FIITJEE

PHYSICS, CHEMISTRY & MATHEMATICS

| CPT-1 | CODE: 120673 | PAPER - 2 |

Time Allotted: 3 Hours   **Maximum Marks: 201**

- 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. Each **Section** is further divided into **Two Parts: Part-A & B.**
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

B. Filling of OMR Sheet

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with **_Blue/Black Ball Point Pen_** for each character of your Enrolment No. and write in ink your Name, Test Centre and other details at the designated places.
3. OMR sheet contains alphabets, numerals & special characters for marking answers.

C. Marking Scheme For All Three Parts.

(i)   **Part-A (01 – 06)** contains 6 Multiple Choice Questions which have Only One Correct answer. Each question carries **+3 marks** for correct answer and **–1 mark** for wrong answer.

Part-A (07 – 09) contains 3 Assertion-Reasoning Questions (MCQs) which have Only One Correct answer. Each question carries **+3 marks** for correct answer and **– 1 mark** for wrong answer.

Part-A (10 – 15) contains 2 Paragraphs. Based upon each paragraph, 3 Multiple Choice Questions have to be answered. Each question has Only One Correct answer and carries **+4 marks** for the correct answer and **–1 mark** for a wrong answer.

(ii)   **Part-B (01 – 02)** contains 2 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 **+8 marks** for all correct answer however for each correct row **+2 marks** will be awarded and **–1 mark** for each row matched incorrectly.

Name of the Candidate :_____

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

Enrolment Number :_____

SECTION– 1: PHYSICS
## PART – A
(Single Correct Choice Type)

This section contains **6 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. A ball of mass "m" moving with kinetic energy 3 J collides with a stationary ball of mass 2m in a head-on elastic collision. During collision, what will be maximum deformation potential energy stored in system?
    (A) 1 J   (B) 2 J
    (C) 2.5 J   (D) 1.5 J

2. A semicircular ring of mass m and radius r is released from rest in the position shown with its lower edge resting on a horizontal surface. Find the minimum coefficient of static friction μ_s which is necessary to prevent any initial slipping of the ring.
    (A) 0.2   (B) 0.3
   (C) 0.4   (D) 0.5
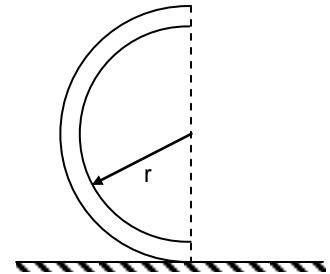
3. A gas is inside a cylinder closed by a piston. The piston is held from above by a spring whose elastic properties obey Hooke's law. If the gas is heated slowly then determine the work done by the gas in the process if volume of the gas varies from V_1 to V_2 and the pressure varies from P_1 to P_2.

    (A) $(P_1 + P_2)(V_2 - V_1)$

    (B) $\dfrac{(P_1 + P_2)(V_2 - V_1)}{2}$

    (C) $\dfrac{(P_1 + P_2)(V_2 - V_1)}{4}$

    (D) Data insufficient
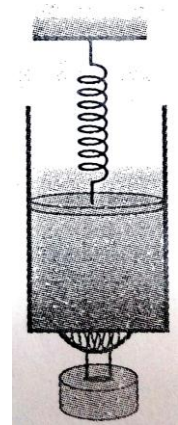
4. An air sealed spherical tank of 1.2 m radius is half filled with oil of relative density 0.8. If the tank is given a horizontal acceleration of 10 m/s^2. The maximum pressure at any point on the tank is [Assume near vaccum condition]
    (A) $4800\sqrt{2}\,N/m^2$ (B) $4800\,N/m^2$
    (C) $9600\sqrt{2}\,N/m^2$ (D) $9600\,N/m^2$

