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D0679_MATH_I_PP

MATHEMATICS (PART – I)

BOARD'S QUESTION PAPER (MARCH 2025)

(With Full Solution and Marking Scheme)

Time : 2 Hours] **[Total Marks : 40**

Note : *(i) All questions are compulsory.*
*(ii) Use of a calculator is **not** allowed.*
(iii) The numbers to the right of the questions indicate full marks.
*(iv) In case of MCQs [Q. No. **1(A)**], only the first attempt will be evaluated and will be given credit.*

Q. 1. (A) Choose the correct alternative from given : 4

(i) $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$. Write the degree of the given determinant.

(A) 1 (B) 2 (C) 3 (D) 4

(ii) From the following equations, which one is the quadratic equation?

(A) $\frac{5}{x}-3=x^2$ (B) $x(x+5)=2$ (C) $n-1=2n$ (D) $\frac{1}{x^2}(x+2)=x$

(iii) Find the common difference of the following A.P. :
4, 4, 4, ...

(A) 1 (B) 8 (C) 4 (D) 0

(iv) Which number cannot represent the probability?

(A) $\frac{2}{3}$ (B) $\frac{15}{10}$ (C) 15% (D) 0.7

Q. 1. (B) Solve the following subquestions : 4

(i) If $2x+y=7$ and $x+2y=11$, then find the value of $x+y$.

(ii) Find the first term of the sequence $t_n=3n-4$.

(iii) How many alphanumerals are there in the format of GSTIN?

(iv) Two coins are tossed simultaneously. Write the sample space S.

Q. 2. (A) Complete and write *any two* activities from the following : 4

(i) Complete the following table to draw the graph of $x+2y=4$.

Activity :

x	-2	
y		1
(x, y)		

(ii) Complete the following activity to form a quadratic equation.

Activity :

I am a quadratic equation.

↓

My standard form is $\square$.

↓

My roots are 5 and 12.

↓

Sum of my roots $\square$.

↓

Product of my roots $\square$.

↓

My quadratic equation is $\square$.

(iii) Pushpmala invested ₹ 24,000 and purchased shares of FV ₹ 20 at a premium of ₹ 4. Complete the following activity to find the number of shares she purchased.

Activity : FV = ₹ 20, Premium = ₹ 4

MV = FV + $\square$

= 20 + $\square$ = ₹ 24

Number of shares = $\frac{\text{Total investment}}{\text{MV}} = \frac{24000}{\square} = \square$ shares.

Q. 2. (B) Solve *any four* subquestions from the following : **8**

(i) Solve the following simultaneous equations :

$x + y = 3;\ 3x - 2y = 4.$

(ii) Solve the following quadratic equation, by factorisation method :

$m^2 + 14m + 13 = 0.$

(iii) Find the 19th term of the A.P. : 7, 13, 19, 25, ...

(iv) A share is sold for the market value of ₹ 2000. Brokerage is paid at the rate of 0.5%. What is the amount received after the sale?

(v) The following table shows the number of students and the time they utilized daily for their studies. Find the mean time spent by the students for their studies :

Class Time (In hours)	**Class marks** (x_i)	**Number of Students** (f_i)	$f_i x_i$
0–2	1	8	8
2–4	3	14	42
4–6	5	18	90
6–8	7	10	70
8–10	9	10	90

Q. 3. (A) Complete and write any one activity from the following :

(i) Shri Maniklal purchased 300 shares of FV ₹ 100, for MV ₹ 120. Company paid dividend at 7%. Complete the following activity to find the rate of return on his investment.

Activity :

FV = ₹ 100, Number of shares = 300,

Market Value = ₹ 120.

(a) Sum invested = MV × Number of shares

$= \square \times \square$

= ₹ 36,000

(b) Dividend per share = FV × Rate of dividend

$= \square \times \frac{\square}{100}$

= ₹ 7

∴ total dividend received = 300 × 7

= ₹ $\square$

(c) Rate of return $= \frac{\text{Dividend income}}{\text{Sum invested}} \times 100$

$= \frac{2100}{36000} \times 100$

$= \square$ %.

(ii) A two-digit number is to be formed from the digits 2, 3, 5 without repetition of the digits. Complete the following activity to find the probability that the number so formed is an odd number.

Activity :

Let S be the sample space.

∴ $S = \{23, 25, 32, \square, 52, 53\}$

∴ $n(S) = \square$

Event A : The number so formed is an odd number.

∴ $A = \{23, 25, \square, 53\}$ ∴ $n(A) = 4$

$P(A) = \frac{\square}{n(S)}$ ..... (Formula)

∴ $P(A) = \frac{\square}{6}$ ∴ $P(A) = \frac{\square}{3}$.

Q. 3. (B) Solve *any two* subquestions from the following : **6**

(i) Solve the following simultaneous equations by Cramer's rule :

$4x+3y=18;\ 3x-2y=5.$

(ii) Solve the following quadratic equation using formula method :

$x^2-2x-3=0.$

(iii) A committee of two members is to be formed from three boys and two girls. Find the probability of the following events :

Event A : At least one girl must be a member of the committee.

Event B : Committee must be of one boy and one girl.

(iv) In a general store the prices of different articles and its demand is shown in the following frequency distribution table. Find the median of the prices.

Price in Rupees	Less than 20	20–40	40–60	60–80	80–100
Number of Articles	140	100	80	60	20

Q. 4. Solve *any two* subquestions from the following : **8**

(i) Find the value of m, if the quadratic equation $(m-12)x^2+2(m-12)x+2=0$ has real and equal roots.

(ii) A farmer borrows ₹ 1000 and agrees to repay with a total interest of ₹ 140, in 12 instalments. Each instalment being less than the preceding instalment by ₹ 10. What should be the amount of his first and last instalments?

(iii) The following table shows the marks of 180 students in Mathematics.

Marks	0–10	10–20	20–30	30–40	40–50
Number of Students	25	x	30	$2x$	65

Find the value of x and draw histogram.

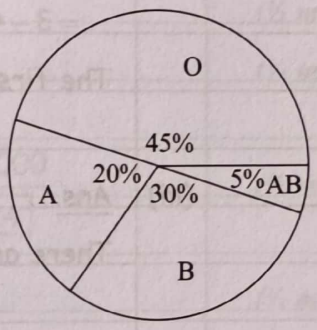
Q. 5. Solve *any one* of the following subquestions : **3**

(i) Draw the graphs representing the equation $2x=y+2$ and $4x+3y=24$ on the same graph paper. Find the area of the triangle formed by these lines and the X-axis.

(ii) The pie diagram shows percentage of persons according to blood group in a blood group checking camp. Answer the following questions :

(a) Find the measure of central angle for each blood group.

(b) Find the total number of persons, if there are 600 persons of blood group B.



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D0679_MATH_II_PP

MATHEMATICS (PART–II)

BOARD'S QUESTION PAPER (MARCH 2025)

(With Full Solution and Marking Scheme)

Time : 2 Hours] **[Total Marks : 40**

Note : *(i) **All** questions are compulsory.*

*(ii) Use of calculator is **not** allowed.*

(iii) The numbers to the right of the questions indicate full marks.

(iv) In case of MCQs [Q. No. 1(A)], only the first attempt will be evaluated and will be given credit.

(v) Draw the proper figures wherever necessary.

(vi) The marks of construction should be clear. Do not erase them.

(vii) Diagram is essential for writing the proof of the theorem.

Q. 1. (A) Choose the correct alternative from given : **4**

(i) Out of the following which is a Pythagorean triplet?

(A) (1, 5, 10) (B) (3, 4, 5) (C) (2, 2, 2) (D) (5, 5, 2)

(ii) $\angle ACB$ is an inscribed angle in a circle with centre O. If $\angle ACB = 65°$, then what is measure of its intercepted arc AXB?

(A) 65° (B) 230° (C) 295° (D) 130°

(iii) Distance of point (3, 4) from the origin is .....

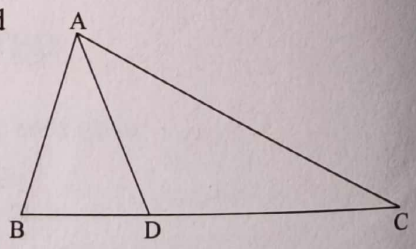
(A) 7 (B) 1 (C) 5 (D) −5

(iv) If the radius of a cone is 5 cm and its perpendicular height is 12 cm, then the slant height is .....

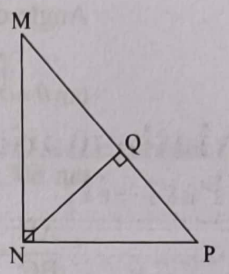
(A) 17 cm (B) 4 cm (C) 13 cm (D) 60 cm

Q. 1. (B) Solve the following subquestions : **4**

(i) In the given figure, in $\triangle ABC$, $B - D - C$ and $BD = 7$, $BC = 20$, then find $\frac{A(\triangle ABD)}{A(\triangle ABC)}$.



