2} \leq \arg z \leq \frac{\pi}{2}$, then which of the following in equality is true

(A) $\left|Z - \bar{Z}\right| \leq |Z|\left(\arg Z - \arg \bar{Z}\right)$ (B) $\left|Z - \bar{Z}\right| \geq |Z|\left(\arg Z - \arg \bar{Z}\right)$

(C) $\left|Z - \bar{Z}\right| < \left(\arg Z - \arg \bar{Z}\right)$ (D) None of these

5. Let Z and w are complex numbers such that $|Z| \leq 1$, $|W| \leq 1$ and $|Z + i\overline{W}| = |Z - iW| = 2$ then Z equals

(A) 1 or i (B) i or – I (C) 1 or – 1 (D) i or – 1

6. If a chord AB of the parabola $x^2 = 4by$ whose equation is y = mx + c subtend a right angle at the vertex of the parabola, then

(A) c = 4 bm (B) b = 4 cm (C) c = 4 b (D) b + 4 cm = 0

7. If $\omega$ is a complex cube root of unity then the value of $\ln\left(\frac{\omega^{\omega}}{\omega^{\omega^2}}\right)$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{\sqrt{3}}$ (C) $-\frac{2\pi}{3}$ (D) $-\frac{2\pi}{\sqrt{3}}$

8. If all the real solutions of the equation $4^x – (a – 3)\, 2^x + (a – 4) = 0$ are non positive, then

(A) $4 < a \leq 5$ (B) $0 < a < 4$ (C) a > 4 (D) a < 3

## SECTION– III : (PART-A) (Total Marks : 16) (4,0)
## (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. All points inside the triangle formed by the points (1,3), (5,0) and (–1, 2) satisfy

(A) $3x+2y \geq 0$ (B) $2x+y-13 \geq 0$ (C) $2x-3y-12 \leq 0$ (D) $-2x+y \geq 0$

10. If from a point P corresponding the complex number $Z_1$ an $|Z| = 2$, pair of tangents are drawn to $|Z| = 1$, meting at $Q(Z_2)$ and $R(Z_3)$ then

(A) Complex number $\frac{1}{3}(Z_1+Z_2+Z_3)$ will lie on $|Z| = 1$

(B) $\left(\frac{4}{Z_1}+\frac{1}{Z_2}+\frac{1}{Z_3}\right)\left(\frac{4}{Z_1}+\frac{1}{Z_2}+\frac{1}{Z_3}\right)=9$

(C) $\left|\arg\left(Z_2/Z_3\right)\right|=2\pi/3$

(D) Ortho centre of the triangle PQR lien $|Z| = 1$.

11. If the equation $ax^2 + bx + c = 0$ has no real roots and $a + b + c < 0$, then which of the following must be true

(A) $c < 0$ (B) $a < 0$ (C) $a + 2b + 4c < 0$ (D) $b < 0$

12. The solution of the equation $\log_7 \log_5\left(\sqrt{x+5}+\sqrt{x}\right)=0$ is

(A) 4 (B) 2 (C) 0 (D) none of these

## SECTION– III : (PART-B) (Total Marks: 16) (8, 0)
### (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.

**01.**

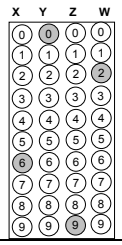
| *Column I* | | *Column II* | |
|---|---|---|---|
| (A) | $\|Z_1 + Z_2\|^2 + \|Z_1 - Z_2\|^2$ = | (P) | $\|Z_1\|^2 + \|Z_2\|^2 - 2\,\text{Re}\left(Z_1.\bar{Z}_2\right)$ |
| (B) | $\|Z_1 - Z_2\|^2$ | (Q) | $2\left(\|Z_1\|^2+\|Z_2\|^2\right)$ |
| (C) | $\arg(Z_1)-\arg(Z_2)=\frac{\pi}{2}$ *means* | (R) | $\|Z_1 + Z_2\| = \|Z_1 - Z_2\|$ |
| (D) | arg $Z_1$ = arg $Z_2$ means | (S) | $\|Z_1 + Z_2\| = \|Z_1\| + \|Z_2\|$ |
| | | (T) | $Z_1$ and $Z_2$ are both real |