space for rough work

5. An U-shaped tube contains a liquid of density ρ and it rotates about an axis as shown in the figure. Given L = 2 m, Δy = 1.6 m and ω = 4 rad/s. Then the value of 'x' is
    (A) 0.25 m
    (B) 0.5 m
    (C) 0.75 m
    (D) 1 m
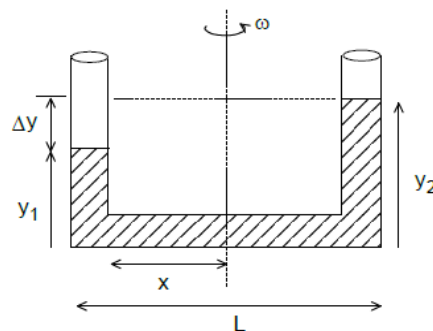
6. A source S and a detector O are initially at a distance of x = 1 km. Both start moving towards one another with same acceleration a = 10 m/s². Frequency of source is f = 2000 Hz. Find the frequency observed by the detector at time t = 4 second. Speed of sound in air is v = 300 m/s.
    (A) 2241 Hz   (B) 2341 Hz
    (C) 2441 Hz   (D) 2541 Hz
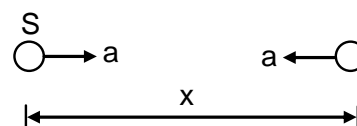
PART – A
Assertion – Reason Type
This section contains 3 questions numbered 7 to 9. Each question contains STATEMENT-1 (Assertion) and STATEMENT – 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

7. **Statement-1:**
    Generally, the path of a projectile thrown from earth is parabolic (e.g. upon throwing it at acute angle (0 < θ < 90°) with earth surface) but it is elliptical for projectiles going to a very large height.

    Statement-2:
    The path of a projectile is independent of the gravitational force of earth.

    (A) **Statement-1** is true, **Statement-**2 is true, **Statement-2** is a correct explanation for **Statement-1**
    (B) **Statement-1** is true, **Statement-2** is true, **Statement-2** is not a correct explanation for **Statement-1.**
    (C) **Statement-1** is true, **Statement-2** is false.
    (D) **Statement-1** is false, **Statement-2** is true.

8. **Statement-1:**
    Peak voltage across resistor in a series LCR circuit may be greater that peak value of applied voltage.

    Statement-2:
    Peak voltage across capacitor in a series LCR circuit may be greater that peak value of applied voltage.

    (A) **Statement-1** is true, **Statement-2** is true, **Statement-2** is a correct explanation for **Statement-1**
    (B) **Statement-1** is true, **Statement-2** is true, **Statement-2** is not a correct explanation for **Statement-1**.
    (C) **Statement-1** is true, **Statement-2** is false.
    (D) **Statement-1** is false, **Statement-2** is true.

space for rough work

9. **Statement-1:**
Separation of isotopes from each other is possible because of the difference in electron numbers of isotope.

Statement-2:
Isotopes of an element can be separated from each other by using a mass spectrometer.

(A) **Statement-1** is true, **Statement-**2 is true, **Statement-2** is a correct explanation for **Statement-1**
(B) **Statement-1** is true, **Statement-2** is true, **Statement-2** is not a correct explanation for **Statement-1.**
(C) **Statement-1** is true, **Statement-2** is false.
(D) **Statement-1** is false, **Statement-2** is true.

(Paragraph Type)

This section contains **2 paragraphs**. Based upon the paragraphs **3 multiple choice questions** have to be answered. Each of these questions has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Paragraph for Question no. 10 to 12

Two containers of sand S and H are arranged like the blocks in figure I. The containers alone have negligible mass; the sand in them has a total mass M_{tot}; the sand in the hanging container H has mass m. You are to measure the magnitude of the acceleration of the system in a series of experiments where m varies from experiment to experiment but M_{tot} does not; that is, you will shift sand between the containers before each trial. $\dfrac{m}{M_{tot}}$ is taken on the horizontal axis for all plots.
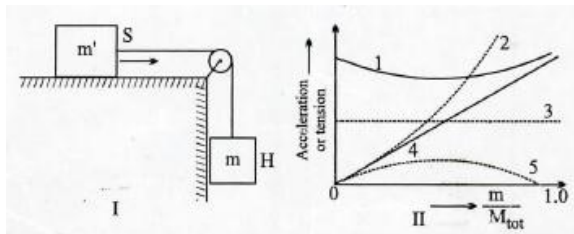
10. The plot in figure II which gives the acceleration magnitude of the containers (taken on y- axis) against ratio $\left(\dfrac{m}{M_{tot}}\right)$ is.

(A) 1   (B) 3   (C) 4   (D) 5

11. The curve which gives tension in the connecting string (taken on y-axis) against ratio $\left(\dfrac{m}{M_{tot}}\right)$ is.

