FIITJEE INTERNAL Phase Test

BATCHES – Two Year CRP – 2325

PHYSICS, CHEMISTRY & MATHEMATICS

QP CODE: 100889 | **RIT – 9**

Time Allotted: 3 Hours | **Maximum Marks: 180**

- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
- You are not allowed to leave the Examination Hall before the end of the test.

INSTRUCTIONS

Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.

A. General Instructions

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. This question paper contains **Three Sections.**
3. **Section-I** is Physics, **Section-II** is Chemistry and **Section-III** is Mathematics.
4. All the section can be filled in **PART-A & B** of OMR.
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

B. Filling of OMR Sheet

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with ***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 Two Parts.

(i) **PART–A (01–03)** contains **(3)** Multiple Choice Questions which have **One or More Than One Correct** answer.
Full Marks: **+4** If only the bubble(s) corresponding to all the correct options(s) is (are) darkened.
Partial Marks: **+1** For darkening a bubble corresponding **to each correct option,** provided NO incorrect option is darkened.
Zero Marks: **0** If none of the bubbles is darkened.
***Negative Marks*: – 1 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 –**1** marks, as a wrong option is also darkened.

(ii) **Part-A (04-07) –** Contains Four (04) multiple choice questions which have ONLY ONE CORRECT answer Each question carries **+3 marks** for correct answer and **-1 marks** for wrong answer.

(iii) **Part-A (08-11) –** This section contains Four (04) Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question. Each question carries **+3 Marks** for correct answer and **-1 marks** for wrong answer.

(iii) **Part-B (01-06)** This section contains **SIX (06)** questions. The answer to each question is a **NON-NEGATIVE INTEGER**. For each question, enter the correct integer corresponding to the answer. Each question carries **+4 marks** for correct answer. **There is no negative marking.**

Name of the Candidate: ____

Batch: ____________________ **Date of Examination:** ___________________

Enrolment Number: ____

SECTION – I: PHYSICS

(PART – A)

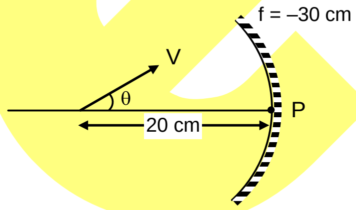
(One or More Than One Options Correct Type)

This section contains **3 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE is correct.**

1. Laws of reflection are valid for
(A) plane surface
(B) curved surface
(C) zigzag surface
(D) none of these

2. A thin film of thickness *t* and index of refraction 1.33 coats a glass with index of refraction 1.50. Which of the following thickness *t* will not reflect normally incident light (from air to film) with wavelength 640 nm in air?
(A) 120 nm
(B) 240 nm
(C) 360 nm
(D) 600 nm

3. A ball is projected with initial speed v at a distance 20 cm from pole of a concave mirror as shown in the figure. Speed of image can be



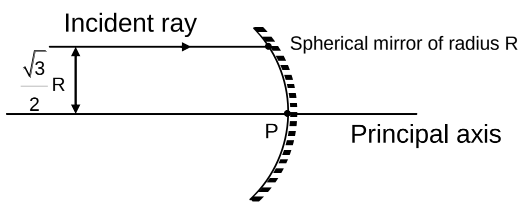
(A) 2V
(B) 3 V
(C) 5 V
(D) 10 V

(Single Correct Answer Type)

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

4. When a thin transparent sheet of refractive index $\mu = \frac{3}{2}$ is placed near one the slits in Young's double slits experiment, the intensity at the centre of the screen reduces to half of the maximum intensity. The minimum thickness of the sheet should be
(A) $\frac{\lambda}{4}$
(B) $\frac{\lambda}{8}$
(C) $\frac{\lambda}{2}$
(D) $\frac{\lambda}{3}$

5. As situation shown in figure, the angle of deviation of the ray when the ray is moving away from the mirror



(A) 120°
(B) 90°
(C) 180°
(D) none of these

Space For Rough Work

6. The maximum intensity in Young's double slit experiment is I_0. Distance between the slits is $d = 5\lambda$, where λ is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance $D = 10\,d$? (Assuming $D >> d$)

(A) $\frac{I_0}{2}$ (B) $\frac{3}{4}I_0$ (C) I_0 (D) $\frac{I_0}{4}$

7. A ray parallel to the principal axis is incident at 30° with the normal on a convex spherical mirror having radius of curvature R. The distance from the pole to the point where the line of reflected ray intersects the principal axis.