**02.**

| | ***Column I*** | | ***Column II*** |
|---|---|---|---|
| (A) | The normal chord at a point t on the parabola $y^2 = 4x$ subtends a right angle at the vertex, then $t^2$ is | (P) | 4 |
| (B) | If the point (2,–2) is the one end of the focal chord PQ of the parabola $y^2 = 2x$, then the slope of the tangent at Q is | (Q) | 2 |
| (C) | The number of distinct normal possible from $\left(1, \frac{1}{4}\right)$ to the parabola $y^2 = 4x$ is | (R) | 3 |
| (D) | The normal at (a, 2a) an $y^2 = 4ax$ meet the curve again at $(at^2, 2at)$ then the value of $\|t - 1\|$ is | (S) | 1 |
| | | (T) | 0 |

## SECTION– III : (PART-C) (Total Marks: 24)(4, 0)
### (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 bubble corresponding to the correct answer is to be darkened in the ORS.




1. If $|Z - i| \le 2$ and $Z_o = 5 + 3i$, then max value of $|iZ + Z_o|$ is _____.

2. The straight line y = mx + c (m > o) touch the parabola $y^2 = 8(x + 2)$ then minimum value of C is _____

3. If two distinct chord of a parabola $y^2 = 4ax$ passing through the point (a, 2a) are bisected on the line x + y = 1 then maximum value of [4 a] is _____.
Where [x] denotes greatest integer less than equal to x.

4. The smallest value of K for which both the roots of the equation $x^2 - 8kx + 16(k^2 - k + 1) = 0$ are real, distinct and have value at least 4 is _____.

5. If P (1,2), Q (4,6), R (5,7) and S (a,b) are the vertices of a parallelogram PQRS, then a+b is equal to ____.

6. If the roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are real and less than 3, then maximum value of [a] is_____ ([a] denotes greatest integer less than of equal to a)

* * *

# FIITJEE COMMON TEST

## TWO YEAR CRP REGULAR

## PHASE–II

## IIT–JEE, 2014

## PAPER–2

**SET A**

**Paper Code XXXX.X**

### CHEMISTRY

**(PART – A)**

| | | | |
|---|---|---|---|
| 1. B | 2. A | 3. A | 4. A |
| 5. D | 6. B | 7. A | 8. C |
| 9. BCD | 10. ABC | 11. C | 12. ACD |

**(PART – B)**

| | | | |
|---|---|---|---|
| 1. A→ RS | B→ PQT | C→ PRS | D→ QT |
| 2. A→ T | B→ S | C→ P | D→ QR |

**(PART – C)**

| | | | |
|---|---|---|---|
| 1. 5 | 2. 8 | 3. 4 | 4. 1 |
| 5. 8 | 6. 5 | | |

### PHYSICS

**(PART – A)**

| | | | |
|---|---|---|---|
| 1. A | 2. A | 3. C | 4. D |
| 5. B | 6. B | 7. A | 8. B |
| 9. AD | 10. AD | 11. ACD | 12. A |

**(PART – B)**

| | | | |
|---|---|---|---|
| 1. A→ Q | B→ R | C→ Q | D→ R |
| 2. A→ QR | B→ S | C→ P | D→ P |

**(PART – C)**

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

### MATHEMATICS

**(PART – A)**

| | | | |
|---|---|---|---|
| 1. B | 2. D | 3. A | 4. A |
| 5. C | 6. C | 7. D | 8. A |
| 9. AC | 10. ABCD | 11. ABC | 12. A |

**(PART – B)**

| | | | |
|---|---|---|---|
| 1. A→ Q | B→ P | C→ R | D→ S |
| 2. A→ Q | B→ Q | C→ S | D→ P |

**(PART – C)**

| | | | |
|---|---|---|---|
| 1. 7 | 2. 4 | 3. 3 | 4. 2 |
| 5. 5 | 6. 1 | | |