(A) 1   (B) 2   (C) 4   (D) 5

space for rough work

12. With increasing value of ratio $\left(\dfrac{m}{M_{tot}}\right)$, the ratio $\dfrac{T}{a}$

(A) keeps increasing (B) keeps decreasing
(C) first increases then decreases (D) first decreases then increases

Paragraph for Question no. 13 to 15

The main scale of a vernier callipers reads in millimetre and its vernier is divided into 10 divisions which coincide with 9 divisions of the main scale. When the two jaws of the instrument touch each other the seventh division of the vernier scale coincide with a main scale division and the zero of the vernier lies to the right of the zero of main scale. Furthermore, when a cylinder is tightly placed along its length between the two jaws, the zero of the vernier scale lies slightly to the left of 3.2 cm; and the fourth vernier division coincides with a scale division. Choose from following the correct option.

13. The least count of the apparent is
(A) 0.01 cm (B) 0.1 cm (C) 0.001 cm (D) 0.10 cm

14. The zero error in the apparatus is
(A) −0.07 cm (B) 0.07 cm (C) 0.03 cm (D) −0.03 cm

15. The measured value of the length of the cylinder is
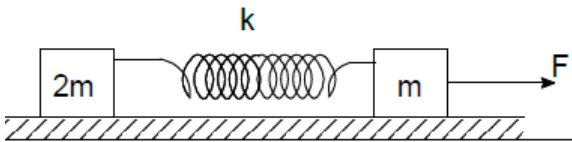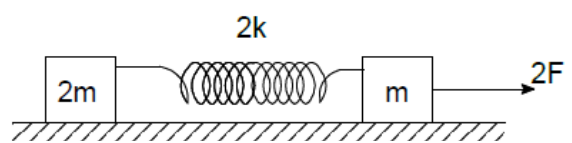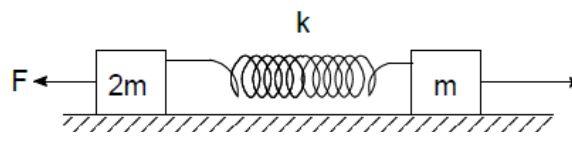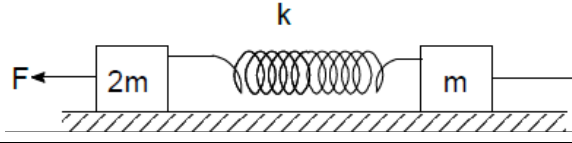(A) 3.14 cm (B) 3.24 cm
(C) 3.07 cm (D) 3.17 cm

space for rough work

PART - B
Matrix-Match Type

This section contains 2 questions. Each question contains statements given in two columns which have to be matched. Statements (a, b, c, d) in **Column I** have to be matched with statements (p, q, r, s) in **Column II.** The answer to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches 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 :


1. In the situations shown in the figure Surface are frictionless. Find the maximum extension of the spring if blocks are initially at rest and springs are initially in natural lengths.

Column I		Column II	
(A)		(P)	$\dfrac{8F}{3K}$
(B)		(Q)	$\dfrac{14F}{3K}$
(C)		(R)	$\dfrac{2F}{K}$
(D)		(S)	$\dfrac{4F}{3K}$

space for rough work

2.   Read the following statements and match the following and write the correct pairs.
       Three wire are carrying same constant current in different directions. Four loops enclosing the wires in different manners are shown. The direction of $\mathbf{d}\vec{\ell}$ is shown in the figure.
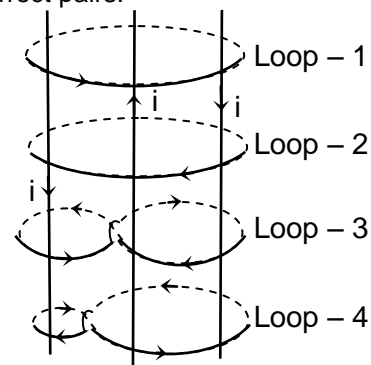
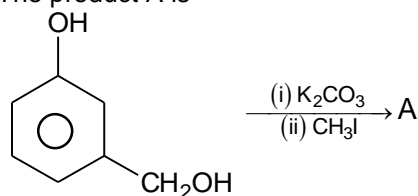| Column I		Column II	
(A)	Along closed loop – 1	(P)	$\oint \vec{B}.d\vec{\ell} = \mu_0 i$
(B)	Along closed loop – 2	(Q)	$\oint \vec{B}.d\vec{\ell} = -\mu_0 i$
(C)	Along closed loop – 3	(R)	$\oint \vec{B}.d\vec{\ell} = -3\mu_0 i$
(D)	Along closed loop – 4	(S)	$\oint \vec{B}.d\vec{\ell} = 3\mu_0 i$

space for rough work

SECTION-2: CHEMISTRY
PART – A
(Single Correct Choice Type)

