JEE EXPERT

#StayHome#StaySafe

CORONA KO STOP KARNA HAI
AT LOCKDOWN, UNLOCK YOUR POTENTIAL

Practice Test - 09

Time : 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 end of the test.***
- Use ***Blue/Black Ball Point Pen only*** for writing particulars on ***Side-1*** and ***Side-2*** of the Answer Sheet. ***Use of pencil is strictly prohibited.***

Instructions

Note:

1. The question paper contains 3 sections (Chemistry, Physics & Mathematics).
2. Each section is divided into three parts, **Part – A**, **Part – B** & **Part – C**.
3. **Part – A** contains **12** questions which are further divided as follows:
   - **Q. 1 – 8** are multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which **only one is correct**.
   - **Q. 9 – 12** are multiple correct answer type questions. Each question has four choices (A), (B), (C) and (D) out of which one or more answer(s) is/are correct.
4. **Part – B** contains two questions **(Q. 1 – 2)**. Each question has four statements (A, B, C and D) given in **Column – I** and five statements (P,Q,R,S and T) given 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 that particular question, against statement B, darken the bubbles corresponding to Q and R in the ORS.
5. **Part – C** contains **6** questions **(Q. 1 – 6)**. The answer to each of the questions is a single – digit integer, ranging from 0 to 9. The appropriate bubbles against the respective question numbers in the ORS have to be darkened.

Marking Scheme

1. For each question in the group **Q. 1 – 8** of **Part – A** you will be awarded **3 marks** if you have darkened only the bubble corresponding to the correct answer and **zero marks** if no bubble is darkened in all other cases, **minus two (–1) mark** will be awarded.
2. For each question in the group **Q. 9 – 12** of **Part – A** you will be awarded **4 marks** if you have darkened **ALL** the bubble(s) corresponding to the correct answer(s) **ONLY** and zero marks otherwise. There are **no negative marks** in this section.
3. For each question in **Part – B**, you will be **awarded two marks** for **each row** in which you have darkened the bubble(s) corresponding to the correct answer. Thus, each question in this part carries a maximum of **8 marks**. There is **no negative marking** for incorrect answer(s) in this section.
4. For each question in **Part – C,** you will be awarded **4 marks** if you have darkened the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. No negative marks will be awarded for incorrect answer.

Name of the Candidate : ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Enrolment Number : ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Useful Data Chemistry :

Gas Constant	R	=	$8.314\ J\ K^{-1}\ mol^{-1}$
		=	$0.0821\ Lit\ atm\ K^{-1}\ mol^{-1}$
		=	$1.987 \approx 2\ Cal\ K^{-1}\ mol^{-1}$
Avogadro's Number	N_a	=	6.023×10^{23}
Planck's Constant	h	=	6.626×10^{-34} Js
		=	6.25×10^{-27} erg.s
1 Faraday		=	96500 Coulomb
1 calorie		=	4.2 Joule
1 amu		=	1.66×10^{-27} kg
1 eV		=	1.6×10^{-19} J

Atomic No : H=1, D=1, Li=3, Na=11, K=19, Rb=37, Cs=55, F=9, Ca=20, He=2, O=8, Au=79.

Atomic Masses: He=4, Mg=24, C=12, O=16, N=14, P=31, Br=80, Cu=63.5, Fe=56, Mn=55, Pb=207,
Au=197, Ag=108, F=19, H=2, Cl=35.5, Sn=118.6

Useful Data Physics :

Acceleration due to gravity g = 10 m/s^2

Section – I (Chemistry)

PART – A

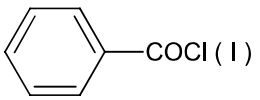
Single Correct Choice Type

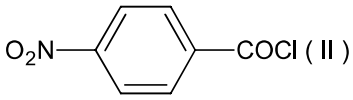
1. Which of the following compounds forms a yellow precipitate with I_2/NaOH?