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

(C) $R\left(1-\frac{1}{\sqrt{2}}\right)$ (D) $R\left(1-\frac{1}{\sqrt{3}}\right)$

(Matching List Sets)

This section contains **FOUR (04)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

8. For a real point object placed in front of a mirror, magnification m is given in List-I, List-II gives the possible nature of the mirror or that of image. Match appropriately.

List-I		**List-II**	
(P)	$m = \frac{1}{4}$	(1)	Concave mirror
(Q)	$m = -1$	(2)	Convex mirror
(R)	$m = 2$	(3)	Plane mirror
(S)	$m = 1$	(4)	Real
		(5)	Virtual

The correct option is:

(A) P → 1,4 ; Q → 3,5 ; R → 2 ; S → 3,4
(B) P → 2,4 ; Q → 1,5 ; R → 2 ; S → 1,5
(C) P → 2,5 ; Q → 1,4 ; R → 1,5 ; S → 3,5
(D) P → 2,5 ; Q → 1,4 ; R → 2,3 ; S → 1

Space For Rough Work

9.

List-I		List-II	
(P)	Observed on screen	(1)	virtual image of a real object.
(Q)	Observed by naked eye	(2)	virtual image of a virtual object.
(R)	Still photographed by a camera	(3)	real image of a real object.
(S)	Recording by video camera	(4)	real image of a virtual object
		(5)	a real object is placed at the focus of concave lens.

The correct option is:
(A) $P \rightarrow 3,4$; $Q \rightarrow 1,2,3,4,5$; $R \rightarrow 1,2,3,4,5$; $S \rightarrow 1,2,3,4,5$
(B) $P \rightarrow 2,4$; $Q \rightarrow 1,2,3,4,5$; $R \rightarrow 1,2,3,4$; $S \rightarrow 1,2,3$
(C) $P \rightarrow 1,2,3,4,5$; $Q \rightarrow 3,4,5$; $R \rightarrow 1,2$; $S \rightarrow 1,2,3,4,5$
(D) $P \rightarrow 1,2$; $Q \rightarrow 1,2,3,4,5$; $R \rightarrow 2,4,5$; $S \rightarrow 1,3,4,5$

10. A light wave is moving in air and incident at the surface of the water then match the lists.

List-I		List-II	
(P)	The phase difference between transmitted wave (in water) and incoming wave (in air).	(1)	O
(Q)	The phase difference between reflected wave and incoming wave.	(2)	π
(R)	The change of phase if the sound wave travelled in air for half of the time period.	(3)	$\frac{\pi}{2}$
(S)	The change of phase if the sound wave travelled in water for half of the time period.	(4)	2π
		(5)	$\frac{\pi}{6}$

The correct option is:
(A) $P \rightarrow 2$; $Q \rightarrow 2$; $R \rightarrow 3$; $S \rightarrow 1$
(B) $P \rightarrow 1$; $Q \rightarrow 1$; $R \rightarrow 2$; $S \rightarrow 2$
(C) $P \rightarrow 5$; $Q \rightarrow 3$; $R \rightarrow 2$; $S \rightarrow 1$
(D) $P \rightarrow 4$; $Q \rightarrow 3$; $R \rightarrow 1$; $S \rightarrow 2$

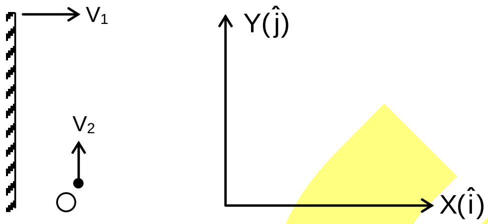
11. List-I shows four situations of standard young's double slit arrangement with screen placed far away from the slits S_1 and S_2. Match each situation given in List-I with the statement(s) in List-II.

List-I		List-II	
(P)	If sodium light is replaced by red light of same intensity.	(1)	All fringes are coloured except central fringe.
(Q)	Monochromatic light is replaced by white light.	(2)	Fringe width will become quadrupled.
(R)	Distance between slits and screen is doubled and the distance between slits is halved.	(3)	The bright fringe will become less bright.
(S)	If one of the slits is covered by cellophane paper.	(4)	The fringe width will increases.
		(5)	The fringe width will remains same.