This section contains **6 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. The compound that will react most readily with NaOH to form methanol is:-
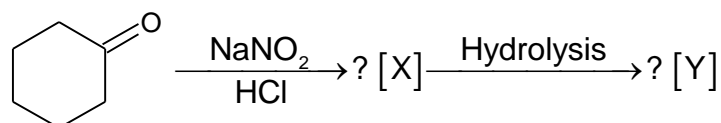
    (A) $(CH_3)_4 \overset{+}{N} I^-$ (B) $CH_3 - O - CH_3$ (C) $(CH_3)_3 \overset{+}{S} I^-$ (D) $(CH_3)_3 C - Cl$

2. The product A is

    (A)

    (B)

    (C)

    (D)

3.

    The end product [Y] is

    (A)

    (B)

    (C)

    (D)

space for rough work

4.

$\xrightarrow{CH_3-NH_2}$ Product

(A)

(B)

(C)

(D)

5.

$$\begin{array}{l} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{array} \xrightarrow{PI_3} (X) \xrightarrow{HI} (Y)$$
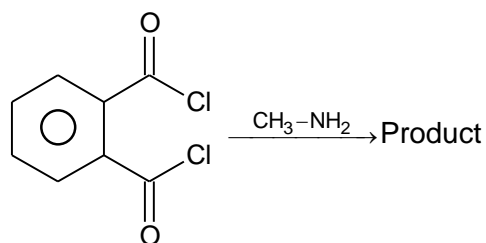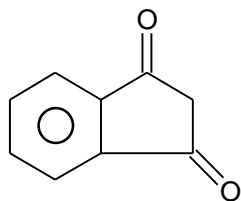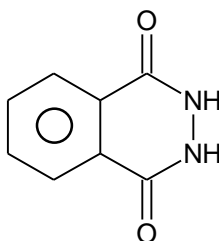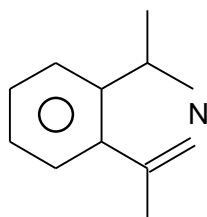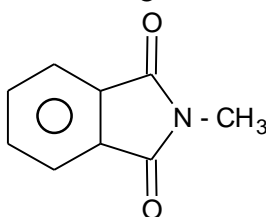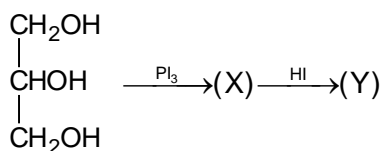
Product (Y) in the above reaction is :

(A)
$$\begin{array}{l} CH_2I \\ | \\ CHI \\ | \\ CH_2I \end{array}$$

(B) $CH_2{=}CH{-}CH_2I$

(C) $CH_3{-}CH{=}CH_2$

(D)
$$\begin{array}{l} CH_2I \\ | \\ CH_2 \\ | \\ CH_2I \end{array}$$

6.

$CH_2 = CH - CH_2 - CHO \xrightarrow{NH_3 (1\ eq)} (A) \xrightarrow{H_2 / Ni} (B)$

$(C) \xleftarrow[\text{KOH}]{CHCl_3}$ (B)
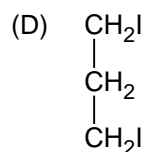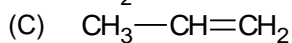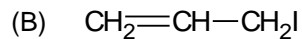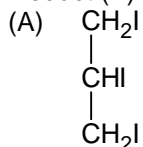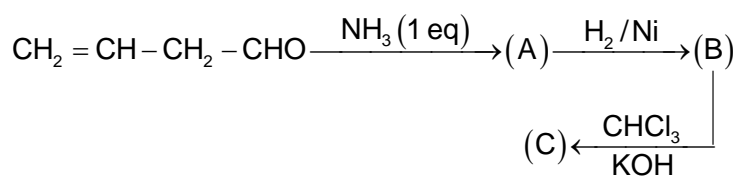
How many pi(π) bond(s) is/are present in one molecule of (C)?
(A) 1   (B) 2   (C) 4   (D) 3

space for rough work

PART – A
Assertion – Reason Type

This section contains 3 questions numbered 7 to 9. Each question contains STATEMENT-1 (Assertion) and STATEMENT – 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

7. Statement - 1: A white precipitate is formed if aluminium chloride ($AlCl_3$) reacts with ammonium hydroxide (NH_4OH). The precipitate also dissolves by excess of NH_4OH.
   Statement - 2: The product $Al(OH)_3$ is insoluble in water.
   (A) Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.
   (B) Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.
   (C) Statement-1 is True, Statement-2 is False.
   (D) Statement-1 is False, Statement-2 is True.