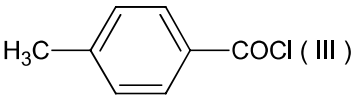
(A) $CH_3CH_2\overset{\overset{O}{\|}}{C}CH_2CH_3$ (B) $CH_3CH_2\overset{\overset{O}{\|}}{C}-CH_2CHO$

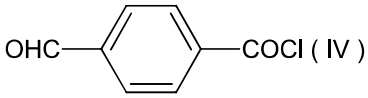
(C) $CH_3CH_2CH_2\overset{\overset{OH}{|}}{C}HCH_3$ (D) $CH_3CH_2\overset{\overset{OH}{|}}{C}H\ \overset{\overset{OH}{|}}{C}HCH_2CH_3$

2. Arrange the following compounds in decreasing order of their reactivity towards hydrolysis?









(A) II > IV > I > III (B) II > IV > III > I
(C) I > II > III > IV (D) IV > II > I > III

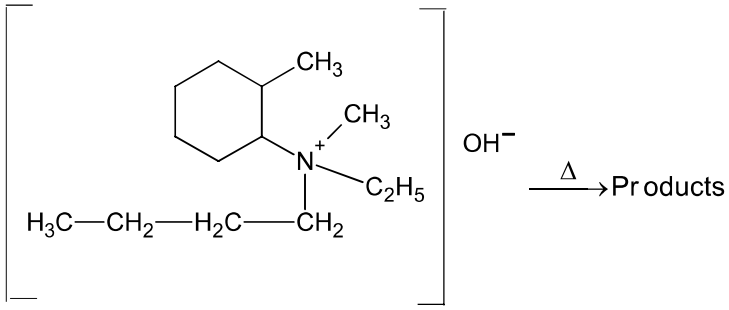
3. A certain amount of $SnCl_2$ is completely oxidised by 200ml of 0.3M acidified $KMnO_4$ solution. What is the normality of the $KMnO_4$ solution?
(A) 0.3 (B) 0.9
(C) 1.5 (D) 0.06

4. At very high pressure, van der Waal's equation reduces to

(A) $V\left(P+\frac{n^2a}{V^2}\right)=nRT$ (B) $P(V-nb)=nRT$

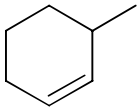
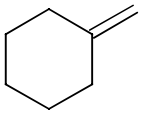
(C) $\frac{n^2a}{V^2}(V-nb)=nRT$ (D) $\frac{a}{V^2}\left(P+\frac{n^2a}{V^2}\right)=nRT$

Space for rough work

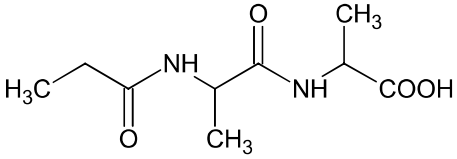
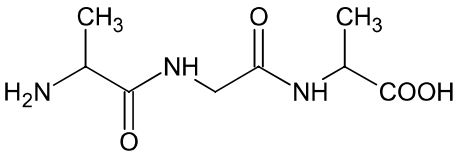
5. 

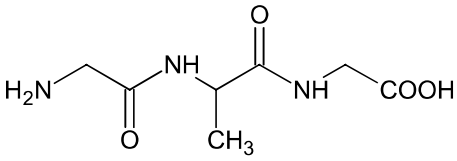
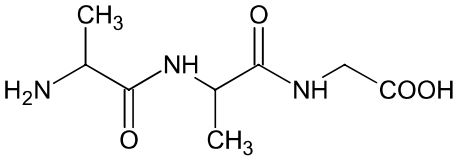
Which of the following products is not formed in the above reaction?

(A) $CH_2 = CH_2$ (B) $H_2C = CH - CH_2 - CH_3$

(C)  (D) 

6. The tripeptide is written as Glycine – Alanine-glycine. The correct structure of the tripeptide is:

(A)  (B) 

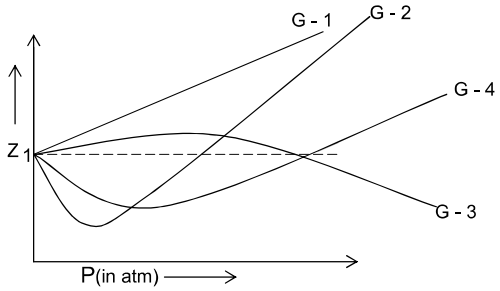
(C)  (D) 

7. Which of the following combination of solutions forms a grey recipitate?

(A) $NaCl + BaCO_3$ (B) $AgNO_3 + Ca(NO_3)_2$

(C) $HgCl_2 + SnCl_2$ (D) $Pb(NO_3)_2 + K_2CrO_4$

Space for rough work

8. 

Which of the following gases has been in correctly represented in the above figure?