(ii) In the given figure, $\angle MNP = 90°$,
seg NQ $\perp$ seg MP, MQ = 9, QP = 4, find NQ.

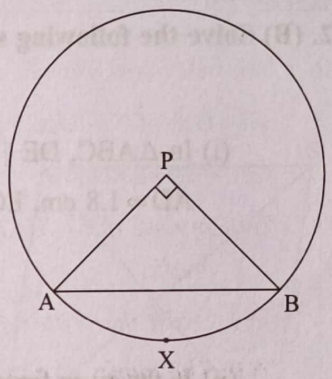


(iii) The angle made by a line with the positive direction of X-axis is 30°. Find slope of that line.

(iv) In cyclic quadrilateral ABCD, $m\angle A = 100°$, then find $m\angle C$.

Q. 2. (A) Complete the following activities and rewrite it : *(Any two)* **4**

(i) The radius of a circle with centre P is 10 cm. If chord AB of the circle subtends a right angle at P, find area of minor sector by using the following activity. ($\pi = 3.14$)



Activity :

$r = 10$ cm, $\theta = 90°$, $\pi = 3.14$.

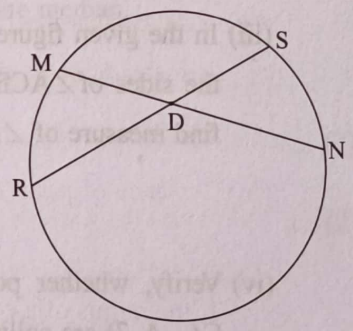
$$A(P-AXB) = \frac{\theta}{360} \times \square$$

$$= \frac{\square}{360} \times 3.14 \times 10^2$$

$$= \frac{1}{4} \times \square$$

$\therefore$ A(P–AXB) = $\square$ sq cm.

(ii) In the given figure, chord MN and chord RS intersect at point D. If RD = 15, DS = 4, MD = 8, find DN by completing the following activity.



Activity :

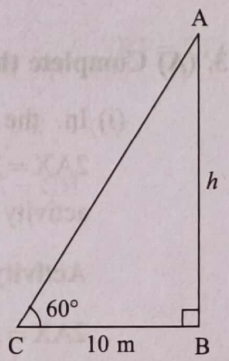
MD × DN = $\square$ × DS

... (Theorem of internal division of chords)

$\therefore$ $\square$ × DN = 15 × 4

$\therefore$ DN = $\frac{\square}{8}$ $\quad\quad$ $\therefore$ DN = $\square$.

(iii) An observer at a distance of 10 m from the tree, looks at the top of the tree. The angle of elevation is 60°. Complete the activity to find the height of tree. ($\sqrt{3} = 1.73$)



Activity :

In the given figure, AB = h = height of the tree, distance of the observer from the tree, BC = 10 m,

Angle of elevation $(\theta) = \angle BCA = 60°$.

$\tan\theta = \frac{\square}{BC}$ ... (1)

$\tan 60° = \square$ ... (2)

$\therefore \frac{AB}{BC} = \sqrt{3}$ ... [From (1) and (2)]

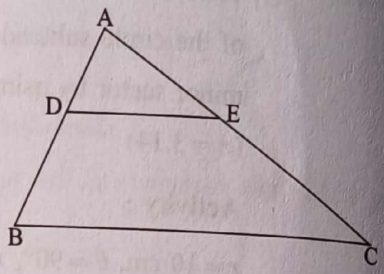
$\therefore AB = \sqrt{3} \times BC = 10\sqrt{3}$

$\therefore AB = 10 \times 1.73 = \square$

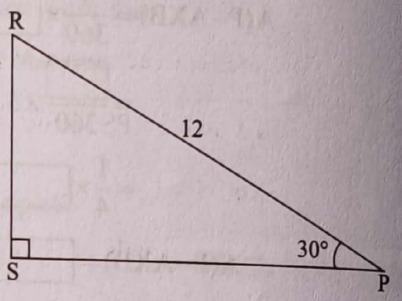
$\therefore$ the height of the tree is $\square$ m.

Q. 2. (B) Solve the following subquestions : *(Any four)* **8**

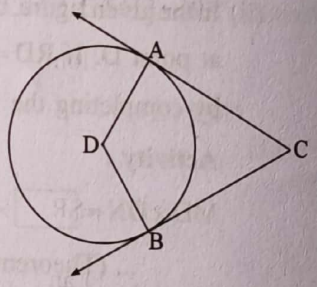
(i) In $\triangle ABC$, $DE \parallel BC$. If $DB = 5.4$ cm, $AD = 1.8$ cm, $EC = 7.2$ cm, then find AE.



(ii) In the given figure, find RS and PS using the information given in $\triangle PSR$.



(iii) In the given figure, circle with centre D touches the sides of $\angle ACB$ at A and B. If $\angle ACB = 52°$, find measure of $\angle ADB$.

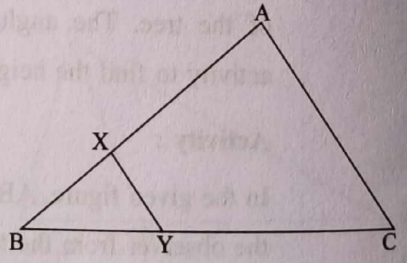


(iv) Verify, whether points, A(1, −3), B(2, −5) and C(−4, 7) are collinear or not.

(v) If $\sin\theta = \frac{11}{61}$, find the value of $\cos\theta$ using trigonometric identity.

Q. 3. (A) Complete the following activities and rewrite it : *(Any one)* **3**

(i) In the given figure, $XY \parallel$ seg AC. If $2AX = 3BX$ and $XY = 9$, complete the activity to find the value of AC.



Activity :

$2AX = 3BX$ ... (Given)

$\therefore \frac{AX}{BX} = \frac{3}{\square}$

$\therefore \frac{AX+BX}{BX} = \frac{3+2}{2}$ ... (By componendo)

$\therefore \frac{\square}{BX} = \frac{5}{2}$ ... (1)

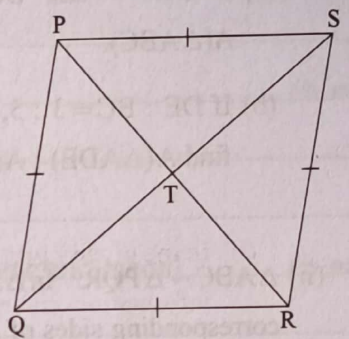
Now, $\triangle BCA \sim \triangle BYX$ ... ($\square$ test of similarity)

$\therefore \frac{BA}{BX} = \frac{AC}{XY}$ ... (Corresponding sides of similar triangles)

$\therefore \frac{\square}{\square} = \frac{AC}{9}$ ... [From (1)]

$\therefore AC = \square$.

(ii) Complete the following activity to prove that the sum of squares of the diagonals of a rhombus is equal to the sum of the squares of its sides.



Given :

□PQRS is a rhombus. Diagonals PR and SQ intersect each other at point T.

To prove : $PS^2 + SR^2 + QR^2 + PQ^2 = PR^2 + QS^2$

Activity :

The diagonals of a rhombus bisect each other.

In $\triangle PQS$, PT is the median and in $\triangle QRS$, RT is the median.

$\therefore$ by Apollonius theorem,

$PQ^2 + PS^2 = \square + 2QT^2$ ... (1)

and $QR^2 + SR^2 = \square + 2QT^2$ ... (2)

Adding (1) and (2),

$PQ^2 + PS^2 + QR^2 + SR^2 = 2\left(PT^2 + \square\right) + 4QT^2$

$= 2\left(PT^2 + \square\right) + 4QT^2$ ... (RT = PT)

$= 4PT^2 + 4QT^2$

$= \left(\square\right)^2 + (2QT)^2$

$\therefore PQ^2 + PS^2 + QR^2 + SR^2 = PR^2 + \square$.

Q. 3. (B) Solve the following subquestions : *(Any two)* 6

(i) Show that points P (1 − 2), Q (5, 2), R (3, −1), S (−1, −5) are the vertices of a parallelogram.

(ii) Prove that tangent segments drawn from an external point to a circle are congruent.

(iii) Draw a circle with radius 4.1 cm. Construct tangents to the circle from a point at a distance 7.3 cm from the centre.

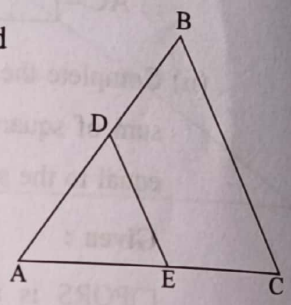
(iv) How many solid cylinders of radius 10 cm and height 6 cm can be made by melting a solid sphere of radius 30 cm?

Q. 4. Solve the following subquestions : *(Any two)* 8

(i) In the figure DE ∥ BC.

(a) If DE = 4 cm, BC = 8 cm, A(△ADE) = 25 cm^2, find A(△ABC).

(b) If DE : BC = 3 : 5, then find A(△ADE) : A(□DBCE).



