FIITJEE INTERNAL TEST

RANK BOOSTER TEST SERIES – IX

Batches: All1719 (R & W)

IIT- JEE 2019

QP CODE:

Time: ***3 hours*** **Maximum Marks: 228**

- ***Please read the instructions carefully. You are allotted 5 minutes specially 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 to Pencil is strictly prohibited.***

Instructions

Note:

1. The question paper contains 3 sections (Sec-1, Chemistry, Sec-II, Physics & Sec-III, Mathematics.)
2. Each section is divided into three parts, **PART-A, PART-B and PART-C**.
3. **PART – A** contains 13 questions which are further divided as follows:

❖ **Q. 1 – 5** are multiple choice questions. Each question has four choices (A), (B), (C) and (D), out of which **only one is correct**.

❖ **Q. 6 – 13** 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 1 Matrix Match Type Questions which have statements given in 2 columns. Statements in the first column have to be matched with statements in the second column. There may be One or More Than One Correct choices.
5. **PART–C** contains 5 Numerical Based questions with Single Digit Integer as answer, ranging from 0 to 9.

Marking Scheme

1. For each question in the group **Q. 1 – 5** to **PART – A** you will be awarded **5 marks** if you have darkened only the bubble corresponding to the answer and zero marks if no bubble is darkened. In all other cases, **minus three (–3) mark will be awarded.**
2. For each question in the group **Q. 6 – 13** to **Part – A**, contains 8 Multiple Choice Questions which have **One or More Correct** answer.

   For each question in the group **Q. 6 – 13** of **PART – A** you will be awarded
   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.
3. **PART – B** contains 1 Matrix Match Type Questions which have statements given in 2 columns. Statements in the first column have to be matched with statements in the second column. There may be One or More Than One Correct choices. Each question carries **+4 marks** for all correct answer however for each correct row **+1 marks** will be awarded. No negative marks will be awarded in this section.
4. **PART-C (1 – 5)** contains 5 Numerical Based questions with Single Digit Integer as answer, ranging from 0 to 9 and each question carries **+3 marks** for correct answer and **–1 mark** for wrong answer.

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

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

Section – I (Chemistry)

PART – A

(Single Correct Choice Type)

This section contains 5 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which only **ONE** option is be correct.

1. Out of the following which can be enriched through froth flotation process?
(A) Galena, Argentite, Amblygonite, salt peter (B) Galena, Kupfernickel, Pyrargyrite, Chalcocite
(C) Argentite, Iron pyrite, Chalcocite, Pyrargyrite (D) Amblygonite, Pyrargyrite, Ilmenite, Triphylite

2. Out of the following which element is ultra purified by magnesium reduction preferably?
(A) Tritium (B) Thalium (C) Tungsten (D) Titanium

3. $\underset{(\text{Solid})}{A} \xrightarrow{\Delta} \underset{\left(\begin{smallmatrix}\text{Brown}\\ \text{residue}\end{smallmatrix}\right)}{B} + C(g) + D(g)$

Aq. NaOH

$E\,(\text{dirty green precipitate}) \xrightarrow[\text{to air}]{\text{on exposure}} F$

Which combination is correct?

	A	B	C	D	F
(A)	$FeCl_3$	Fe_2O_3	Cl_2	HCl	$Fe(OH)_3$
(B)	$Fe_2(SO_4)_3$	Fe_2O_3	SO_2	SO_3	$Fe(OH)_3$
(C)	$FeSO_4$	Fe_2O_3	SO_2	SO_3	$Fe(OH)_3$
(D)	$FeSO_4$	Fe_2O_3	SO_2	O_2	$Fe(OH)_3$

4. $A + FeCl_3 \longrightarrow \text{Deep blue ppt}(B) \xrightarrow[\text{Solution}]{H_2C_2O_4} \text{Deep blue}$

(Clear solution used as Writing ink)

$C + FeCl_2 \longrightarrow \text{Deep blue ppt}(B)$

$C + FeCl_3 \longrightarrow \text{Brown colouration} \xrightarrow[\text{Solution}]{H_2O_2} \text{Deep blue ppt.}(B)$