The correct option is:
(A) $P \rightarrow 4$; $Q \rightarrow 1$; $R \rightarrow 3$; $S \rightarrow 5$
(B) $P \rightarrow 4$; $Q \rightarrow 1$; $R \rightarrow 2$; $S \rightarrow 3$
(C) $P \rightarrow 3$; $Q \rightarrow 2$; $R \rightarrow 1$; $S \rightarrow 5$
(D) $P \rightarrow 2$; $Q \rightarrow 1$; $R \rightarrow 4$; $S \rightarrow 5$

(PART – B)
(Non – Negative Integer)

1. The mirror moves along x-axis with velocity V_1 = 2 m/s and object moves parallel to y-axis with velocity V_2 = 3 m/s as shown in figure. The magnitude of velocity of the image is

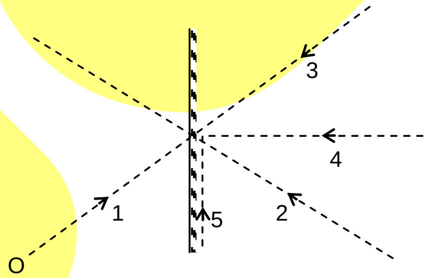


2. A point object is placed at the centre of a glass sphere of radius 6 cm and refractive index 1.5. The distance of virtual image from the surface (in cm) will be

3. The intensity of the light coming from one of the slits in a Young's double slit experiment is four times the intensity from the other slit. Find the ratio of the maximum intensity to the minimum intensity in the interference fringe pattern observed.

4. Monochromatic light of wavelength1 of 600 nm is used in a YDSE. One of the slits is covered by a transparent sheet of thickness 0.9 x 10^{-5} m made of a material of refractive index 1.6. How many fringes will shift due to the introduction of the sheet?

5. An insect moves along the dotted line (1). It's image moves along the line



6. A ray of light is incident with an angle of incidence 60° on one face of prism, which has an angle of 30°. The ray emerging out of the prism makes an angle of 30° with the incident ray. Then angle of emergence will be

Space For Rough Work

SECTION – II: CHEMISTRY

(PART – A)

(One or More Than One Options Correct Type)

This section contains **3 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE is correct.**

1. An hcp and a ccp structure for a given element would be expected to have
(A) the same coordination number
(B) the same density
(C) the same packing fraction
(D) all of these

2. A mixture of two salts is used to prepare a solution 's' which gives the following results

$$\text{White ppt}(s)\text{only} \xleftarrow[\text{Room temp}]{\text{Dil NaOH}} \underset{\left(\text{aq. sol of the salts}\right)}{s} \xrightarrow[\text{Room temp}]{\text{Dil.HCl}} \text{White ppt}(s)\text{ only}$$

The correct option(s) for the salt mixture is(are)
(A) $Pb(NO_3)_2$ and $Zn(NO_3)_2$
(B) $Pb(NO_3)_2$ and $Bi(NO_3)_2$
(C) $AgNO_3$ and $Bi(NO_3)_2$
(D) $PbNO_3$ and $Hg(NO_3)_2$

3. Consider the following solutions
I. 1 M sucrose
II. 1 M KCl
III. 1 M benzoic acid in benzene
IV. 1 M$(NH_4)_3PO_4$
Which of the following is/are true?
[Assume 100% dissociation on salts]
(A) All solutions are isotonic
(B) III is hypotonic of I, II and IV
(C) I, II and III are hypertonic of IV
(D) IV is hypertonic of I, II and III

(Single Correct Answer Type)

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

4. The incorrect statement(s) about surface properties is(are)
(A) Adsorption is accompanied by decrease in enthalpy and decrease in entropy of the system.
(B) The critical temperatures of ethane and nitrogen are 563 K and 126 K, respectively. The adsorption of ethane will be more than that of nitrogen on same amount of activated charcoal at a given temperature.
(C) Cloud is an emulsion type of colloid in which liquid is dispersed phase and gas is dispersion medium.
(D) Brownian motion of colloidal particles does not depend on the size of the particles but depends on viscosity of the solution.