(ii) △ABC ~ △PQR. In △ABC, AB = 3.6 cm, BC = 4 cm and AC = 4.2 cm. The corresponding sides of △ABC and △PQR are in the ratio 2 : 3, construct △ABC and △PQR.

(iii) The radii of the circular ends of a frustum of a cone are 14 cm and 8 cm. If the height of the frustum is 8 cm, find

(a) Curved surface area of the frustum.

(b) Total surface area of the frustum.

(c) Volume of the frustum. ($\pi = 3.14$)

Q. 5. Solve the following subquestions : *(Any one)* 3

(i) □ABCD is a rectangle. Taking AD as a diameter, a semicircle AXD is drawn which intersects the diagonal BD at X. If AB = 12 cm, AD = 9 cm, then find the values of BD and BX.

(ii) Taking $\theta = 30°$ to verify the following Trigonometric identities :

(a) $\sin^2\theta + \cos^2\theta = 1$

(b) $1 + \tan^2\theta = \sec^2\theta$

(c) $1 + \cot^2\theta = \text{cosec}^2\theta$.

प्र. क्र. / Q. No. 1 (A)

(i) (B)

(ii) (B)

(iii) (D)

(iv) (B) *(1 mark each)*

Note : Answers with solutions are expected.

1 (B) (i) Ans.

$2x+y=7$ ... (1)

$x+2y=11$ ... (2)

Adding equations (1) and (2),

$2x+y=7$ ... (1)

$x+2y=11$ ... (2)

$3x+3y=18$ *(½ mark)*

$\therefore x+y=6$ ... (Dividing both the sides by 3) *(½ mark)*

The value of $(x+y)$ is 6.

(ii) Ans.

$x_n=3n-4$

Substituting $n=1$,

$x_1=3\times1-4$ *(½ mark)*

$=3-4=-1$ *(½ mark)*

The first term is -1.

(iii) Ans.

There are 15 alphanumerals in the format of GSTIN. *(1 mark)*

(iv) Ans.

The Sample Space $S=\{HH, HT, TH, TT\}$. *(1 mark)*

प्र. क्र.
Q. No. 2 (A)

Note : *Any two out of three activities are to be attempted. Here, we have completed all the three activities for the guidance of the students.*

(i) Activity :

x	-2	2	(½ mark)
y	3	1	(½ mark)
(x, y)	$(-2, 3)$	$(2, 1)$	(½ + ½ mark)

(ii) Activity :

I am a quadratic equation.

My standard form is $ax^2+bx+c=0$. (½ mark)

My roots are 5 and 12.

Sum of my roots 17 (½ mark)

Product of my roots 60 (½ mark)

My quadratic equation is $x^2-17x+60=0$ (½ mark)

(iii) Activity :

FV = ₹ 20, Premium = ₹ 4

MV = FV + Premium (½ mark)

$= 20 + 4 = ₹\ 24$ (½ mark)

$$\text{Number of shares} = \frac{\text{Total investment}}{\text{MV}} = \frac{24000}{24}$$ (½ mark)

$= 1000$ shares. (½ mark)

प्र. क्र.
Q. No. 2 (B)

Note : Any four out of five questions are to be solved. Answers with solutions are expected.

(i) Solution :

$x+y=3$ ... (1) $3x-2y=4$ ... (2)

Multiplying equation (1) by 2,

$2x+2y=6$ ... (3) *(½ mark)*

Adding equations (3) and (2),

$2x+2y=6$ ... (3)

$3x-2y=4$ ... (2)

$5x = 10$ $\therefore x=\frac{10}{5}$ $\therefore x=2$ *(½ mark)*

Substituting $x=2$ in equation (1), *(½ mark)*

$x+y=3$

$\therefore 2+y=3$ $\therefore y=3-2$

$\therefore y=1$

Ans. $(x, y)=(2, 1)$ is the solution. *(½ mark)*

(ii) Solution :

$m^2+14m+13=0$

$\therefore m^2+1m+13m+13=0$ *(½ mark)*

$\therefore m(m+1)+13(m+1)=0$

$\therefore (m+1)(m+13)=0$ *(½ mark)*

$\therefore m+1=0$ or $m+13=0$ *(½ mark)*

$\therefore m=-1$ or $m=-13$ *(½ mark)*

Ans. -1 and -13 are the roots of the given quadratic equation.

(iii) Solution :

Here, $a=t_1=7$, $t_2=13$, $t_3=19$, $t_4=25$, ...

$d=t_2-t_1=13-7=6$, $n=19$ *(½ mark)*

$t_n=a+(n-1)\,d$ ... (Formula) *(½ mark)*

$\therefore t_{19}=7+(19-1)\times 6$ ... (Substituting the values) *(½ mark)*

$=7+18\times 6$

$=7+108$

प्र. क्र.
Q. No. 2 (B)

$\therefore t_{19} = 115$ *(½ mark)*

Ans. The 19th term is 115.

(iv) Solution :

MV = ₹ 2000, Brokerage = 0.5%.

Brokerage per share = Rate of brokerage × MV *(½ mark)*

$$= \frac{0.5}{100} \times 2000$$

$$= ₹\ 10$$ *(½ mark)*

Amount received after sale = MV − Brokerage *(½ mark)*

$$= ₹\ (2000 - 10)$$

$$= ₹\ 1990$$ *(½ mark)*

Ans. The amount received after sale is ₹ 1990.

(v) Solution :

Class Time (In hours)	Class marks (x_i)	Number of Students (f_i)	Class marks × Frequency ($x_i f_i$)
0-2	1	8	8
2-4	3	14	42
4-6	5	18	90
6-8	7	10	70
8-10	9	10	90
Total		$\Sigma f_i = 60$	$\Sigma x_i f_i = 300$

(1 mark)

$$\text{Mean} = \bar{X} = \frac{\Sigma x_i f_i}{\Sigma f_i}$$ *(½ mark)*

$$= \frac{300}{60} = 5$$ *(½ mark)*

Ans. The mean time spent by a student is 5 hours.

प्र. क्र.
Q. No. 3 (A)

Note : Any one out of two activities are to be attempted. Here, we have completed both the activities for the guidance of the students.

(i) Activity :

FV = ₹ 100, Number of shares = 300,

Market Value = ₹ 120.

(a) Sum invested = MV × Number of shares

$= \boxed{120} \times \boxed{300}$ (½ + ½ mark)

= ₹ 36,000

(b) Dividend per share = FV × Rate of dividend

$= \boxed{100} \times \frac{\boxed{7}}{100}$ (½ + ½ mark)

= ₹ 7

∴ total dividend received = 300 × 7 = ₹ $\boxed{2100}$ (½ mark)

(c) Rate of return = $\frac{\text{Dividend income}}{\text{Sum invested}} \times 100$

$= \frac{2100}{36000} \times 100 = \boxed{5.83}$ %. (½ mark)

(ii) Activity :

Let S be the sample space.

∴ S = {23, 25, 32, $\boxed{35}$, 52, 53} (½ mark)

∴ n(S) = $\boxed{6}$ (½ mark)

Event A : The number so formed is an odd number.

∴ A = {23, 25, $\boxed{35}$, 53} ∴ n(A) = 4 (½ mark)

$P(A) = \frac{\boxed{n(A)}}{n(S)}$ ..... (Formula) (½ mark)

$\therefore P(A) = \frac{\boxed{4}}{6}$ (½ mark)

$\therefore P(A) = \frac{\boxed{2}}{3}$. (½ mark)

प्र. क्र.
Q. No. 3 (B)

Note : Any two out of four questions are to be solved. Here, we have solved all the four questions for the guidance of the students.

(i) Solution :

$4x+3y=18$ ... (1) Here, $a_1=4, b_1=3, c_1=18$

$3x-2y=5$ ... (2) Here, $a_2=3, b_2=-2, c_2=5$

$$D=\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}=\begin{vmatrix} 4 & 3 \\ 3 & -2 \end{vmatrix}=4\times(-2)-3\times3=-8-9=-17$$ *(½ mark)*

$$D_x=\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}=\begin{vmatrix} 18 & 3 \\ 5 & -2 \end{vmatrix}=18\times(-2)-3\times5=-36-15=-51$$ *(½ mark)*

$$D_y=\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}=\begin{vmatrix} 4 & 18 \\ 3 & 5 \end{vmatrix}=4\times5-3\times18=20-54=-34$$ *(½ mark)*

By Cramer's rule,

$$x=\frac{D_x}{D}=\frac{-51}{-17}=3,$$ *(½ mark)*

$$y=\frac{D_y}{D}=\frac{-34}{-17}=2$$ *(½ mark)*

Ans. $x=3$ and $y=2$ is the solution. *(½ mark)*

(ii) Solution :

$x^2-2x-3=0$

Comparing with $ax^2+bx+c=0$,

$a=1, b=-2, c=-3$ *(½ mark)*

$b^2-4ac=(-2)^2-4(1)(-3)$

$=4+12=16$ *(½ mark)*

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$ ..... (Formula) *(½ mark)*

$$=\frac{-(-2)\pm\sqrt{16}}{2\times1}$$ *(½ mark)*

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Q. No. 3 (B)

$= \frac{2 \pm 4}{2}$ (½ mark)

$= \frac{2(1 \pm 2)}{2} = 1 \pm 2$ (½ mark)

$\therefore x = 1 + 2$ or $x = 1 - 2$

$\therefore x = 3$ or $x = -1$ (½ mark)

Ans. 3, −1 are the roots of the given quadratic equation.