Which of the following statement is correct for above scheme?
(A) When 'C' is added to $CuSO_4$ solution then chocolate brown ppt. formed.
(B) When 'A' is treated with conc. H_2SO_4 the gas CO_2 comes out
(C) When 'C' is treated with $CuSO_4$ then a green ppt. form have Oxidation state of 'Fe' is '+2'
(D) When 'A' is treated with conc. H_2SO_4 the gas CO comes out

5. A compound formed by elements X and Y has a cubic structure in which X atoms are at the corners of the cube and also at the alternate face centres. Y atoms are present at body centre and also at the alternate edge centre of the cube. If all the atoms are removed from one of the plane passing through the middle of the cube which contains atoms only on the edge centre but not on face centre. Calculate formula of the compound?
(A) X (B) X_2 (C) X_2Y (D) XY_2

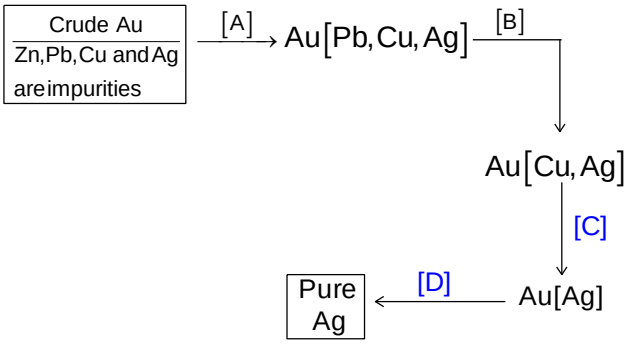
space for rough work

(Multiple Correct Choice Type)

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

6. Which refining method is/are correctly matched with given element to refine the element?
(A) Cupellation: lead (B) Parting process: Gold
(C) Poling : Tin (D) Column Chromatography: Lathanoids

7. In the given scheme for refining of Gold?



W: Heated with conc. H_2SO_4 and washed with hot water
X: Heated with dil.H_2SO_4
Y: Heated with Borax & washed with hot water
Z: Cupellation
Out of the following which is incorrectly matched?
(A) A :: W (B) B :: Z (C) C :: Z (D) X :: D

8. Out of the following oxide/hydroxide precipitate which is insoluble in excess of NaOH as well as in excess of NH_4OH?
(A) $Fe(OH)_3$, $Bi(OH)_3$, $Cd(OH)_2$ (B) $Mn(OH)_2$, $Ni(OH)_2$, Hg_2O
(C) $Fe(OH)_2$, $Fe(OH)_3$, $Mn(OH)_2$ (D) $Bi(OH)_3$, $Mg(OH)_2$, $Fe(OH)_2$

9. If n spheres of radius 1 unit, n sphere of radius 0.414 units and 2 n spheres of radius 0.225 units are packed in closest packing. Which statement is/are correct about this packing?
(A) Volume of crystal is $4\sqrt{3}\,n$ (B) Volume of atoms in crystal is $4\sqrt{2}\,n$
(C) Void space in this packing is 19% (D) Volume of atoms in crystal is 4.58n

10. If Al^{3+} ions are present in two thirds of octahedral void and O^{2-} ions are present in hcp arrangement in correndum(Al_2O_3) type lattice? Which statement is correct?
(A) % Packing fraction is 77.56% (B) % Packing fraction is 22.4%
(C) No of O^{2-} ion is 12/unit cells in lattice (D) No. of Al^{3+} ion is 4/unit cell in lattice

space for rough work

11. Choose the correct statement from the following
(A) addition of (Na_2CrO_4 + CH_3COOH) cannot distinguish group V cations
(B) Addition of Na_2CrO_4 solution cannot distinguish Hg_2^{2+} & Ag^+ ion
(C) Addition of Na_2CrO_4 solution followed by NH_3 solution can distinguish Hg_2^{2+} & Ag^+ ion
(D) Addition of $HClO_4$ or $NaClO_4$ solution can distinguish K^+ and NH_4^+

12. Which of the following statement is/are correct?
(A) $NaNO_3$, $AgNO_3$, $Hg(NO_3)_2$ and $LiNO_3$ are water soluble
(B) $CaCl_2$, $Na_2[Fe(CN)_5NO]$ can be used to distinguish S^{2-} and SO_3^{2-}
(C) Ag_2S, AgI ppt. is insoluble in NH_3 solution
(D) NO_3^- and NO_2^- can be easily distinguished by NH_2SO_3H(sulphanilic acid)