8. Statement - 1: Colloidal sol of As_2S_3 is more effectively coagulated by Al^{3+} ions than Na^+ ions.
   Statement - 2: Colloidal particles of As_2S_3 are negatively charged.
   (A) Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.
   (B) Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.
   (C) Statement-1 is True, Statement-2 is False.
   (D) Statement-1 is False, Statement-2 is True.

9. Statement - 1: In Cannizzaro reaction, certain aldehydes react with conc. NaOH to form redox products.
   Statement - 2: Intermolecular hydride shift takes place in the reaction.
   (A) Statement-1 is True, Statement-2 is true, Statement-2 is a correct explanation for Statement-1.
   (B) Statement-1 is True, Statement-2 is true, Statement-2 is NOT a correct explanation for Statement-1.
   (C) Statement-1 is True, Statement-2 is False.
   (D) Statement-1 is False, Statement-2 is True.

(Paragraph Type)

This section contains **2 paragraphs**. Based upon the paragraphs **3 multiple choice questions** have to be answered. Each of these questions has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Paragraph for Question no. 10 to 12

Consider the following sequence of reactions.
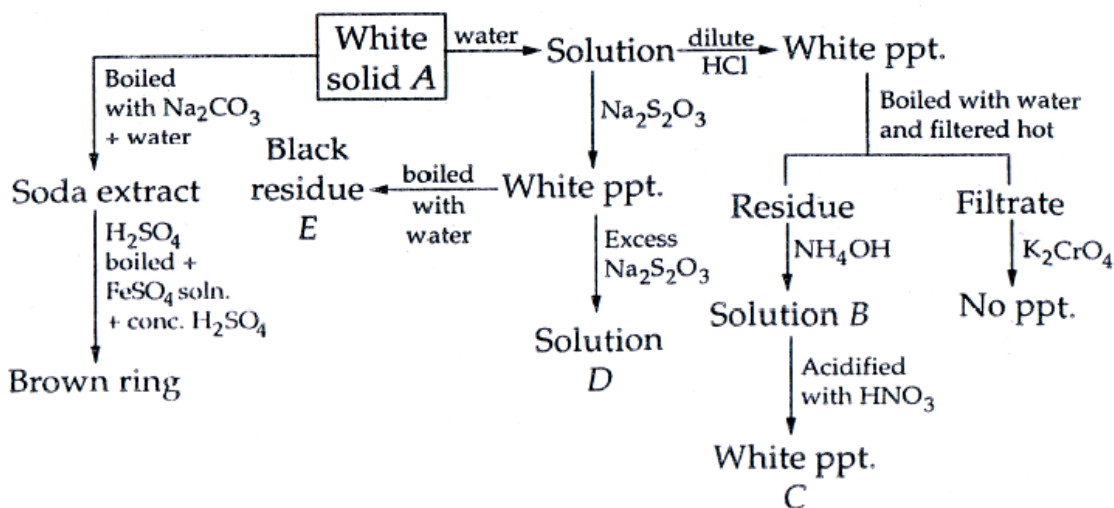
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10. The white solid A is a
     (A) chloride   (B) nitrate   (C) nitrite   (D) bromide

11. The change from B to C involves the reaction

(A) $\left[Hg(NH_3)_4\right]^{2+} + 2H^+ + Cl^- \longrightarrow Hg(NH_2)Cl\downarrow + 3NH_4^+$

(B) $\left[Pb(NH_3)_4\right]^{2+} + 4H^+ + 2Cl^- \longrightarrow PbCl_2\downarrow + 4NH_4^+$

(C) $\left[Pb(OH)_4\right]^{2+} + 4H^+ + 2Cl^- \longrightarrow PbCl_2\downarrow + 4H_2O$

(D) $\left[Ag(NH_3)_2\right]^{2+} + 2H^+ + Cl^- \longrightarrow AgCl\downarrow + 2NH_4^+$

12. The white ppt. 'C' is
     (A) $PbCl_2$ (B) $PbSO_4$ (C) $AgCl$ (D) $BaSO_4$

Paragraph for Question no. 13 to 15

An aromatic tertiary alcohol upon acid catalysed dehydration gives a product (I). Reductive ozonolysis of (I) forms compounds (J) and (K). Compound (J) upon reaction with NaOH gives benzyl alcohol and compound (L), whereas (K) on heating with NaOH gives only (M)

Answer the following questions on the basis of the above write up.