(A) G – 1 (B) G – 2

(C) G – 3 (D) G – 4

Multiple Correct Choice Type

9. Which of the following compound(s) show(s) Cannizzaro reaction?

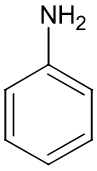
(A) HCHO (B) CH_3CHO

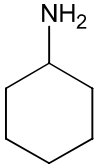
(C) C_6H_5CHO (D) $C_6H_5CH_2CHO$

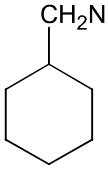
10. Which of the following acid(s) undergo(es) HVZ reaction?

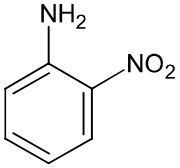
(A) CH_3CH_2COOH (B) $(CH_3)_3COOH$

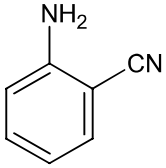
(C) C_6H_5COOH (D) $C_6H_5CH_2COOH$

11. Which of the following is/are more basic than  ?

(A) 

(B) 

(C) 

(D) 

12. Which of the following salt(s) evolve(s) color gases on treatment with acids?

(A) Na_2S (B) NaI

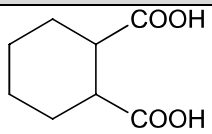
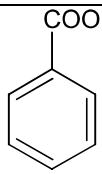
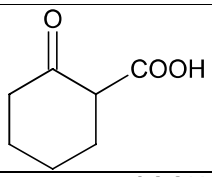
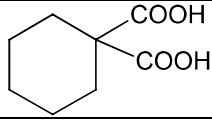
(C) $NaNO_3$ (D) Na_2SO_3

Space for rough work

PART – B

Matrix – Match Type

1. Match the carboxylic acids mentioned in Column – I with their properties mentioned in Column – II

Column – I		Column – II	
(A)		(P)	Undergoes decarboxylation reaction on heating
(B)		(Q)	Undergoes dehydration on heating
(C)		(R)	Forms anhydride when heated with P_2O_5
(D)		(S)	Product obtained after heating undergoes aldol condensation
		(T)	Product obtained after heating undergoes HVZ reaction

2. Match the compounds mentioned in Column – I with the reagents with which they react mentioned in Column – II.

Column – I		Column – II	
(A)	CH_3CHO	(P)	Fehling's solution
(B)	CH_3COCH_3	(Q)	Tollen's reagent
(C)	CH_3COOH	(R)	Iodoform test
(D)	HCOOH	(S)	$NaHCO_3$
		(T)	Na

Space for rough work

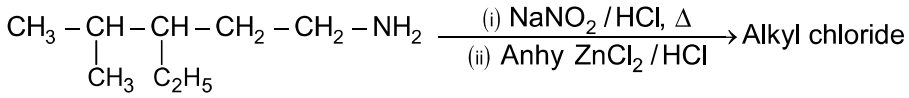
PART – C

Numerical Based

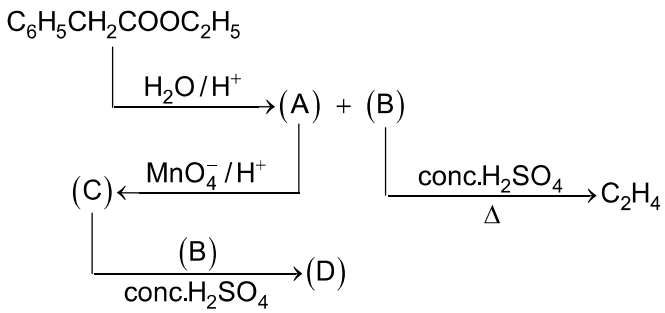
1. The r.m.s speed of argon (At. Wt = 40) at 2000K is same as the most probable speed of an unknown gas at 1200K. If one molecule of the unknown gas contains one carbon atom, how many hydrogen atoms does it contain?

2. The density of an ideal gas(X) (mol.mass = 60) is 1.4 g/l at a certain temperature and pressure. Under the same conditions, the density of another gas(Y) is 2.1 g/l. What is the mass of 0.1 g-molecule of gas(Y)?

3. 0.45 g of an acid of molecular weight 90 is completely neutralized by 20 ml of 0.5N caustic potash. What is the basicity of the acid?

4. 

How many alkyl chlorides formed in the above reaction contain(s) asymmetric carbon atom(s)?

5. 

How many oxygen atoms are present in one molecule of (D)?