13. Which of the following are the byproducts obtained in the extraction of copper?
(A) SO_2, which is further used in the manufacture H_2SO_4 by the contact process
(B) Gold, silver and platinum obtained as anode mud
(C) $FeSO_4$ which is used to prepare green vitriol
(D) $FeSiO_3$ obtained as slag, used in road making

PART – B
(*Matrix Match Type*)

1. Match the precipitates of the compounds listed in Column-I with the solvent(s) listed in Column-II.

Column – I		Column – II	
(A)	$Zn(OH)_2$ precipitate dissolves in	(P)	Potassium cyanide
(B)	$Cr(OH)_3$ precipitate dissolves in	(Q)	Ammonia solution
(C)	AgCl precipitate dissolves in	(R)	Sodium hydroxide
(D)	CuS precipitate dissolves in	(S)	Sodium peroxide

PART – C

This section contains 05 **multiple choice questions**. The answer to each question is a single digit integer, ranging from 0 to 9 (both inclusive)

1. In how many of the following reaction, one of the product is obtained as a yellow precipitate?

$Ba^{2+} + CrO_4^{2-} \longrightarrow \text{Product}$

$Hg^{2+} + CO^{2+} + SCN^- \longrightarrow \text{Product}$

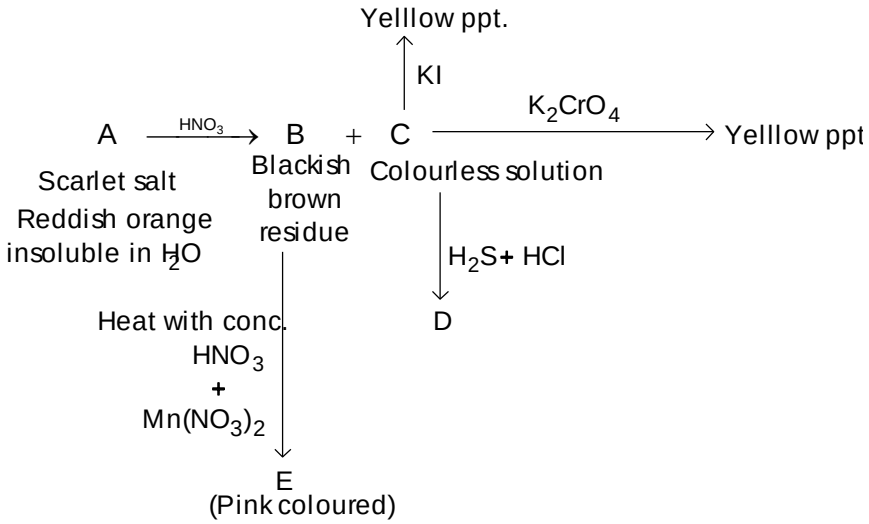
$NH_4^+ + [PtCl_6]^{2-} \longrightarrow \text{Product}$

$Ag^+ + CrO_4^{2-} \longrightarrow \text{Product}$

$NH_4^{\oplus} + \left[Co(NO_2)_6\right]^{3-} \longrightarrow \text{Product}$

space for rough work

2.



How many atoms of metals are present in A(No. of atoms)?

3. The Pyknometric density of NaCl crystal is 2.165×10^3 kg/m^3 while its X-ray density is 2.178×10^3 kg/m^3. The fraction of unoccupied sites in NaCl crystal is $x \times 10^{-y}$. Find the value of (x + y)?

4. Find the no. of metals which are commercially reduced by carbon reduction method from given metals:
Ag, Cr, Mn, Sn, Zn, Fe

5. How many ppt. are not yellowish in colour?
$Cu(CN)_2$, , Ag_2CrO_4, PbI_2, AgI, Ag_3PO_4, BiI_3 $FePO_4$, $K_3[Co(NO_2)_6]$, HgI_2,

space for rough work

Section – II (Physics)

PART – A

(Single Correct Choice Type)

This section contains 5 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which only **ONE** option is be correct.