13. The tertiary alcohol in the above question is formed by the reaction of

(A) Ph–CHO + PhCH$_2$MgBr

(B) Ph–CO–CH$_3$ + PhMgBr

(C) Ph–CO–CH$_3$ + PhCH$_2$MgBr

(D) Ph–CHO + PhMgBr
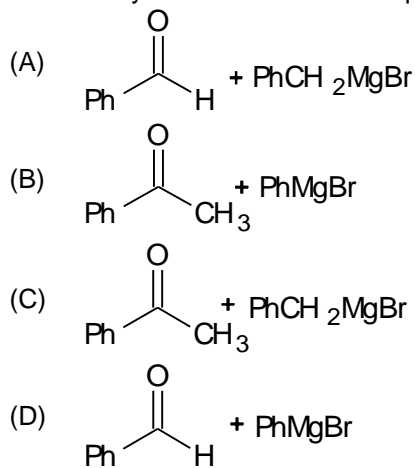
14. The structure of the compound (I) is:

(A) $CH_3CH=\underset{\underset{Ph}{|}}{C}-Ph$ (B) $PhCH=\underset{\underset{Ph}{|}}{C}-CH_3$

(C) $PhCH=CH-CH_3$ (D) $PhCH=\underset{\underset{CH_2Ph}{|}}{C}-CH_3$
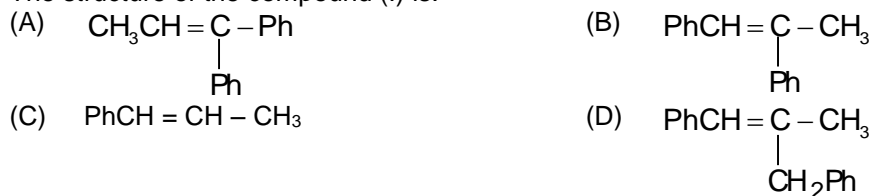
space for rough work

15. The structure of compounds J, K and L respectively are:
    (A) PhCHO, PhCH$_2$CHO and PhCH$_2$COONa   (B) PhCHO, PhCOCH$_3$ and PhCOONa
    (C) PhCHO, PhCOCH$_3$ and PhCH$_2$COONa   (D) PhCHO, PhCOPh and PhCOONa

PART - B
Matrix-Match Type

This section contains 2 questions. Each question contains statements given in two columns which have to be matched. Statements (a, b, c, d) in **Column I** have to be matched with statements (p, q, r, s) in **Column II.** The answer to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches 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 :

```
        p   q   r   s
(a)  | (p) (q) (r) (s) |
(b)  | (p) (q) (r) (s) |
(c)  | (p) (q) (r) (s) |
(d)  | (p) (q) (r) (s) |
```

1. Match the following column :

	Column-I		Column-II
(A)	$\dfrac{E_f}{E_b} = \dfrac{20}{31}$; $E_f - E_b = -33$ kJ mol^{-1} E_f = activation energy for forward reaction E_b = activation energy for backward reaction	(P)	$E_f = 60$ kJ mol^{-1}
(B)	$\dfrac{K_{eq_2}}{K_{eq_1}} = 10$; $\left[\dfrac{1}{T_1} - \dfrac{1}{T_2}\right] = 0.005802$	(Q)	$E_f = 104$ kJ mol
(C)	$A = 10^{11.44}$; $k = 10$ s^{-1} $E_f = 1.818 \times \Delta H$ kJ mol^{-1}; $T = 300$ K	(R)	$\Delta H = 33$ kJ mol^{-1} approx (only magnitude in consideration)
(D)	$\ln k_f = 14.34 - \dfrac{1.25 \times 10^4}{T}$; $T = 513$ K, $\Delta H = 11$ kJ mol^{-1}	(S)	endothermic reaction
		(T)	exothermic reaction