(iii) Solution :

Let B_1, B_2, B_3 are the boys and G_1, G_2 are the girls.

$S = \{B_1B_2, B_1B_3, B_2B_3, B_1G_1, B_1G_2, B_2G_1, B_2G_2, B_3G_1, B_3G_2, G_1G_2\}$

(½ mark)

$\therefore n(S) = 10$ (½ mark)

Event A : At least one girl must be a member of the committee.

$\therefore A = \{B_1G_1, B_1G_2, B_2G_1, B_2G_2, B_3G_1, B_3G_2, G_1G_2\}$ (½ mark)

$\therefore n(A) = 7$

$P(A) = \frac{n(A)}{n(S)} \quad \therefore P(A) = \frac{7}{10}$ (½ mark)

Event B : Committee must be of one boy and one girl.

$\therefore B = \{B_1G_1, B_1G_2, B_2G_1, B_2G_2, B_3G_1, B_3G_2\}$ (½ mark)

$\therefore n(B) = 6$

$P(B) = \frac{n(B)}{n(S)} \quad \therefore P(B) = \frac{6}{10} = \frac{3}{5}$ (½ mark)

Ans. The probability of event A is $\frac{7}{10}$ and that of event B is $\frac{3}{5}$.

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Q. No. 3 (B)

(iv) Solution :

Class (Price in Rupees)	Frequency (Number of Articles)	Cumulative Frequency (Less than type)
Less than 20	140	140→cf
20-40 Median class	100→f	240
40-60	80	320
60-80	60	380
80-100	20	400
Total	$\Sigma f_i = 400$	

(1 mark)

Here, $N = \Sigma f_i = 400$

$$\frac{N}{2} = \frac{400}{2} = 200$$

200th score is in the class 20-40 *(½ mark)*

∴ 20-40 is the median class.

$L = 20,\ cf = 140,\ f = 100,\ h = 20$ *(½ mark)*

$$\text{Median} = L + \left[\frac{\frac{N}{2} - cf}{f}\right] \times h$$ ... (Formula) *(½ mark)*

$$= 20 + \left[\frac{200 - 140}{100}\right] \times 20$$ ... (Substituting the values)

$$= 20 + \frac{60}{100} \times 20 = 20 + 12 = 32$$ *(½ mark)*

Ans. The median of the price is ₹ 32.

प्र. क्र.
Q. No. 4

Note : Any two out of three questions are to be solved. Here, we have solved all the three questions for the guidance of the students.

(i) Solution :

Comparing $(m-12)x^2+2(m-12)x+2=0$ with $ax^2+bx+c=0$,

$a=(m-12),\ b=2(m-12),\ c=2.$ *(½ mark)*

$b^2-4ac=[2(m-12)]^2-4(m-12)(2)$ *(1 mark)*

$=4(m-12)^2-8m+96$

$=4(m^2-24m+144)-8m+96$

$=4m^2-96m+576-8m+96$

$=4m^2-104m+672$ *(½ mark)*

The roots of the given quadratic equation are real and equal. ... (Given)

$\therefore b^2-4ac=0$ *(½ mark)*

$\therefore 4m^2-104m+672=0$

$\therefore m^2-26m+168=0$ ... (Dividing by 4)

$\therefore m^2-12m-14m+168=0 \quad \therefore m(m-12)-14(m-12)=0$

$\therefore (m-12)(m-14)=0$

$\therefore m-12=0$ or $m-14=0$ *(½ mark)*

$\therefore m=12$ or $m=14$ *(½ mark)*

If $m=12$, $m-12=0$ and $(m-12)x^2=0$

i.e. the quadratic term becomes zero.

$\therefore$ the equation will not be a quadratic one.

$\therefore m=12$ is unacceptable.

$\therefore m=14$ *(½ mark)*

Ans. The value of m is 14.

(ii) Solution :

The person repays ₹ 1000 + ₹ 140 = ₹ 1140. *(½ mark)*

The number of instalments = 12

$\therefore n=12,\ S_n=S_{12}=1140.$

Each instalment is ₹ 10 less than the preceding one.

प्र. क्र.
Q. No. 4

$\therefore d = -10$ .... (A constant number)

This is an A.P.

$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$ ... (Formula) *(½ mark)*

$\therefore S_{12} = \frac{12}{2}\left[2a + (12-1)\times(-10)\right]$ ... (Substituting the values) *(½ mark)*

$\therefore 1140 = 6[2a + 11\times(-10)]$

$\therefore 190 = 2a - 110$ ... (Dividing both the sides by 6) *(½ mark)*

$\therefore 2a - 110 = 190$

$\therefore 2a = 190 + 110$

$\therefore 2a = 300$

$\therefore a = \frac{300}{2}$

$\therefore a = 150$ ... (The first instalment) *(½ mark)*

t_n = last instalment

$t_n = a + (n-1)d$ ... (Formula) *(½ mark)*

$= 150 + (12-1)\times(-10)$ ... (Substituting the values) *(½ mark)*

$= 150 + 11\times(-10)$

$= 150 - 110$

$= 40$ ... (The last instalment) *(½ mark)*

Ans. The first instalment is ₹ 150 and the last instalment is ₹ 40.

(iii) Solution :

First we find the value of x.

$25 + x + 30 + 2x + 65 = 180$

$\therefore 3x + 120 = 180$

$\therefore 3x = 180 - 120$ $\therefore 3x = 60$ $\therefore x = 20$

the value of x is 20.

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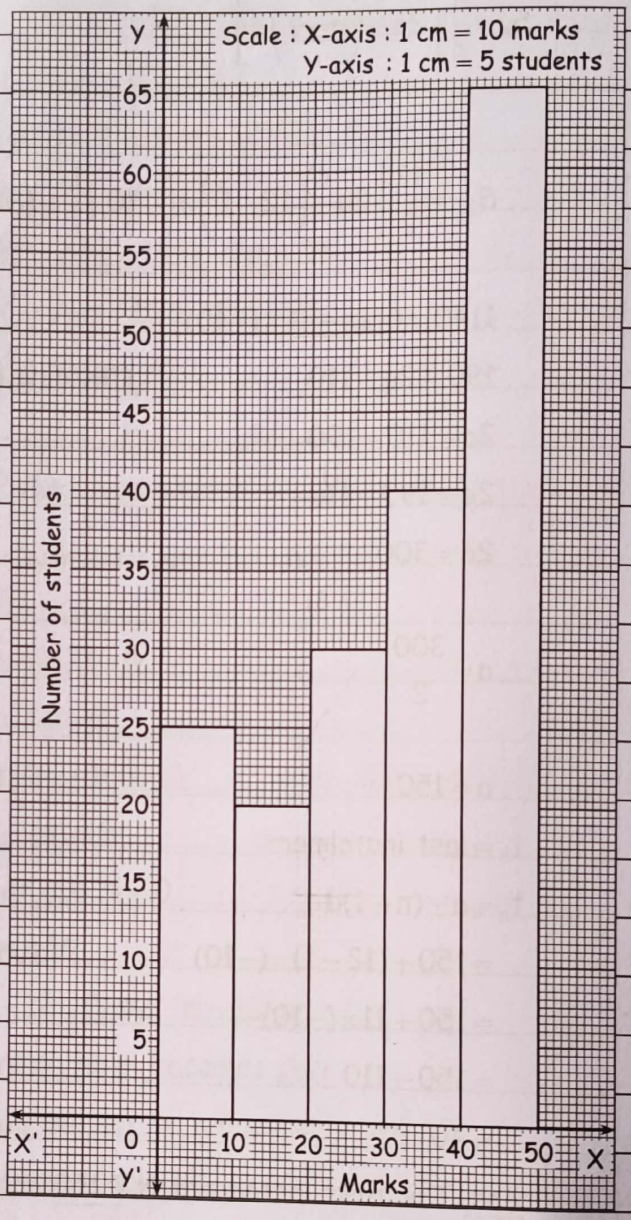
Q. No. 4

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	25	20	30	40	65



[Scheme of marking :

(1) Finding the value of x : (1 mark)

(2) For correct scale and axes : (½ mark)

(3) For drawing correct rectangles : (2½ marks)]

प्र. क्र.
Q. No. 5

Note : Any one out of two questions are to be solved. Here, we have solved both the questions for the guidance of the students.