1. The electric potential between a proton and an electron is given by $V = V_0 \ln\frac{r}{r_0}$, where r_0 is a constant. Assuming Bohr's model to be applicable, write variation of r_n with n, n being the principal quantum number.
(A) $r_n \propto n$ (B) $r_n \propto 1/n$
(C) $r_n \propto n^2$ (D) $r_n \propto 1/n^2$

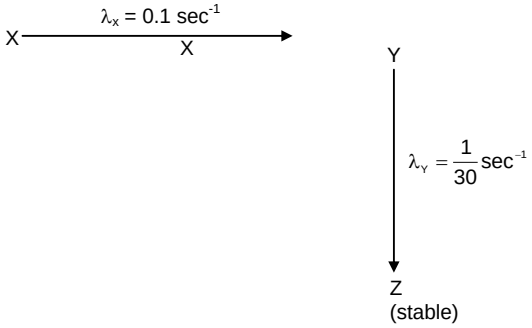
2. If an experiment, the following observation's were recorded: L = 2.820 m, M = 3.00 kg, l = 0.087 cm, diameter D = 0.041 cm. Taking g = 9.81 m/s^2 using the formula, $Y = \frac{4MgL}{\pi m/s^2}$ the maximum permissible error in Y is
(A) 7.96% (B) 4.56%
(C) 6.50% (D) 8.42%

3. Two identical photo-cathodes receive light of frequencies f_1 and f_2. If the velocities of the photo electrons (of mass m) coming out are respectively v_1 and v_2, then
(A) $v_1 - v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{1/2}$ (B) $v_1^2 - v_2^2 = \frac{2h}{m}(f_1 - f_2)$
(C) $v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{1/2}$ (D) $v_1^2 - v_2^2 = \frac{2h}{m}(f_1 + f_2)$

4. A small quantity of solution containing Na^{24} radio nuclide of activity 1 microcurie is injected into the blood of a person. A sample of the blood of volume 1 cm^3 taken after 5 hours shows an activity of 296 disintegration per minute. What will be the total volume of the blood in the body of the person. Assume that the radioactive solution mixes uniformly in the blood of the person. (Take 1 curie = 3.7×10^{10} disintegration per second and $e^{-\lambda t} = 0.7927$; where λ = disintegration constant)
(A) 5.94 litre (B) 2 litre
(C) 317 litre (D) 1 litre

space for rough work

5. A radioactive nucleus X decays to nucleus Y which further decays to a stable nucleus Z as given below:



Initially the sample contains nucleus of X only and its population is $N_0 = 10^{20}$. Further, the population of Y as a function of time is given by

$$N_y(t) = \frac{N_0\lambda_x}{\lambda_x - \lambda_y}\left[e^{-\lambda_y t} - e^{-\lambda_x t}\right]$$

The time at which population of Y is maximum is:

(A) In 3 (B) In 5 (C) 15 In 3 (D) 5 In 3

(Multiple Correct Choice Type)

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

6. Radiations of monochromatic waves of wavelength 400 nm are made incident on the surface of metals Zn, Fe and Ni of work functions 3.4 eV, 4.8 eV and 5.9 eV respectively. Which of the following is(are) correct?
   (A) Maximum KE associated with photoelectrons from the surface of any metal is 0.3 eV.
   (B) No photoelectron are emitted from the surface of Ni.
   (C) If the wavelength of source of radiation is doubled then KE of photoelectrons is also doubled.
   (D) Photoelectrons will be emitted from the surface of all the three metals if the wavelength of incident radiations < 200 nm.

7. Using screw gauge the radius of the wire is found to be 2.50 mm. The length of wire is measured by using a scale and is found to be 50.0 cm. If mass of wire is measured as 25 g, then mark the correct statement(s) [Take π = 3.14]
   (A) The density has to be computed upto 2 significant digit.
   (B) The least count of scale used to measure length of wire is 1 mm.
   (C) The density of wire is 2.5 g/cm^3.
   (D) The least count of screw gauge is 0.01 mm

8. The electron in a hydrogen atom makes a transition $n_1 \to n_2$, where n_1 and n_2 are the principal quantum numbers of two states. Assume the Bohr model to be valid. If the time period of the electron in the initial state is eight times that in the final state then the possible values of n_1 and n_2 are
   (A) $n_1 = 4, n_2 = 2$ (B) $n_1 = 8, n_2 = 2$
   (C) $n_1 = 8, n_2 = 1$ (D) $n_1 = 6, n_2 = 3$

space for rough work

9. If the dimensions of length are expressed as $G^x c^y h^z$; where G, c and h are the universal gravitational constant, speed of light and Planck's constant respectively, then