2. Match the radicals mentioned in Column-I with their reactions mentioned in Column-II.

	Column – I		Column – II
(A)	Fe^{2+}	(P)	Forms precipitate with KCN, which is soluble in excess of the reagent.
(B)	Hg^{2+}	(Q)	Forms precipitate with NaOH and NH$_4$OH, which is insoluble in both excess of reagent.
(C)	Pb^{2+}	(R)	forms coloured precipitate with KI, which is soluble in excess of reagent.
(D)	Ag$^+$	(S)	forms black precipitate with H$_2$S which is soluble in hot and dilute HNO$_3$.

space for rough work

SECTION-3: MATHEMATICS
PART – A
(Single Correct Choice Type)

This section contains **6 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE is correct.**

1. Let $\Delta(p) = \begin{vmatrix} \cos p & p^3 & p^5 \\ \sec^3 p & \sin p & 0 \\ \sin^2 p & -p & p+p^3 \end{vmatrix}$. Then the value of $\dfrac{d^3(\Delta(p))}{dp^3}\bigg|_{p=0}$ is

    (A) 1   (B) -3 (C) 2   (D) none of these

2. Let the roots of $f(x) = ax^3 + bx^2 + cx + d = 0$ are $\alpha_1, \alpha_2, \alpha_3$ and the roots of

    $ax^3 + \dfrac{f''(2017)}{2!}x^2 + \dfrac{f'(2017)}{1!}x + f(2017) = 0$ are $\beta_1, \beta_2, \beta_3$ then the value of

    $(\alpha_1 - \beta_1) - 2(\alpha_2 - \beta_2) + (\alpha_3 - \beta_3)$ is

    (A) 2017   (B) 2016   (C) 2018   (D) none of these

3. If a line with direction ratios $2:1:1$ intersects the lines $\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}$ and

    $\dfrac{x-2}{1} = \dfrac{y+1}{2} = \dfrac{z+2}{3}$ at A and B respectively, then $|\overrightarrow{AB}|$ is

    (A) $2\sqrt{3}$ (B) $2\sqrt{5}$ (C) $2\sqrt{6}$ (D) none of these

4. The number of solutions of the equation $10\left[x^2 - x - 1\right] + 20\left[x + \dfrac{1}{2}\right] = 3 + 500[\cos \pi x]$ is

    (where [.] denotes G.I.F)

    (A) 3   (B) 4   (C) 63   (D) none of these

5. The value of $\displaystyle\int_0^1 \cos([2x]\pi)\cos(\pi x)\,dx$ is equal to (where [.] denotes G.I.F.)

    (A) 1   (B) $\dfrac{-2}{\pi}$ (C) $\dfrac{2}{\pi}$ (D) $\dfrac{1}{\pi}$

space for rough work

6. Three numbers a_1, a_2, a_3 are drawn randomly and without replacement from

    the set $\{1, 2, 3, \ldots \ldots, 1000\}$. Three other numbers b_1, b_2, b_3 are then drawn randomly and without replacement from the remaining set of 997 numbers. The probability that after a suitable rotation, a brick of dimensions $a_1 \times a_2 \times a_3$ can be enclosed in a box of dimensions $b_1 \times b_2 \times b_3$, with the sides of the brick parallel to the sides of the box is

    (A) $\dfrac{1}{2}$
    (B) $\dfrac{1}{3}$
    (C) $\dfrac{1}{4}$
    (D) none of these

PART – A
Assertion – Reason Type

This section contains 3 questions numbered 7 to 9. Each question contains STATEMENT-1 (Assertion) and STATEMENT – 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

7. Statement – 1: $\lim\limits_{x \to \infty} \sin x$ does not exist.

    Statement – 2: Limit of a periodic function $f(x)$ as $x \to \infty$ does not exist because the function exhibits oscillatory behaviour.
    (A) Statement – 1 is True, Statement – 2 is True; statement – 2 is a correct explanation for Statement – 1
    (B) Statement – 1 is True, Statement – 2 is true, statement – 2 is **NOT** a correct explanation for statement – 1
    (C) Statement – 1 is True, Statement – 2 is False
    (D) Statement – 1 is False, Statement – 2 is true