5. Which of the following solutions has minimum freezing point?
(A) 0.01 M NaCl
(B) 0.005 M C_2H_5OH
(C) 0.005 M $MgCl_2$
(D) 0.005 $MgSO_4$

Space For Rough Work

6. Which is not a molecular solid?
(A) Ice
(B) Iodine
(C) Dry ice
(D) Diamond

7. $PCl_5 + H_2O \longrightarrow X + HCl$

$PCl_3 + H_2O \longrightarrow Y + HCl$

(X) and (Y) are respectively
(A) H_3PO_4 and H_3PO_3
(B) $POCl_3$ and POCl
(C) $POCl_3$ and H_3PO_3
(D) H_3PO_4 and POCl

(Matching List Sets)

This section contains **FOUR (04)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

8. Match the anions mentioned in list-I with their reactions mentioned in list-II.

List – I (salts with degree of dissociation)		List– II (Van't Hoff factor)	
(P)	$KNO_3(\alpha = 0.8)$	(1)	4.6
(Q)	$CaCl_2(\alpha = 0.6)$	(2)	5.8
(R)	$K_4[Fe(CN)_6]$ $(\alpha = 0.9)$	(3)	2.2
(S)	$Fe_4[Fe(CN)_6]_3$ $(\alpha = 0.8)$	(4)	1.8
		(5)	3.6

(A) $P \to 2$; $Q \to 3$; $R \to 1$; $S \to 4$
(B) $P \to 4$; $Q \to 3$; $R \to 1$; $S \to 2$
(C) $P \to 3$; $Q \to 2$; $R \to 1$; $S \to 4$
(D) $P \to 5$; $Q \to 3$; $R \to 2$; $S \to 1$

9. Match the lists.

List – I (Basic radicals)		List– II (Properties)	
(P)	Ca^{2+}	(1)	When the acetate salt of the metal ion reacts with K_2CrO_4 a yellow ppt. in soluble in acidic medium is formed
(Q)	Al^{3+}	(2)	Forms white ppt. with both NaOH and NH_4OH
(R)	Pb^{2+}	(3)	Forms a white precipitate with $Na_2C_2O_4$. The ppt. is soluble in dil. acid
(S)	Ba^{2+}	(4)	Forms a white ppt. with Na_2SO_3. The ppt. is soluble in dil. acids when freshly prepared. When the ppt. is exposed to atmosphere, it becomes insoluble in dil.acids
		(5)	Forms a white precipitate with KCN

(A) $P \to 3$; $Q \to 5$; $R \to 4$; $S \to 2$
(B) $P \to 3$; $Q \to 2$; $R \to 1$; $S \to 4$
(C) $P \to 3$; $Q \to 5$; $R \to 1$; $S \to 2$
(D) $P \to 3$; $Q \to 1$; $R \to 2$; $S \to 4$

Space For Rough Work

10. Match the lists.

	List – I (Ionic solids)		**List– II (Coordination number)**
(P)	NaCl	(1)	8
(Q)	CsCl	(2)	6
(R)	ZnS	(3)	4
(S)	CaF_2	(4)	4 and 8
		(5)	3 and 6

(A) $P \rightarrow 4$; $Q \rightarrow 2$; $R \rightarrow 3$; $S \rightarrow 1$
(B) $P \rightarrow 3$; $Q \rightarrow 2$; $R \rightarrow 1$; $S \rightarrow 4$
(C) $P \rightarrow 3$; $Q \rightarrow 1$; $R \rightarrow 2$; $S \rightarrow 5$
(D) $P \rightarrow 2$; $Q \rightarrow 1$; $R \rightarrow 3$; $S \rightarrow 4$

11. Match the lists.

	List – I (Interhalogen compounds)		**List– II (Hybridization of central atom)**
(P)	BrCl	(1)	sp^3d^3
(Q)	ClF_3	(2)	sp^3d^2
(R)	IF_5	(3)	sp^3d
(S)	IF_7	(4)	sp^3
		(5)	sp^2

(A) $P \rightarrow 5$; $Q \rightarrow 2$; $R \rightarrow 3$; $S \rightarrow 4$
(B) $P \rightarrow 5$; $Q \rightarrow 1$; $R \rightarrow 3$; $S \rightarrow 2$
(C) $P \rightarrow 4$; $Q \rightarrow 3$; $R \rightarrow 2$; $S \rightarrow 1$
(D) $P \rightarrow 4$; $Q \rightarrow 2$; $R \rightarrow 3$; $S \rightarrow 1$

(PART – B)

(Non – Negative Integer)

1. The nitrate of a 3d-series metal 'M' forms a single white zelatinous precipitate(P) with NaOH. (P) is soluble in dil. HCl as well as in NaOH solution. It can also form the same precipitate with ammonia solution and the precipitate is readily soluble in excess of the reagent due to formation of a complex of M^{2+}. How many maximum number of electrons with ℓ = 2 and s = +½ are present in metal(M?)