6. 29.2g of a mixture containing NaOH and Na_2CO_3 required 200 ml of 2M HCl for neutralization up to phenolphthalein end point. How many gram of NaOH is present in the mixture?

Space for rough work

Section – II (Physics)

PART – A

Single Correct Choice Type

1. Two soap bubbles of radii 2mm and 4mm are brought in contact. If the surface tension of liquid is 7 x 10^{-2} Nm^{-1}. Then the radius of the common surface is

(A) 2×10^{-3}m (B) 4×10^{-3}m

(C) 6×10^{-3}m (D) 8×10^{-3}m

2. A tank with vertical walls is mounted so that its base is at a height H above the horizontal ground. The tank is filled with water to a depth h. A hole is punched in the side wall of the tank at a depth x below the water surface. To have maximum range of emerging stream, the value of x is (h > H)

(A) $\frac{H-h}{2}$ (B) $\frac{H}{2}$

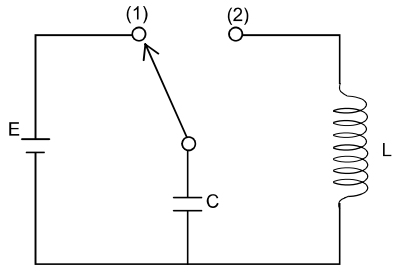
(C) $\frac{h}{2}$ (D) $\frac{H+h}{2}$

3. A body of mass m rises to a height h = R/5 from the surface of earth, where R is the radius of earth. If g is the acceleration due to gravity at the surface of earth the increase in potential energy is

(A) (4/5) mgh (B) (5/6) mgh

(C) (6/7) mgh (D) mgh

4. In the electrical network at t < 0, key was placed on (1) till the capacitor got fully charged. Key placed on (2) at t = 0. Time when the energy in both the capacitor and the inductor will be same for the first time is

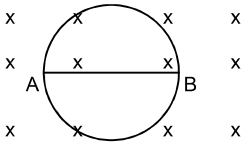


(A) $\frac{\pi}{4}\sqrt{LC}$ (B) $\frac{3\pi}{4}\sqrt{LC}$

(C) $\frac{\pi}{3}\sqrt{LC}$ (D) $\frac{2\pi}{3}\sqrt{LC}$

Space for rough work

5. The radius of the circular conducting loop shown in figure is R. Magnetic field is decreasing at a constant rate α. Resistance per unit length of the loop is ρ. Then current in wire AB is (AB is one of the diameters)



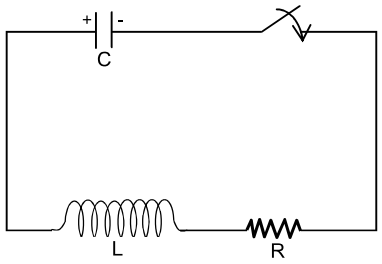
(A) $\frac{R\alpha}{2\rho}$ from A to B

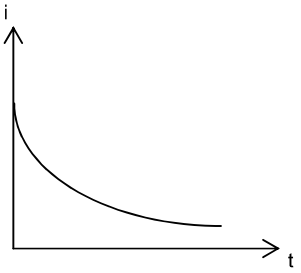
(B) $\frac{R\alpha}{2\rho}$ from B to A

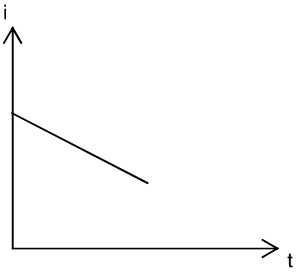
(C) $\frac{2R\alpha}{\rho}$ from A to B

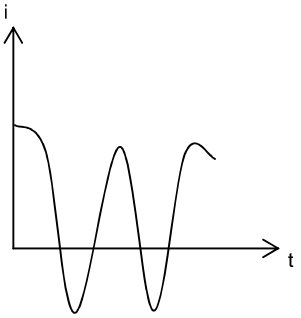
(D) zero

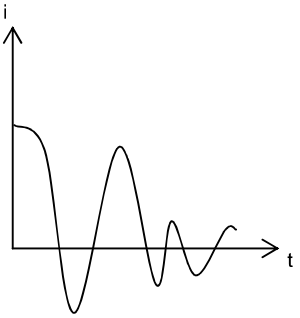
6. Which of the following I –t graph is best suitable for the given R-L-C circuit



(A)