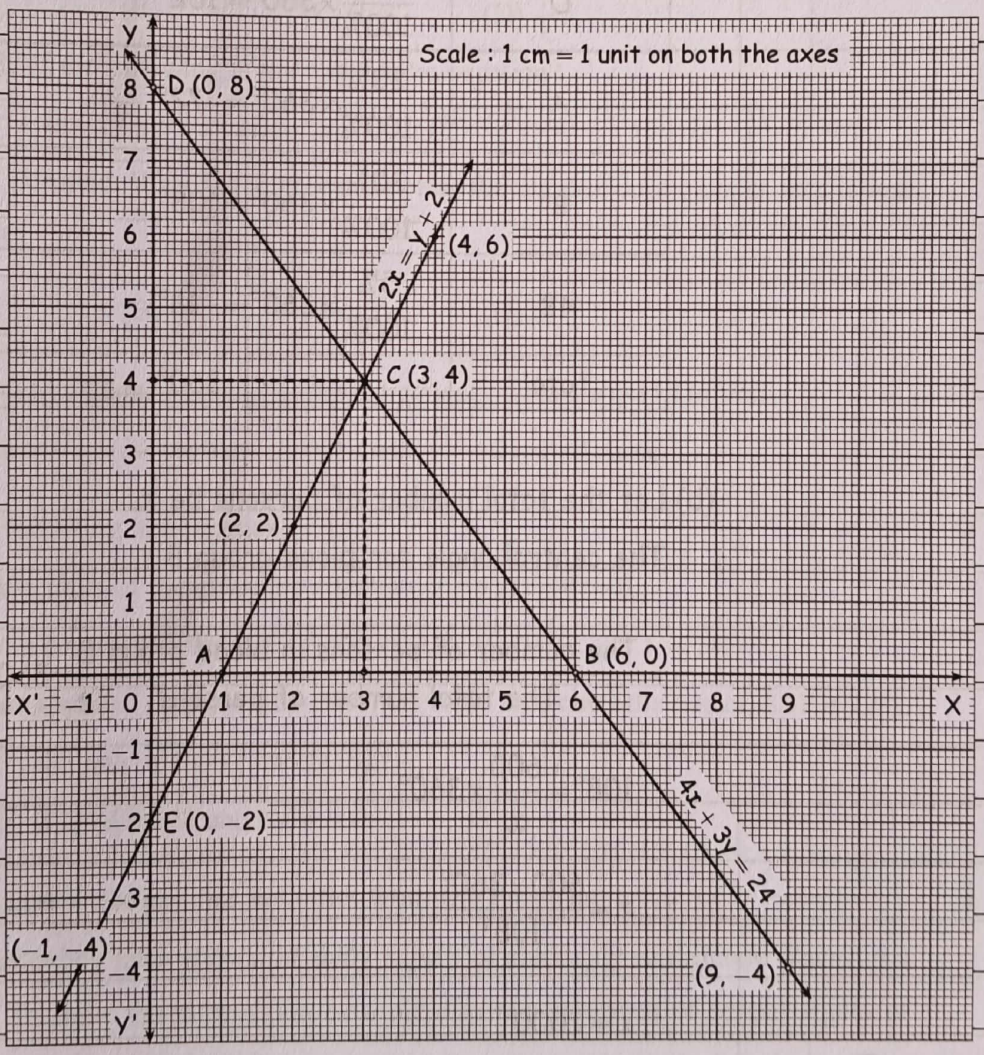
(i) Solution :

$2x = y + 2 \quad \therefore y + 2 = 2x \quad \therefore y = 2x - 2$

x	−1	0	2	4
y	−4	−2	2	6
(x, y)	(−1, −4)	(0, −2)	(2, 2)	(4, 6)

$4x + 3y = 24 \quad \therefore 3y = 24 - 4x \quad \therefore y = \frac{24 - 4x}{3}$

x	0	3	6	9
y	8	4	0	−4
(x, y)	(0, 8)	(3, 4)	(6, 0)	(9, −4)



The lines intersect each other at the point C(3, 4).

From the graph △ABC is formed by the two lines and the X-axis.

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Q. No. 5

For $\triangle ABC$, $d(A,B) = (6-1) = 5$

$\therefore AB = 5$ and the perpendicular distance of point C on the X-axis is 4.

$A(\triangle ABC) = \frac{1}{2} \times 5 \times 4 = \underline{10 \text{ cm}^2}$.

[Scheme of marking : 1 mark for preparing a table; 1 mark for drawing correct graph of the given equations; 1 mark for finding the area of the triangle.]

(ii) Solution :

(a)

Blood Group	Measure of the central angle	
O	$\frac{45\%}{100\%} \times 360° = 162°$	*(½ mark)*
A	$\frac{20\%}{100\%} \times 360° = 72°$	*(½ mark)*
B	$\frac{30\%}{100\%} \times 360° = 108°$	*(½ mark)*
AB	$\frac{5\%}{100\%} \times 360° = 18°$	*(½ mark)*
Total	360°	

(b) Let the total number of persons be x.

The central angle for blood group B

$= \frac{\text{The number of persons in blood group B}}{\text{The total number of persons}} \times 360°$ *(½ mark)*

$\therefore 108° = \frac{600}{x} \times 360°$

$\therefore x = \frac{600 \times 360°}{108°}$

$\therefore x = 2000$ *(½ mark)*

The total number of persons is 2000.

प्र. क्र. Q. No. 1 (A)

(i) (B) (ii) (D) (iii) (C) (iv) (C). *(1 mark each)*

1 (B)

Note : Here answers with solution are expected.

(i) Ans.

$\triangle ABD$ and $\triangle ABC$ have a common vertex A and their bases BD and BC lie on the same line BC.

$\therefore$ their areas are proportional to their corresponding bases.

$$\frac{A(\triangle ABD)}{A(\triangle ABC)} = \frac{BD}{BC}$$ *(½ mark)*

$$= \frac{7}{20}$$ *(½ mark)*

(ii) Ans.

$NQ^2 = MQ \times PQ$ ... (Theorem of geometric mean) *(½ mark)*

$= 9 \times 4$

$NQ = 3 \times 2$ ... (Taking square roots of both the sides) *(½ mark)*

$NQ = 6$.

(iii) Ans.

The angle made by the line with the positive direction of X-axis is 30°.

Slope of the line $= \tan\theta$ *(½ mark)*

$$= \tan 30° = \frac{1}{\sqrt{3}}$$

The slope of the line is $\frac{1}{\sqrt{3}}$ *(½ mark)*

(iv) Ans.

The opposite angles of a cyclic quadrilateral are supplementary.

$\therefore m\angle A + m\angle C = 180°$ *(½ mark)*

$\therefore 100° + m\angle C = 180°$

$\therefore m\angle C = 180° - 100°$

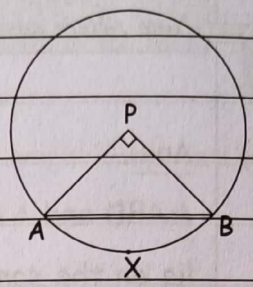
$m\angle C = 80°$. *(½ mark)*

प्र. क्र.
Q. No. 1 (B)

Note : In this question type, students are required to solve any 2 of 3 activities. However, solutions to all 3 activities are given here, for the guidance of the students.

(i) Activity : $r = 10$ cm, $\theta = 90°$, $\pi = 3.14$.

$A(P-AXB) = \frac{\theta}{360} \times \boxed{\pi r^2}$ (½ mark)



$= \frac{\boxed{90}}{360} \times 3.14 \times 10^2$ (½ mark)

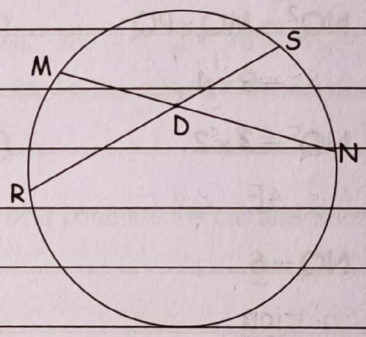
$= \frac{1}{4} \times \boxed{314}$ (½ mark)

$\therefore A(P-AXB) = \boxed{78.5}$ sq cm.) (½ mark)

(ii) Activity : $MD \times DN = \boxed{RD} \times DS$ (½ mark)

... (Theorem of internal division of chords)

$\therefore \boxed{8} \times DN = 15 \times 4$ (½ mark)



$\therefore DN = \frac{\boxed{60}}{8}$ (½ mark)

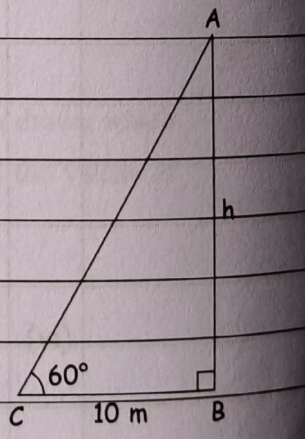
$\therefore DN = \boxed{7.5}$. (½ mark)

(iii) Activity :

In the given figure, $AB = h$ = height of the tree, distance of the observer from the tree, $BC = 10$ m,

Angle of elevation $(\theta) = \angle BCA = 60°$

$\tan\theta = \frac{\boxed{AB}}{BC}$ ... (1) (½ mark)