2. The sodium salt of the monocarboxylic acid(P) forms a white precipitate(Q) when treated with mercuric chloride. This precipitate turns grey when excess of (P) is added. How many carbon atom(s) is/are present in the acid(P)?

3. The formula of the spinel is $MgAl_2O_4$. If the oxide ions are replaced with carbide ions(C^{4-}), how many anionic vacancy will be created per unit cell?

4. Two ions A^+ and B^- have ionic radii 88 and 200 pm respectively. In the close-packed crystal of compound AB, predict the coordination number of A^+.

5. Among PbS, CuS, HgS, MnS, Ag_2S, NiS, CoS, CdS, the total number of black coloured sulphides is

6. 0.1 mole of glycol was added to 500 g of water at 1 atm pressure. The aqueous solution was cooled to -X°C, in order to produce 65 g of ice, what is the value of 10X?
[K_f or H_2O = 1.86 K Kg mol^{-1}]

Space For Rough Work

SECTION – III: MATHEMATICS

(PART – A)

(One or More Than One Options Correct Type)

This section contains **3 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D), out of which **ONE** or **MORE THAN ONE is correct.**

1. If $A^2 + A + I = 0$, then
(A) A is nonsingular
(B) $A \neq 0$
(C) A is singular
(D) $A^{-1} = -(A + I)$

2. If $y = f(x)$ is solution of the differential equation $\left(\frac{dy}{dx} - 1\right)(e^x - e^{-x}) + y(e^x + e^{-x}) = 0$ then
(A) maximum value of $f(x)$ is 1
(B) minimum value of $f(x)$ is –1
(C) range of $f(x)$ is (–1, 1)
(D) equation $f(|x|) = |x|$ has exactly one solution

3. If the area bounded by $y = f(x)$, y – axis and line $2y = \pi(x + 1)$, where $f(x) = \sin^{-1} x + \cos^{-1} x + \tan^{-1} x + \tan^{-1}\left(\frac{1}{x}\right)$ is $\frac{\pi}{k}$, then k is not equal to
(A) 1
(B) 2
(C) 3
(D) 4

(Single Correct Answer Type)

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

4. If A is order 3 square matrix such that $|A| = 2$, then $|\text{adj}(\text{adj}(\text{adj}\, A))|$ is
(A) 512
(B) 256
(C) 64
(D) none of these

5. Let A and B be 2 × 2 matrices with real entries satisfying $(AB - BA)^n = I_2$ for some positive integer n, then n is
(A) even
(B) odd
(C) prime
(D) any integer

Space For Rough Work

6. Solution of the differential equation $\left\{\frac{1}{x}-\frac{y^2}{(x-y)^2}\right\}dx+\left\{\frac{x^2}{(x-y)^2}-\frac{1}{y}\right\}dy=0$ is

(A) $\ln\left|\frac{x}{y}\right|+\frac{xy}{(x-y)}=c$
(B) $\ln|xy|+\frac{xy}{(x-y)}=c$
(C) $\frac{xy}{(x-y)}=ce^{x/y}$
(D) $\frac{xy}{(x-y)}=ce^{xy}$

(where c is an arbitrary constant)

7. The area enclosed by the graph of $\frac{|x|}{5}+\frac{|y|}{3}=1$ is

(A) 10
(B) 20
(C) 30
(D) 40

(Matching List Sets)

This section contains **FOUR (04)** Matching List Sets. Each set has **ONE** Multiple Choice Question. Each set has **TWO** lists: **List-I** and **List-II**. **List-I** has **Four** entries (P), (Q), (R) and (S) and **List-II** has **Five** entries (1), (2), (3), (4) and (5). **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