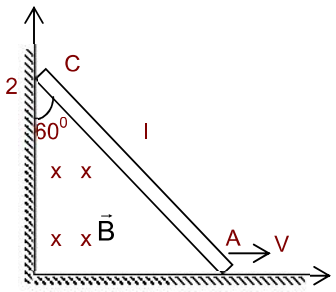
(B)


(C)


(D)


Space for rough work

7. A rod of length l slides against the perpendicular walls such that the lowest point (A) of the rod moves with a speed $\vec{v}$ in the magnetic field $\vec{B}$. The induced emf between the ends A & C of the rod is



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

(C) $3\frac{BIV}{2}$ (D) $\frac{3}{4}BIV$

8. A wooden ball of density ρ is immersed in water of density σ to depth h and then released. The height H above the surface of water upto which the ball will jump out of water is

(A) $\frac{\sigma h}{\rho}$ (B) $\left(\frac{\sigma}{\rho}-1\right)h$

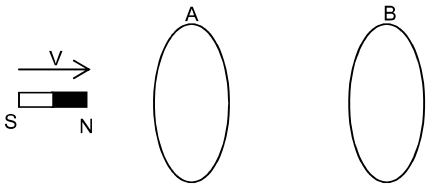
(C) h (D) zero

Multiple Correct Choice Type

9. In case of earth:
(A) Potential is minimum at the centre of earth
(B) Potential is same, both at centre and infinity but not zero
(C) Potential is zero, both at centre and infinity
(D) Field is zero, both at centre and infinity

10. Two bodies A and B have thermal emissivities of 0.01 and 0.81 respectively. The outer surface areas of the two bodies are equal. The two bodies emit total radiant power at the same rate. The wavelength λ_B corresponding to maximum spectral radiacncy in the radiation from B to shifted from the wavelength corresponding to maximum spectral radiacncy in the radiation from A by 1 μm. If the temperature of A is 5802 K,
(A) The temperature of B is 1934 K (B) $\lambda_B = 1.5\mu m$
(C) The temperature of B is 1160 K (D) The temperature of B is 2901 K

11. A bar magnet moves towards two identical parallel circular loops with a constant velocity v, as shown in figure



(A) Both the loops will attract each other
(B) Both the loops will repel each other
(C) The induced current in A is more than that in B
(D) The induced current is same in both the loops

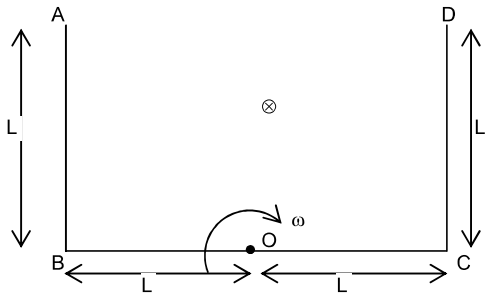
Space for rough work

12. A long straight wire of radius r carries a current distributed uniformly over its crossection. The magnitude of the magnetic field is
(A) maximum at the axis of the wire (B) minimum at the axis of the wire
(C) maximum at the surface of the wire (D) minimum at the surface of the wire

PART – B

Matrix – Match Type

1. A frame ABCD is rotating with the angular velocity ω about an axis passing through the point O perpendicular to the plane of paper as shown in the figure. A uniform magnetic field $\vec{B}$ is applied into the plane of the paper in the region as shown. Match the following



Column I		Column II	
(A)	Potential difference between A and O	(P)	zero
(B)	Potential difference between O and D	(Q)	$\frac{B\omega L^2}{2}$
(C)	Potential difference between C and D	(R)	$B\omega L^2$
(D)	Potential difference between A and D	(S)	Constant

2 .An artificial satellite is in circular orbit around the earth. One of the rockers of the satellite is momentarily fired, the direction of firing of rocket is mentioned in Column I and corresponding change(s) are given in Column II. Match the entries of Column I with the entries of Column II

Column I		Column II	
(A)	Towards the earth's centre	(P)	Orbit changes and becomes elliptical
(B)	Away from the earth's centre	(Q)	Orbit plane changes
(C)	At right angle to the plane or orbit	(R)	Semi major axis of orbit increases
(D)	In forward direction	(S)	Energy of earth satellite system increases

Space for rough work

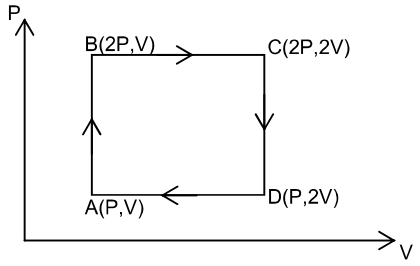
PART – C

Numerical Based

1. Water rises in a capillary tube to a height of 2 cm, In another capillary whose radius is one third of it, how high the water will rise (in cm)