$\tan 60° = \boxed{\sqrt{3}}$ ... (2) (½ mark)

$\therefore \frac{AB}{BC} = \sqrt{3}$ ... [From (1) and (2)]

$\therefore AB = \sqrt{3} \times BC = 10\sqrt{3}$

$\therefore AB = 10 \times 1.73 = \boxed{17.3}$ (½ mark)

$\therefore$ the height of the tree is $\boxed{17.3}$ m. (½ mark)

प्र. क्र.
Q. No. 2 (A)

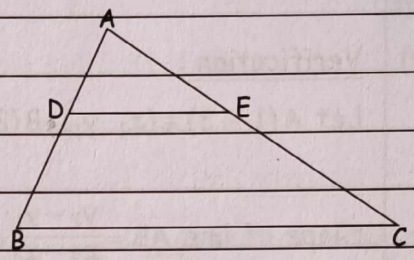
Note : *In this question type, students are required to solve any 4 of 5 subquestions. However, solutions to all 5 subquestions are given here, for the guidance of the students.*

(i) **Solution :**

In $\triangle ABC$, $DE \parallel BC$

By the basic proportionality theorem,

$\frac{AD}{DB} = \frac{AE}{EC}$ *(½ mark)*



$\therefore \frac{1.8}{5.4} = \frac{AE}{7.2}$ *(½ mark)*

$\therefore \frac{AE}{7.2} = \frac{1.8}{5.4}$

$\therefore AE = \frac{1.8 \times 7.2}{5.4}$ *(½ mark)*

$\therefore AE = 2.4$ *(½ mark)*

Ans. $AE = 2.4$ cm.

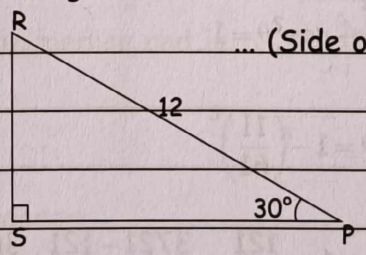
(ii) **Solution :**

In $\triangle RSP$, $\angle RSP = 90°$, $\angle RPS = 30°$,

$\therefore \angle SRP = 60°$ ... (The remaining angle of $\triangle RSP$)

By $30° - 60° - 90°$ triangle theorem,

$RS = \frac{1}{2} RP$ ... (Side opposite to 30°) *(½ mark)*



$= \frac{1}{2} \times 12 = 6$ *(½ mark)*

$PS = \frac{\sqrt{3}}{2} RP$ ... (Side opposite to 60°) *(½ mark)*

$= \frac{\sqrt{3}}{2} \times 12 = 6\sqrt{3}$ *(½ mark)*

Ans. $RS = 6$ and $PS = 6\sqrt{3}$.

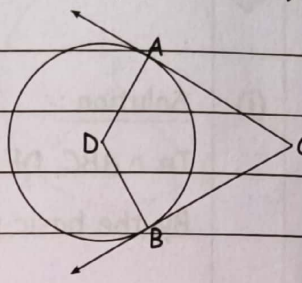
प्र. क्र. Q. No. 2 (A)

(iii) Solution :

$\angle CAD = \angle CBD = 90°$ ... (Tangent theorem) (½ mark)

$\angle ADB + \angle CBD + \angle ACB + \angle CAD = 360°$

... (The sum of all the angles of a quadrilateral) (½ mark)



$\therefore \angle ADB + 90° + 52° + 90° = 360°$

$\therefore \angle ADB + 232° = 360°$

$\therefore \angle ADB = 360° - 232°$ (½ mark)

$\therefore \angle ADB = 128°$ (½ mark)

Ans. The measure of $\angle ADB$ is $128°$.

(iv) Verification :

Let $A(1, -3) \equiv (x_1, y_1)$, $B(2, -5) \equiv (x_2, y_2)$, $C(-4, 7) \equiv (x_3, y_3)$.

Slope of line $AB = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5-(-3)}{2-1} = \frac{-5+3}{1} = -2$ (½ mark)

Slope of line $BC = \frac{y_3 - y_2}{x_3 - x_2} = \frac{7-(-5)}{-4-2} = \frac{7+5}{-6} = \frac{12}{-6} = -2$ (½ mark)

Slope of line AB = slope of line BC and point B is common to both the lines.

$\therefore$ points $A(1, -3)$, $B(2, -5)$ and $C(-4, 7)$ are collinear. (½ mark)

(v) Solution :

$\sin^2\theta + \cos^2\theta = 1$ ... (Trigonometric identity) (½ mark)

$\therefore \left(\frac{11}{61}\right)^2 + \cos^2\theta = 1$

$\therefore \cos^2\theta = 1 - \left(\frac{11}{61}\right)^2$ (½ mark)

$= 1 - \frac{121}{3721} = \frac{3721 - 121}{3721} = \frac{3600}{3721}$ (½ mark)

$\therefore \cos\theta = \frac{60}{61}$ ... (Taking square roots of both the sides) (½ mark)

Ans. The value of $\cos\theta$ is $\frac{60}{61}$.

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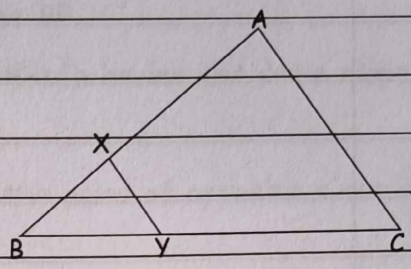
Q. No. 2 (B)

Note : *In this question type, students are required to attempt any 1 of 2 activities. However, solutions to both the activities are given here, for the guidance of the students.*

(i) Activity :

$2AX = 3BX$ ... (Given)



$\therefore \frac{AX}{BX} = \frac{3}{2}$ ... *(½ mark)*

$\therefore \frac{AX + BX}{BX} = \frac{3+2}{2}$ ... (By componendo)

$\therefore \frac{AB}{BX} = \frac{5}{2}$ ... (1) *(½ mark)*

Now, $\triangle BCA \sim \triangle BYX$ ... (AA test of similarity) *(½ mark)*

$\therefore \frac{BA}{BX} = \frac{AC}{XY}$ ... (Corresponding sides of similar triangles)

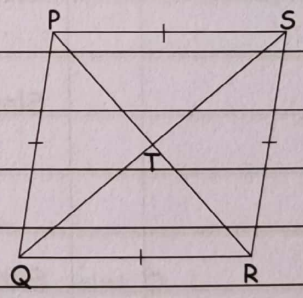
$\therefore \frac{5}{2} = \frac{AC}{9}$ *(½ + ½ mark)*

$\therefore AC = 22.5$ ... [From (1)] *(½ mark)*

(ii) Activity :

The diagonals of a rhombus bisect each other.

In $\triangle PQS$, PT is the median and in $\triangle QRS$, RT is the median.



$\therefore$ by Apollonius theorem,

$PQ^2 + PS^2 = 2PT^2 + 2QT^2$ ... (1) *(½ mark)*

and $QR^2 + SR^2 = 2RT^2 + 2QT^2$ ... (2) *(½ mark)*

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Q. No. 2 (B)

Adding (1) and (2),

$PQ^2+PS^2+QR^2+SR^2=2\left(PT^2+\boxed{RT^2}\right)+4QT^2$ *(½ mark)*

$=2\left(PT^2+\boxed{PT^2}\right)+4QT^2$ ... (RT = PT) *(½ mark)*

$=4PT^2+4QT^2$

$=\left(\boxed{2PT}\right)^2+(2QT)^2$ *(½ mark)*

$\therefore PQ^2+PS^2+QR^2+SR^2=PR^2+\boxed{QS^2}$. *(½ mark)*

Note : *In this question type, students are required to solve any 2 of 4 subquestions. However, solutions to all 4 subquestions are given here, for the guidance of the students.*

(i) Proof :

$P(1,-2)\equiv(x_1, y_1)$, $Q(5, 2)\equiv(x_2, y_2)$, $R(3, -1)\equiv(x_3, y_3)$,

$S(-1, -5)\equiv(x_4, y_4)$.

Slope of line $PQ=\frac{y_2-y_1}{x_2-x_1}=\frac{2-(-2)}{5-1}=\frac{2+2}{4}=\frac{4}{4}=1$ ... (1) *(½ mark)*

Slope of line $QR=\frac{y_3-y_2}{x_3-x_2}=\frac{-1-2}{3-5}=\frac{-3}{-2}=\frac{3}{2}$ ... (2) *(½ mark)*

Slope of line $RS=\frac{y_4-y_3}{x_4-x_3}=\frac{-5-(-1)}{-1-3}=\frac{-5+1}{-4}=\frac{-4}{-4}=1$

... (3) *(½ mark)*

Slope of line $SP=\frac{y_4-y_1}{x_4-x_1}=\frac{-5-(-2)}{-1-1}=\frac{-5+2}{-2}=\frac{-3}{-2}=\frac{3}{2}$

... (4) *(½ mark)*

From (1) and (3),

slope of line PQ = slope of line RS

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Q. No. 2 (B)

∴ line PQ ∥ line RS ... (Both having the same slope) *(½ mark)*

From (2) and (4),

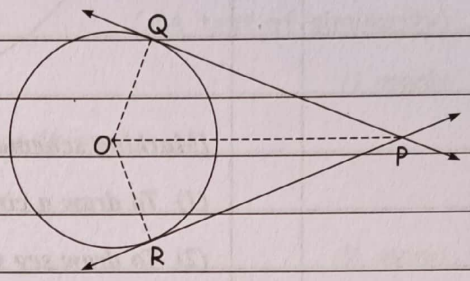
slope of line QR = slope of line SP

∴ line QR ∥ line SP ... (Both having the same slope) *(½ mark)*

∴ □PQRS is a parallelogram

... (Both the pairs of opposite sides are parallel)

(ii)



Given : (1) A circle with centre O.