8. Match the expression in **List – I** with the appropriate value in **List – II**

	List – I		**List – II**
(P)	$f(x)=\begin{vmatrix}\sin(x+\alpha) & \sin(x+\beta) & \sin(x+\gamma)\\ \cos(x+\alpha) & \cos(x+\beta) & \cos(x+\gamma)\\ \sin(\beta+\gamma) & \sin(\gamma+\alpha) & \sin(\alpha+\beta)\end{vmatrix}$ and $f(0)=0$, then $\sum_{j=-5}^{5} f(j)$ equals	(1)	–1
(Q)	If $\sin 2x=1$, then $f(x)=\begin{vmatrix}0 & \cos x & -\sin x\\ \sin x & 0 & \cos x\\ \cos x & \sin x & 0\end{vmatrix}^2$ equals	(2)	0
(R)	If $f(x)=\begin{vmatrix}\sin x & \sec x & x^2-1\\ \operatorname{cosec} x & x\sin x & \cos x\\ \tan x & x\tan x & x^2+1\end{vmatrix}$ then $\int_{-\pi/3}^{\pi/3} f(x)dx$ equals	(3)	2
(S)	Maximum value of the determinant $\begin{vmatrix}1+\sin^2 x & \cos^2 x & \sin 2x\\ \sin^2 x & 1+\cos^2 x & \sin 2x\\ \sin^2 x & \cos^2 x & 1+\sin 2x\end{vmatrix}$	(4)	3
		(5)	1

(A) P $\to$ 2, Q $\to$2, R $\to$4, S $\to$1
(B) P $\to$ 2, Q $\to$2, R $\to$2, S $\to$4
(C) P $\to$ 2, Q $\to$1, R $\to$2, S $\to$5
(D) P $\to$ 5, Q $\to$2, R $\to$2, S $\to$1

Space For Rough Work

9.

	List – I		List – II
(P)	If $\begin{bmatrix} 1 & 2 & a \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{bmatrix}^n = \begin{bmatrix} 1 & 18 & 2007 \\ 0 & 1 & 36 \\ 0 & 0 & 1 \end{bmatrix}$, then $(n+a)=$	(1)	225
(Q)	If A is a square matrix of order 3 such that $\lvert A\rvert = a, B = \text{adj}(A)$ and $\lvert B\rvert = b$, then $(ab^2 + a^2b + 1)\lambda =$ ________ (where $\frac{1}{2}\lambda = \frac{a}{b} + \frac{a^2}{b^3} + \frac{a^3}{b^5} + \ldots$upto ∞ and $a=3$)	(2)	200
(R)	Let $A = \begin{bmatrix} a & b & c \\ p & q & r \\ 1 & 1 & 1 \end{bmatrix}$ and $B = A^2$. If $(a-b)^2 + (p-q)^2 = 25, (b-c)^2 + (q-r)^2 = 36$ and $(c-a)^2 + (r-p)^2 = 49$, then $\det\left(\frac{B}{2}\right)$ equals	(3)	16
(S)	If A and B are square matrices of odd order and $(A+B)^2 = A^2 + B^2$, if $\det(A) = 2$, then $\det(B)$ equals	(4)	108
		(5)	0

(A) P $\to$ 5, Q $\to$1, R $\to$4, S $\to$2
(B) P $\to$ 2, Q $\to$1, R $\to$4, S $\to$5
(C) P $\to$ 5, Q $\to$1, R $\to$3, S $\to$5
(D) P $\to$ 1, Q $\to$2, R $\to$5, S $\to$3

10. Answer the following by appropriately matching the lists

	List – I		List – II
(P)	The area bounded by $y = 3x$ and $y = x^2$	(1)	$\frac{2}{3}$
(Q)	The area bounded by $x = 4 - y^2$ and the y-axis	(2)	$\frac{17}{12}$
(R)	The area in square units of the region bounded by the curve $x^2 = 4y$ on the line $x = 2$ and the x-axis is	(3)	$\frac{32}{3}$
(S)	The area bounded by $y = x^3$, $y = x^2$ and $x = 1$, $x = 2$	(4)	$\frac{32}{9}$
		(5)	$\frac{9}{2}$

Which is correct option?
(A) P$\to$ 5, Q$\to$ 3, R$\to$ 1, S$\to$ 2
(B) P$\to$ 2, Q$\to$ 1, R$\to$ 3, S$\to$ 5
(C) P$\to$ 4, Q$\to$ 3, R$\to$ 2, S$\to$ 1
(D) P$\to$ 2, Q$\to$ 3, R$\to$ 5, S$\to$ 2