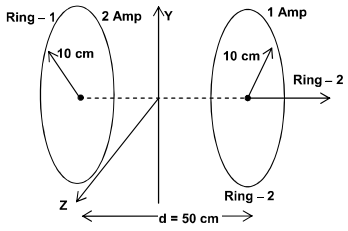
2. The gauge pressure inside two soap bubbles is 0.01 and 0.02 atm. Find the ratio of their respective volumes

3. An ideal monoatomic gas is taken round the cycle ABCDA as shown in the P – V diagram (see figure). The work done during the cycle is $\frac{pv}{n}$ then n = ?



4. Two particles A and B of masses 1kg and 2kg respectively are kept at a very large separation. When they are released they move under their gravitational attraction. Find the speed (in 10^{-5} m/sec) of A when that of B is 3.6 cm/hr.

5. Two co–axial rings of same radius R=10 cm are placed parallel to the y–z plane ,such that x–axis of the rings .Ring 1 carries a current of 2 Amp and 2 carries a current of 1 Amp in opposite sense as shown in the figure .The separation between the rings is d = 50 cm .Find the magnitude of $\frac{\int_{+\infty}^{-\infty} \vec{B}.d\vec{x}}{\mu_0}$,where $\vec{B}$ is the net magnetic field due to both the rings at any point on the axis .



6. Two electrons are moving in air "side by side" along parallel straight lines at the same speed $V = 3 \times 10^5 m/sec$. The distance between the electrons is 1 mm. If force of magnetic interaction between the electrons are $m \times 2.56 \times 10^{-29} N$. Find the value of m.

Space for rough work

Section – III (Mathematics)

PART – A

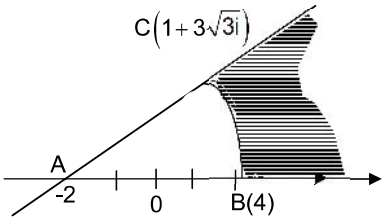
Single Correct Choice Type

1. The values of k for which $\left|\frac{x^2+kx+1}{x^2+x+1}\right|<3$ for all $x\in R$ is

(A) $(-11,5)$ (B) $(-1,5)$

(C) $(-1,7)$ (D) none of these

2. Shaded region is given by



(A) $|z+2|\geq 6, 0\leq \arg(z+2)\leq \frac{\pi}{6}$

(B) $|z+2|\geq 6, 0\leq \arg(z+2)\leq \frac{\pi}{3}$

(C) $|z+2|\geq 6, 0\leq \arg(z+2)\leq \frac{\pi}{2}$

(D) none of these

3. $21\left(x^2+y^2+z^2\right)=(x+2y+4z)^2$, then x,y,z are in

(A) A.P (B) G.P

(C) H.P (D) not in A.P/G.P/H.P

4. Perimeter of the locus represented by $\arg\left(\frac{z+i}{z-i}\right)=\frac{\pi}{4}$,(where i = $\sqrt{-1}$) is equal to

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

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

5. The roots of the equation $(2x-3)^4+(7-4x)^4=16(3x-5)^4$ are

(A) all real (B) all imaginary

(C) two real distinct and two imaginary (D) two real coincident and two imaginary

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Space for rough work

6. A bag contains some white and some black balls, all combinations being equally likely. The total number of balls in the bag in 12. Four balls are drawn at random from the bag without replacement, then probability that two balls are black and two are white is
(A) 1/3 (B) 1/5
(C) 14/33 (D) 1/25

7. Given that A,B,C are pairwise independent events with $P(A \cap B \cap C) = 0$ and P(C)>0. Then $P(A^C \cap B^C / C)$ equals
(A) $P(A) - P(B)$ (B) $P(\bar{A}) - P(\bar{B})$
(C) $P(\bar{A}) - P(B)$ (D) $P(\bar{A}) + P(\bar{B}) - 1$

8. If $1, \alpha_1, \alpha_2, \alpha_3, \alpha_4$ be the roots of $x^5 - 1 = 0$, then the value of $\frac{\omega - \alpha_1}{\omega^2 - \alpha_1} \cdot \frac{\omega - \alpha_2}{\omega^2 - \alpha_2} \cdot \frac{\omega - \alpha_3}{\omega^2 - \alpha_3} \cdot \frac{\omega - \alpha_4}{\omega^2 - \alpha_4}$ is
(A) 1 (B) i
(C) ω (D) ω^2