(2) Lines PQ and PR are tangents to the circle at points Q and R respectively. *(½ mark)*

(Fig. : ½ mark)

To prove : seg PQ ≅ seg PR *(½ mark)*

Construction : Draw seg OP, seg OQ and seg OR.

Proof : In △OQP and △ORP,

∠OQP = ∠ORP = 90° ... (Tangent theorem)

Hypotenuse OP ≅ Hypotenuse OP ... (Common side) *(½ mark)*

side OQ ≅ side OR ... (Radii of the same circle)

∴ △OQP ≅ △ORP ... (Hypotenuse side test) *(½ mark)*

∴ seg PQ ≅ seg PR ... (c.s.c.t.) *(½ mark)*

(iii) Steps of construction :

(1) Draw a circle with centre O and radius 4.1 cm.

(2) Take a point P at a distance of 7.3 cm from the point O.

(3) Draw the perpendicular bisector of seg PO intersecting seg PO in the point M.

(4) With M as centre and radius equal to seg MO draw an arc intersecting the circle with centre O in the points A and B.

(5) Draw lines PA and PB.

These lines are tangents to the circle.

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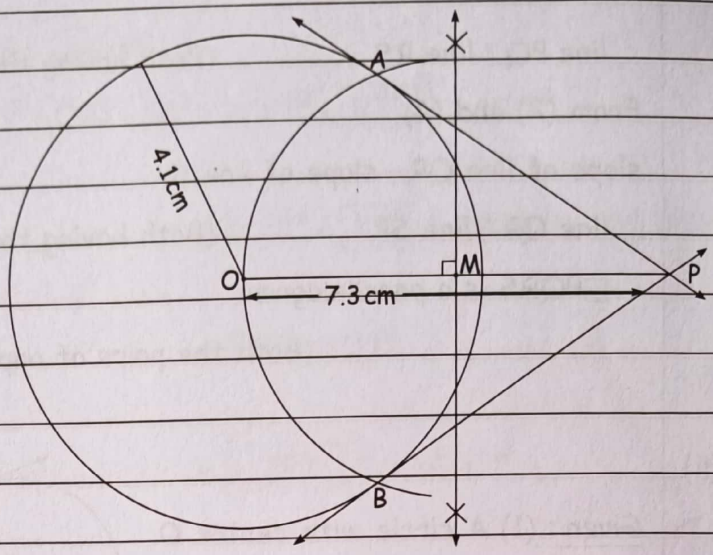
Q. No. 3 (A)

Ans.



[Marking scheme :

(1) To draw a circle of radius 4.1 cm *(1 mark)*

(2) To draw seg OP of length 7.3 cm *(½ mark)*

(3) To draw bisector of seg OP *(½ mark)*

(4) To draw tangent PA *(½ mark)*

(5) To draw tangent PB *(½ mark)]*

(Here the steps of the constructions are given for the guidance of the students. Do not write it in the exam.)

(iv) Solution :

For cylinder : $r = 10$ cm, $h = 6$ cm

For sphere : $R = 30$ cm

The number of solid cylinders that can be made by melting a solid sphere $= \frac{\text{The volume of the sphere}}{\text{The volume of one cylinder}}$ *(½ mark)*

$= \frac{\frac{4}{3}\pi R^3}{\pi r^2 h}$ *(½ + ½ mark)*

$= \frac{\frac{4}{3} \times 30 \times 30 \times 30}{10 \times 10 \times 6}$ *(½ mark)*

$= \frac{4 \times 30 \times 30 \times 30}{3 \times 10 \times 10 \times 6}$ *(½ mark)*

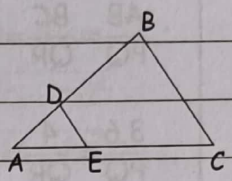
$= 60$ *(½ mark)*

Ans. 60 solid cylinders can be made.

प्र. क्र.
Q. No. 4

Note : *In this question type, students are required to attempt any 2 of 3 subquestions. However, solutions to all 3 subquestions are given here, for the guidance of the students.*

(i) Solution :



(a) $DE \parallel BC$ ... (Given)

$\therefore \angle ADE \cong \angle ABC$ and $\angle AED \cong \angle ACB$ ... (Corresponding angles)

$\therefore \triangle ADE \sim \triangle ABC$ ... (AA test of similarity)

(1 mark)

By the theorem of areas of similar triangles,

$$\frac{A(\triangle ADE)}{A(\triangle ABC)} = \frac{DE^2}{BC^2}$$ *(½ mark)*

$$\therefore \frac{25}{A(\triangle ABC)} = \frac{(4)^2}{(8)^2}$$

$$\therefore A(\triangle ABC) = \frac{25 \times (8)^2}{(4)^2} = 25 \times 4 = 100$$ *(½ mark)*

(b) By the theorem of areas of similar triangles,

$$\frac{A(\triangle ABC)}{A(\triangle ADE)} = \frac{BC^2}{DE^2} = \frac{5^2}{3^2}$$ *(½ mark)*

$$\frac{A(\triangle ABC)}{A(\triangle ADE)} = \left(\frac{5}{3}\right)^2 = \frac{25}{9}$$ *(½ mark)*

$$\therefore \frac{A(\triangle ABC) - A(\triangle ADE)}{A(\triangle ADE)} = \frac{25-9}{9}$$ ... (By dividendo)

(½ mark)

$$\therefore \frac{A(\square DBCE)}{A(\triangle ADE)} = \frac{16}{9}$$

$$\therefore \frac{A(\square ADE)}{A(\triangle DBCE)} = \frac{9}{16}$$ ... (By invertendo)

(½ mark)

Ans. (a) $A(\triangle ABC) = 100 \text{ cm}^2$

(b) $\triangle ADE : A(\square DBCE) = 9 : 16$.

प्र. क्र.
Q. No. 3 (B) (ii) Solution :

$\triangle ABC \sim \triangle PQR$ ... (Given)

$\therefore \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ ... (Corresponding sides of similar triangles) (½ mark)

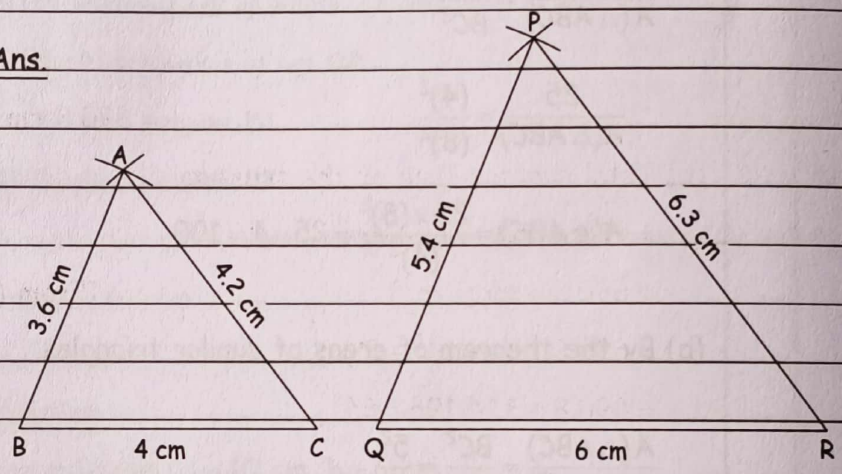
$\therefore \frac{3.6}{PQ} = \frac{4}{QR} = \frac{4.2}{PR} = \frac{2}{3}$ ... (Given : Ratio of sides 2 : 3)

$\therefore \frac{3.6}{PQ} = \frac{2}{3}$ $\therefore PQ = 5.4$ cm, (½ mark)

$\therefore \frac{4}{QR} = \frac{2}{3}$ $\therefore QR = 6$ cm, (½ mark)

$\therefore \frac{4.2}{PR} = \frac{2}{3}$ $\therefore PR = 6.3$ cm (½ mark)

Ans.



[Marking scheme :

(1) To draw $\triangle ABC$ *(1 mark)*

(2) To draw $\triangle PQR$ *(1 mark)]*

Q. No. 4

(iii) Solution :

The radii of the circular ends of a frustum are 14 cm and 8 cm.