(A) $x = \frac{1}{2}, y = \frac{1}{2}$ (B) $x = \frac{1}{2}, z = \frac{1}{2}$

(C) $y = \frac{1}{2}, z = \frac{3}{2}$ (D) $y = -\frac{3}{2}, z = \frac{1}{2}$

10. If the potential difference of Coolidge tube producing X-ray is increased, then choose the correct option(s).

(A) the interval between $\lambda_{k\alpha}$ and $\lambda_{k\beta}$ increases

(B) the interval between $\lambda_{k\alpha}$ and λ_0 increases

(C) the interval between $\lambda_{k\beta}$ and λ_0 increases

(D) λ_0 does not change

Here λ_0 is cutoff wavelength and $\lambda_{k\alpha}$ and λ_{kB} are wavelength of k_α and k_B characteristic X-rays.

11. Students I, II and III perform an experiment for measuring the acceleration due to gravity (g) using a simple pendulum. They use different lengths of the pendulum and / or record time for different number of oscillations. The observations are shown in the table.

Least count for length = 0.1 cm

Least count for time = 0.1 s

Student	Length of pendulum (cm)	Number of oscillation	Total time for (n) oscillations	Time period (s)
I	64.0	8	128.0	16.0
I	64.0	4	64.0	16.0
II	20.0	4	36.0	9.0

If E_I, E_{II} and E_{III} are the percentage errors in g, i.e., $\left(\frac{\Delta g}{g} \times 100\right)$ for students I, II and III, respectively,

(A) $E_I = 0$ (B) E_I is minimum

(C) $E_I = E_{II}$ (D) E_{II} is maximum

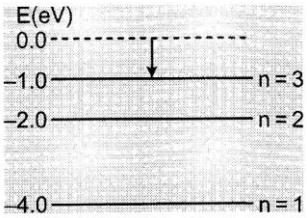
12. Shows the energy-level diagram of hydrogen like imaginary element X. (*hc* = 1242 eV-nm)

(A) The ionization energy of element X is 4eV.

(B) An atom in the ground state absorbs a photon, comes to an excited state then emits a photon with a wavelength of 1242 nm. The incident photon must have a wavelength of 414 nm.

(C) An atom in the ground state has a collision with an electron, then emits a photon with a wavelength of 1242 nm. The incident electron must have energy of 3 eV.

(D) An atom in the ground state absorbs a photon, comes to an excited state then emits a photon with a wavelength of 1242 nm. The incident photon must have a wavelength of 1242 nm.



space for rough work

13. An electron in hydrogen atom first jumps from second excited state to first excited state and then from first excited state to ground state. Let the ratio of wavelength, momentum and energy of photons emitted in these two cases be a, b and c respectively, then

(A) $c = \frac{1}{a}$ (B) $a = \frac{9}{4}$ (C) $b = \frac{5}{27}$ (D) $c = \frac{5}{27}$

PART – B
(*Matrix Match Type*)

1. Match the different kinds of radiations emitted by a hydrogen atom given in Column I with the corresponding electron transitions given in Column II.

Column I		**Column II**	
(A)	Ultraviolet light	(P)	$n = 6 \rightarrow n = 3$
(B)	Visible light	(Q)	$n = 3 \rightarrow n = 1$
(C)	Infrared radiation	(R)	$n = 4 \rightarrow n = 2$
(D)	Microwaves	(S)	$n = 7 \rightarrow n = 6$

PART – C

This section contains 05 **multiple choice questions**. The answer to each question is a single digit integer, ranging from 0 to 9 (both inclusive)

1. An X-rays tube is working at a potential difference of 38.08 kV. The potential difference is decreased to half its initial value. It is found that difference of the wavelength of K_α X-ray and the most energetic continuous X-rays becomes 4 times of the difference prior to the change of voltage. Assuming K_α line is present in both cases, if the atomic number of the target element is (10k + 1), then find the value of k. [Take: *Rch* = 13.6 eV]

2. The unknown resistance in a meter bridge is given by $x = \left(\frac{l}{100 - l}\right) R$ where *l* is the distance of null point from one end. Find the value of $\frac{1}{l}$ (in meter^{-1}) for which error in determination of x is minimum.