8. Statement – 1: If a function $f : A \to A$ is one-one, then it must be onto.
    Statement – 2: If the number of elements in set A is 'n' then the number of functions defined from set A to A is n^n.
    (A) Statement – 1 is True, Statement – 2 is True; statement – 2 is a correct explanation for Statement – 1
    (B) Statement – 1 is True, Statement – 2 is true, statement – 2 is **NOT** a correct explanation for statement – 1
    (C) Statement – 1 is True, Statement – 2 is False
    (D) Statement – 1 is False, Statement – 2 is true

9. Statement – 1: If the arithmetic mean and geometric mean of two positive numbers are $\dfrac{4}{3}$

    and 4 respectively then their harmonic mean equals 12.
    Statement – 2: If A, G and H represents arithmetic mean, geometric mean and harmonic mean of two positive numbers a and b then $G^2 = AH$.
    (A) Statement – 1 is True, Statement – 2 is True; statement – 2 is a correct explanation for Statement – 1
    (B) Statement – 1 is True, Statement – 2 is true, statement – 2 is **NOT** a correct explanation for statement – 1
    (C) Statement – 1 is True, Statement – 2 is False
    (D) Statement – 1 is False, Statement – 2 is true

space for rough work

(Paragraph Type)

This section contains **2 paragraphs**. Based upon the paragraphs **3 multiple choice questions** have to be answered. Each of these questions has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Paragraph for Question no. 10 to 12

Let $f(x) = \begin{cases} \lim\limits_{n\to\infty}\left(\dfrac{|x+1|^n + x^2}{|x| + x^{2n}}\right); & -6 \le x < 0 \\ \{\sin x\} & ; \quad 0 \le x \le 6 \end{cases}$, where {.} denotes fractional part function.

10. The number of points at which $f(x)$ is non-differentiable in $[-6, 6]$ is equal to
    (A) 6   (B) 5   (C) 4   (D) 3

11. The number of solutions of $f(x) = \dfrac{x}{6}$ in $[-6, 6]$ is
    (A) 2   (B) 3   (C) 4   (D) 5

12. The value of $\displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} f(x)\, dx$ is equal to

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

Paragraph for Question no. 13 to 15

Consider a $\triangle ABC$ in which side AB and AC are perpendicular to $x - y - 4 = 0$ and $2x - y - 5 = 0$ respectively vertex A is (–2, 3) and circumcentre of the $\triangle ABC$ is $\left(\dfrac{3}{2}, \dfrac{5}{2}\right)$

13. Equation of perpendicular bisector of side AB will be
    (A) $x - y + 1 = 0$ (B) $x - y + 4 = 0$ (C) $x - y + 2 = 0$ (D) none of these

14. Equation of perpendicular bisector of side AC will be
    (A) $2x - y + 1 = 0$ (B) $2x - y - \dfrac{1}{2} = 0$ (C) $2x - y + \dfrac{1}{2} = 0$ (D) none of these

15. The coordinate of B will be
    (A) (2, –1)   (B) (1, –2)   (C) (2, 3)   (D) none of these

space for rough work

PART - B
Matrix-Match Type

This section contains 2 questions. Each question contains statements given in two columns which have to be matched. Statements (a, b, c, d) in **Column I** have to be matched with statements (p, q, r, s) in **Column II.** The answer to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches 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 :

```
           p    q    r    s
     (a)  (p)  (q)  (r)  (s)
     (b)  (p)  (q)  (r)  (s)
     (c)  (p)  (q)  (r)  (s)
     (d)  (p)  (q)  (r)  (s)
```

1.   Match the following:

	Column – I		Column – II
(A)	Number of ways of distributing 7 books to 2 children is	(P)	126
(B)	The value of $^2C_2 + {}^3C_2 + {}^4C_2 + \ldots + {}^{11}C_2$ is	(Q)	128
(C)	The number of five digit numbers in which every digit exceeds the immediately preceding digit is	(R)	582
(D)	Number of permutations of {1, 2, 3, 4, 5, 6} such that the patterns 13 and 246 do not appear	(S)	220

2.   Consider a twice differentiable function $f(x)$ satisfying $f(x) + f''(x) = 2f'(x)$, where $f(0) = 0$ and $f(1) = e$.

	Column – I		Column – II
(A)	$f'(-1)$ is equal to	(P)	0
(B)	$f''(1)$ is equal to	(Q)	1
(C)	$\int_0^1 f(x)\, dx$ is equal to	(R)	$2e^2$
(D)	Number of roots of the equation $f(x) = 0$ is equal to	(S)	3e

space for rough work