Space For Rough Work

11. Answer the following by appropriately matching the lists

	List – I		List – II
(P)	If matrix $A=\begin{bmatrix}1 & 0 & -1\\3 & 4 & 5\\0 & 6 & 7\end{bmatrix}$ and its inverse $A^{-1}=\begin{bmatrix}a_{11} & a_{12} & a_{13}\\a_{21} & a_{22} & a_{23}\\a_{31} & a_{32} & a_{33}\end{bmatrix}$, then the value of a_{23} is	(1)	– 3
(Q)	If $A=\begin{bmatrix}\cos x & \sin x\\-\sin x & \cos x\end{bmatrix}$ and $A(adj.A)=k\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$ then the value of k is	(2)	1
(R)	$A=\begin{bmatrix}1 & \log_b a\\\log_a b & 1\end{bmatrix}$ then $\|A\|$ is equal to	(3)	0
(S)	If $A=\begin{bmatrix}a & b\\0 & a\end{bmatrix}$ is n[th] root of $4I_2$, then the value of a^n is	(4)	4
		(5)	$\frac{2}{5}$

Which is correct option?

(A) P→ 5, Q→ 2, R→ 3, S→ 4
(B) P→ 2, Q→ 1, R→ 3, S→ 5
(C) P→ 4, Q→ 3, R→ 2, S→ 1
(D) P→ 2, Q→ 3, R→ 5, S→ 2

(PART – B)

(Non – Negative Integer)

1. If $A=\begin{vmatrix}1+a^2+a^4 & 1+ab+a^2b^2 & 1+ac+a^2c^2\\1+ab+a^2b^2 & 1+b^2+b^4 & 1+bc+b^2c^2\\1+ac+a^2c^2 & 1+bc+b^2c^2 & 1+c^2+c^4\end{vmatrix}$, $a,b,c\in R$ and $|A|=|4I|$ (where I is identity matrix and if $k=(a-b)^3+(b-c)^3+(c-a)^3$ then $\frac{|k|}{6}=$

Space For Rough Work

2. Let f be a differentiable function satisfying the condition $f\left(\frac{x}{y}\right)=\frac{f(x)}{f(y)}(y \neq 0,\ f(y) \neq 0)$ $\forall$ x, y $\in$ R and $f'(1)=2$. If the smaller area enclosed by $y=f(x)$, $x^2+y^2=2$ is A, then find [A], where [.] represents the greatest integer function.

3. If the system of linear equations
$(\cos\theta)x+(\sin\theta)y+\cos\theta=0$
$(\sin\theta)x+(\cos\theta)y+\sin\theta=0$
$(\cos\theta)x+(\sin\theta)y-\cos\theta=0$ is consistent, then find the number of possible values of $\theta \in [0, 2\pi]$

4. Let A be a square matrix of order 3 whose elements are real numbers and $\text{adj.}(\text{adj.}(\text{adj.}A))=\begin{bmatrix}16 & 0 & -3\\ 0 & 4 & 0\\ 0 & 3 & 4\end{bmatrix}$ then find absolute value of $\text{Tr}\left(A^{-1}\right)$

[Note : $\text{adj.}(P)$ and $\text{Tr}(P)$ denote adjoint matrix and trace of matrix P respectively.]

5. If the x – axis divide the area of the region bounded by the parabolas $y=4x-x^2$ and $y=x^2-x$ in the ratio of $a:b$ then $\frac{ab}{121}$ is equal to

6. Let $f(x)$ be a differentiable function satisfying $f'(x)=f(x)$ with $f(0)=1$ and $g(x)$ satisfies $f(x)+g(x)=e^x(x+1)^2$. If $\int_0^1 f(x)g(x)dx=ae^2+b$, then the value of $(a+b)$ is

Space For Rough Work

FIITJEE INTERNAL TEST

BATCHES: Two Year CRP325

RIT – 9

Code: 100889

JEE ADVANCED LEVEL

ANSWER KEY

ANSWER KEYS

Physics

PART – A

1.	ABC	2.	ACD	3.	BC	4.	C
5.	C	6.	A	7.	D	8.	C
9.	A	10.	B	11.	B		

PART – B

1.	5	2.	6	3.	9	4.	9
5.	2	6.	0				

Chemistry

PART – A

1.	AC	2.	ABC	3.	BD	4.	D
5.	A	6.	D	7.	C	8.	B
9.	B	10.	D	11.	C		

PART – B

1.	5	2.	1	3.	2	4.	6
5.	6	6.	4				

Mathematics

PART – A

1.	ABD	2.	ABCD	3.	ACD	4.	B
5.	A	6.	A	7.	C	8.	B
9.	B	10.	A	11.	A		

PART – B

1.	4	2.	1	3.	2	4.	3
5.	4	6.	1				