space for rough work

3. An electron in hypothetical hydrogen atom is in its 3rd excited state and makes transition from 3rd to 2nd excited, then to 1st excited state and then to ground state. If the amount of time spent by the electron in any state of quantum number n, is proportional to $\left(\frac{1}{n-1}\right)$, then the ratio of no. of revolutions completed by the electron in 1st excited state to that in the 2nd excited state is $\frac{27}{x}$. Find the value of x. (Take hc = 12400 eV Å)

4. In a certain hypothetical radioactive decay process, species A decays into species B and species B decays into species C according to the reactions

   $A \longrightarrow 2B$ + particles + energy

   $B \longrightarrow 3C$ + particles + energy

   The decay constant for species A is $\lambda_1 = 1\,\text{sec}^{-1}$ and that for species B is $\lambda_2 = 100\,\text{sec}^{-1}$. Initially 10^4 moles of species of A were present while there was none of B and C. It was found that species B reaches its maximum number at a time t_0 = 2 ln(10)sec. Calculate the value of maximum number of moles of B.

5. A metallic sphere (work function 4.2 eV) is suspended in a vacuum chamber by an insulating thread. Ultraviolet light of wavelength 0.2 μm strike on the sphere. Find the maximum electric potential (in volt) of the sphere will be

space for rough work

Section – III (Mathematics)

PART – A

(Single Correct Choice Type)

This section contains 5 **multiple choice questions.** Each question has four choices (A), (B), (C) and (D) out of which only **ONE** option is be correct.

1. Projection of $\frac{x}{2}=\frac{y-1}{2}=\frac{z-1}{1}$ on a plane is $\frac{x}{1}=\frac{y-1}{1}=\frac{z-1}{-1}$. If the plane pass through $(2,1,\alpha)$ then α

(A) 0 (B) 1 (C) 2 (D) 3

2. If $A=\begin{bmatrix} x & y & -z \\ 1 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}, x,y,z\in N$ and $\left|\text{adj}\left(\text{adj}\left(\text{adj}\left(\text{adj}(A)\right)\right)\right)\right|=\left(4^8\right)\left(5^{16}\right)$ then number of such matrices

(A) 6 (B) 12 (C) 24 (D) 36

3. In a triangle ABC if $B-C=45^o$ and $\begin{vmatrix} -2 & \cos C & \cos B \\ \cos C & -1 & \cos A \\ \cos B & \cos A & -1 \end{vmatrix}+\cos^2 A=0$ then $a:b:c$ is equal to

(A) 1 : 2 : 3 (B) 1 : 1 : 1 (C) $1:\sqrt{3}:2$ (D) $1:\sqrt{2}:1$

4. The number of different non – zero Determinant $\begin{vmatrix} 1 & a & c \\ 1 & 1 & b \\ 0 & -w & w \end{vmatrix}$ where $w=e^{i\theta}$ and $a,b,c\in\left\{z:z^4-1=0\right\}$ are

(A) 44 (B) 48 (C) 16 (D) 55

5. If $A=\text{diag}(3,2,5)$, $B=\text{diag}(11,19,13)$, $C=\text{diag}(61,53,31)$ and trace of ABC = 3k then k is equal to

(A) 2014 (B) 2015 (C) 2016 (D) 2017

(Multiple Correct Choice Type)

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

6. If $\vec{p}=a\hat{i}+b\hat{j}+c\hat{k}$ and $\vec{q}=b\hat{i}+c\hat{j}+a\hat{k}$ where a, b, c direction cosines of a line then angle between $\vec{p}$ and $\vec{q}$ can be

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

space for rough work

7. If $\hat{i}+2\hat{j},\ 2\hat{i}+a\hat{j}+10\hat{k},\ 12\hat{i}+20\hat{j}+a\hat{k}$ are linearly independent then 'a' can be
(A) 2 (B) –7 (C) 4 (D) 7

8. If $A=\begin{bmatrix}8 & -4\\ 2 & 2\end{bmatrix}$ and $AX=\lambda X\left(X\neq 0\right),\lambda\in R$ and $X=\begin{bmatrix}\alpha\\ \beta\end{bmatrix}$ then $\frac{\alpha}{\beta}$ is equal to
(A) 1 (B) 2 (C) 3 (D) 4