Multiple Correct Choice Type

9. If n objects are arranged in a row, then the number of ways of selecting three of these objects so that no two of them are next to each other is
(A) $\frac{(n-2)(n-3)(n-4)}{6}$ (B) ${}^{n-2}C_3$
(C) $\frac{(n-1)(n-2)(n-3)}{6}$ (D) ${}^{n-2}C_3 + {}^{n-2}C_2$

10. 1^{st}, 2^{nd} and 7^{th} term of an A.P constitute a G.P of sum 93 then
(A) 4^{th} term of the A.P is 39 (B) common ratio of the G.P is 5
(C) common difference of the A.P is 8 (D) some of first 2 terms is 26

11. If $|a \pm b| < c$ and $a \neq 0$ then the roots of $a^2x^2 + (b^2 + a^2 - c^2)x + b^2 = 0$ are
(A) imaginary (B) real and unequal
(C) of the same sign (D) can not say

Space for rough work

12. If $\left(3+\sqrt{10}\right)^{2n+1} = I + f$, where $I \in Z$ and $0 \le f < 1$ then

(A) I is an odd inteqer (B) I is an even inteqer

(C)(I+f)f=1 (D) $f = -\left(3-\sqrt{10}\right)^{2n+1}$

PART – B

Matrix – Match Type

1. For $n \ge 2$, let $C_r = \binom{n}{r}$ and $a_n = \sum_{r=0}^{n} \frac{1}{C_r}$

Column-I		Column-II	
(A)	$\sum_{r=0}^{n} \frac{r}{C_r}$	(P)	na_n
(B)	$\sum_{r=0}^{n} \frac{n-r}{C_r}$	(Q)	$\frac{1}{n}a_{n-1}$
(C)	$\sum_{r=1}^{n} \frac{1}{rC_r}$	(R)	$\frac{1}{2}na_n$
(D)	$\sum_{r=0}^{n-1} \frac{1}{(n-r)C_r}$	(S)	$\frac{1}{2n}a_{n-1}$

2. If three identical fair unbiased dice are thrown together such that the numbers a,b and c; where $abc \in \{1,2,3,4,5,6\}$ appear on each of them respectively. If λ represents all possible distinct cases, α represents the number of ways in which $a+b+c=9$ and β represents the number of ways of obtaining $a+b+c=8$, then match the following

Column- I		Column-II	
(A)	If α represents the common difference of an A.P such that the arithmetic mean of the squares of these quantities exceeds the square of A.M by 9 then the number of terms in A.P are	(P)	${}^5C_2$
(B)	$\sum_{r=\min(\alpha,\beta)}^{\max(\alpha,\beta)} \left({}^{\max(\alpha,\beta)}C_r\right) - 5$	(Q)	2
(C)	If 6^{th} term in the expansion of $(\alpha+\beta)^n$ is the greatest term, then n is equal to	(R)	1
(D)	$2\left[\left(\frac{\gamma-\beta}{\gamma-\alpha}\right)\left(\frac{\alpha}{\beta}\right)\right]$ = where [.]denotes the greatest integer function	(S)	10

Space for rough work

PART – C

Numerical Based

1. Sum of some consecutive odd positive integers is $65^2 - 16^2$, If the first number is n then $\left(\frac{n}{11}\right)$=_____.

2. In a certain test, there are n questions. In this test 2^{n-i} students gave wrong answers to at lest i question, where i = 1, 2, . . . , n. If the total number of wrong answers given is 2047, then (n-2)=_____.

3. The difference of the integral roots of $(x+2)(x+3)(x+8)(x+12) = 4x^2$ is _____.

4. Let $a_1, a_2, \ldots\ldots\ldots a_{10}$ are in A.P and $h_1, h_2, \ldots\ldots\ldots\ldots h_{10}$ be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ = _____.

5. If $\sum_{r=0}^{n} {}^nC_r \sin(rx)\cos\{(n-r)x\} = f(n)\sin(nx)$, then f(13) is equal to 4^k where k is equal to _____.

6. If $x + y + z = 4, x^2 + y^2 + z^2 = 6$ where x,y,z are real numbers then maximum value of z = __.

Space for rough work