9. a, b, c are three complex numbers representing the vertices of a triangle ABC, such that $\begin{vmatrix}a & b & c\\ b & c & a\\ c & a & b\end{vmatrix}=0$. then which of the following can be true
(A) centrod of ABC is 0 (B) ABC is an equilateral triangle
(C) $|a|=|b|=|c|$ (D) $|a^3|+|b^3|+|c^3|=3|abc|$

10. If $|\vec{a}|=1,\ |\vec{b}|=5,\ |\vec{c}|=3$ and $\vec{a}\times\left(\vec{a}\times\vec{b}\right)=\vec{c}$, θ = angle between $\vec{a}$ and $\vec{b}$ then $\tan\theta=$
(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{3}{4}$ (D) $\frac{4}{5}$

11. The solution of $p^2+2pycotx=y^2$ is $(p=dy/dx)$
(A) $y=\frac{c}{1+\cos x}$ (B) $y=\frac{c}{1-\cos x}$ (C) $x=2\sin^{-1}\sqrt{\frac{c}{2y}}$ (D) $x=2\tan^{-1}\sqrt{\frac{c}{2y}}$

12. A normal is drawn at a point P (x, y) of a curve. It meets the x – axis at Q. If PQ is of constant length k. Such a curve passing through (0, k) is
(A) a circle with centre (0, 0) (B) $x^2+y^2=k^2$
(C) $(1-k)x^2+y^2=k^2$ (D) $x^2+(1+k^2)y^2=k^2$

13. If $\left(1+px+qx^2\right)^{10}=a_0+a_1x+a_2x^2+....+a_{20}x^{20}$, $a_0+a_1+a_2\neq 0$ and $\begin{vmatrix}a_0 & a_1 & a_2\\ a_1 & a_2 & a_0\\ a_2 & a_0 & a_1\end{vmatrix}=0$ then
(A) $P=\frac{1}{10}$ (B) $q=\frac{11}{100}$
(C) $p=\frac{1}{20}$ (D) $q=\frac{11}{200}$

space for rough work

PART – B
(*Matrix Match Type*)

1. Match the following

Column-I		Column-II	
(A)	The solution of D.E. $y_3=8y_2$ satisfying $y(0)=\frac{1}{8}, y_1(0)=0$ and $y_2(0)=1$ is $\lambda y=e^{8x}-8x+7$, then the value of $2\lambda^{1/3}$ is ($y_n=n^{th}$ derivative of y)	(P)	0
(B)	If A is 2×2 matrix, $\lvert A\rvert\neq 0$ and $\lvert A+(\text{adj}\,A)\rvert=0$ then $\lvert A\rvert=$	(Q)	1
(C)	The DE of $y=c_1x+\frac{c_2}{x}$ is $x^2y_2+xy_1=ky$ then k=	(R)	4
(D)	If X be a m x n matrix then $\lvert XX^T\rvert$ is equal to	(S)	8

PART – C

This section contains 05 **multiple choice questions**. The answer to each question is a single digit integer, ranging from 0 to 9 (both inclusive)

1. A line cut AB, AC, AD of parallelogram ABCD at B_1, C_1, D_1. If $AB_1=\lambda_1 AB,\ AD_1=\lambda_2 AD,\ AC_1=\lambda_3 AC$, then $\frac{k}{\lambda_3}=\frac{1}{\lambda_1}+\frac{1}{\lambda_2}$ with k =

2. If a, b, c, $A,B,C\in R-\{0\}$ and $aA+bB+cC+\sqrt{(a^2+b^2+c^2)(A^2+B^2+C^2)}=0$ then $\frac{aB}{bA}+\frac{bC}{cB}+\frac{cA}{aC}=$ _____

3. If $\left[(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})\ \ (\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})\ \ (\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})\right]=m\left[\vec{a}\ \ \vec{b}\ \ \vec{c}\right]^n$ then $m+n=$

4. If $A(3,-2,-1)$, $B(1,3,4)$, $C(2,1,-2)$, $O(0,0,0)$ distance of A from the plane of ΔOBC is

5. If $A(2,3,5), B(-1,3,2), C(h,5,k)$. If median through A is perpendicular to the plane $x-2y+5z=7$ then $\sqrt{h^2+k^2}=$

space for rough work