Let $r_1 = 14$ cm and $r_2 = 8$ cm. Height $(h) = 8$ cm.

Slant height ℓ of the frustum $= \sqrt{h^2 + (r_1 - r_2)^2}$ *(½ mark)*

$= \sqrt{8^2 + (14 - 8)^2}$

$= \sqrt{8^2 + 6^2}$

$= \sqrt{64 + 36}$

$= \sqrt{100}$

$= 10$ cm *(½ mark)*

$\therefore \ell = 10$ cm,

(a) Curved surface area of the frustum $= \pi\ell(r_1 + r_2)$ *(½ mark)*

$= 3.14 \times 10 \times (14 + 8)$

$= 3.14 \times 10 \times 22$

$= 690.8 \text{ cm}^2$ ... (1) *(½ mark)*

(b) Total surface area of the frustum

$= \pi\ell(r_1 + r_2) + \pi r_1^2 + \pi r_2^2$ *(½ mark)*

$= 690.8 + \pi(r_1^2 + r_2^2)$ ... [From (1)]

$= 690.8 + 3.14(14^2 + 8^2)$

$= 690.8 + 3.14(196 + 64)$

$= 690.8 + 3.14 \times 260$

$= 690.8 + 816.4$

$= 1507.2 \text{ cm}^2$ *(½ mark)*

(c) Volume of the frustum

$= \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 \times r_2)$ *(½ mark)*

$= \frac{1}{3} \times 3.14 \times 8 \times (14^2 + 8^2 + 14 \times 8)$

$= \frac{1}{3} \times 3.14 \times 8 \times (196 + 64 + 112)$

$= \frac{1}{3} \times 3.14 \times 8 \times 372$

$= 3114.88 \text{ cm}^3$ *(½ mark)*

Ans. (a) 690.8 cm^2 (b) 1507.2 cm^2 (c) 3114.88 cm^3

प्र. क्र.
Q. No. 5

Note : In this question type, students are required to solve any 1 of 2 subquestions. However, solutions to both the subquestions are given here, for the guidance of the students.

(i) Solution :

$\angle AXD = 90°$ ... (Angle in a semicircle)

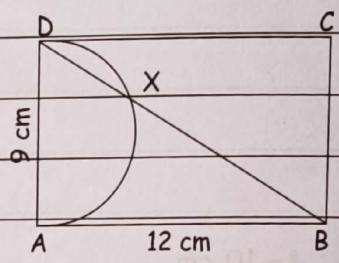
In $\triangle DAB$, $\angle DAB = 90°$ ... (Angle of a rectangle)

By Pythagoras theorem,

$BD^2 = AB^2 + AD^2$ *(½ mark)*

$= (12)^2 + (9)^2$

$= 144 + 81 = 225$



(Fig. : 1 mark)

$\therefore BD = 15$ cm ... (Taking square roots of both the sides) *(½ mark)*

AD is the diameter of the semicircle and $\angle BAD = 90°$

$\therefore$ BA is a tangent. BD is a secant.

By tangent-secant segments theorem,

$BA^2 = BX \times BD$ *(½ mark)*

$\therefore (12)^2 = BX \times 15$

$\therefore BX = \frac{144}{15}$

$\therefore BX = 9.6$ cm *(½ mark)*

Ans. The value of BD is 15 cm, the value of BX is 9.6 cm.

प्र. क्र. Q. No. 5

(ii) Verification :

$\theta = 30°$

(a) $LHS = \sin^2\theta + \cos^2\theta$

$= \sin^2 30° + \cos^2 30°$

$= \left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2$ *(½ mark)*

$= \frac{1}{4} + \frac{3}{4} = 1 = RHS$ *(½ mark)*

$LHS = RHS$

$\therefore \sin^2\theta + \cos^2\theta = 1$

(b) $LHS = 1 + \tan^2\theta$

$= 1 + \tan^2 30°$

$= 1 + \left(\frac{1}{\sqrt{3}}\right)^2$

$= 1 + \frac{1}{3} = \frac{4}{3}$ *(½ mark)*

$RHS = \sec^2\theta$

$= \sec^2 30°$

$= \left(\frac{2}{\sqrt{3}}\right)^2 = \frac{4}{3}$ *(½ mark)*

$\therefore LHS = RHS$ $\quad \therefore 1 + \tan^2\theta = \sec^2\theta$

(c) $LHS = 1 + \cot^2\theta$

$= 1 + \cot^2 30°$

$= 1 + (\sqrt{3})^2 = 1 + 3 = 4$ *(½ mark)*

$RHS = \operatorname{cosec}^2\theta$

$= \operatorname{cosec}^2 30°$

$= (2)^2 = 4$ *(½ mark)*

$\therefore LHS = RHS$ $\quad \therefore 1 + \cot^2\theta = \operatorname{cosec}^2\theta$.

SCIENCE & TECHNOLOGY (PART – 1)

BOARD'S ACTIVITY SHEET (MARCH 2025)

(With Full Solution & Marking Scheme)

Time : 2 Hours] **[Total Marks : 40**

Note : *(i) All questions are compulsory.*

(ii) Use of a calculator is not allowed.

(iii) The numbers to the right of the questions indicate full marks.

(iv) In case of MCQs [Q. No. 1 (A)], only the first attempt will be evaluated and will be given credit.

(v) Scientifically correct, labelled diagrams should be drawn wherever necessary.

Q. 1. (A) Choose the correct alternative : **5**

(i) Alkaline earth metals have valency 2. This means that their position in the modern periodic table is in ----------.

(A) Group 2 *(B) Group 16*

(C) Period 2 *(D) d-block*

(ii) The reaction in which ions in the reactants are exchanged to form a precipitate is called as ---------- reaction.

(A) Combination *(B) Decomposition*

(C) Displacement *(D) Double Displacement*

(iii) ---------- is used to make a solenoid type coil in an electric bulb.

(A) Nichrome *(B) Copper*

(C) Tungsten *(D) Aluminium*

(iv) Light changes its direction when going from one transparent medium to another transparent medium. This process is called ----------.

(A) Reflection *(B) Dispersion*

(C) Scattering *(D) Refraction*

(v) $CaO + H_2O \longrightarrow Ca(OH)_2 + Heat$, is an example of ---------- reaction.

(A) Exothermic *(B) Electrolysis*

(C) Decomposition *(D) Endothermic*

Q. 1. (B) Answer the following questions : **5**

(i) State whether true or false :

A redox reaction takes place during cellular respiration.

(ii) Find the odd one out :

Loudspeaker, microphone, electric motor, magnet.

(iii) What is the reason for twinkling of stars?

(iv) Match the columns :

Column 'A'	Column 'B'
Simple microscope	(a) used to observe minute objects (b) used to see distant objects (c) used for watch repair

(v) Name the behaviour of water between its temperature from 0°C to 4°C.

Q. 2. (A) Give scientific reasons : *(Any two)* **4**

(i) While going from left to right within a period, the size of atom decreases.

(ii) For electric power transmission, copper or aluminium wire is used.

(iii) In some countries, ethanol is used as an additive to increase the efficiency of petrol.

Q. 2. (B) Answer the following : *(Any three)* **6**

(i) Name and state the principle used to measure the specific heat capacity of a substance.

(ii) What is done to prevent rusting of iron door of your house?

(iii) Distinguish between mass and weight.

(iv) The 'rocket' is a type of fire cracker used in Diwali.

(a) Name the launcher.

(b) Name the law on which its working is based.

(v) What is meant by decomposition reaction? Write the chemical reaction of decomposition of sugar on heating.

Q. 3. Answer the following : *(Any five)* **15**

(i) An iron ball of mass 3 kg is released from a height of 125 m and falls freely to the ground. Assuming that the value of g is 10 m/s^2, calculate :

(a) Time taken by the ball to reach the ground.

(b) Velocity of the ball on reaching the ground.

(ii) Write the name and symbol of the element from the description :

(a) The most electronegative atom.

(b) The atom having smallest atomic mass.

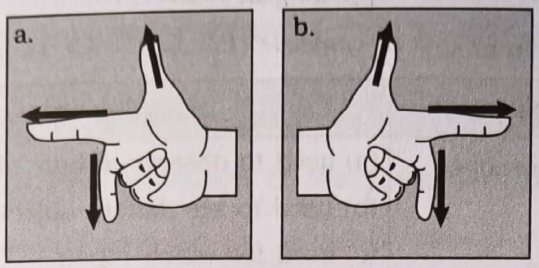
(c) The noble gas with the smallest atomic radius.

(iii) (a) What happens when copper reacts with concentrated nitric acid? What is the colour of the gas released during the reaction?

(b) Write its balanced chemical equation.

(c) Write the names of reactants and products.

(iv) Name the following diagrams and explain the concept behind them :



(v) Answer the following with respect to the 'Formation of Rainbow' :

(a) Draw a neat diagram to show the formation of rainbow.

(b) Name any *two* natural processes involved in formation of rainbow.

(c) What does a small droplet of water act as?

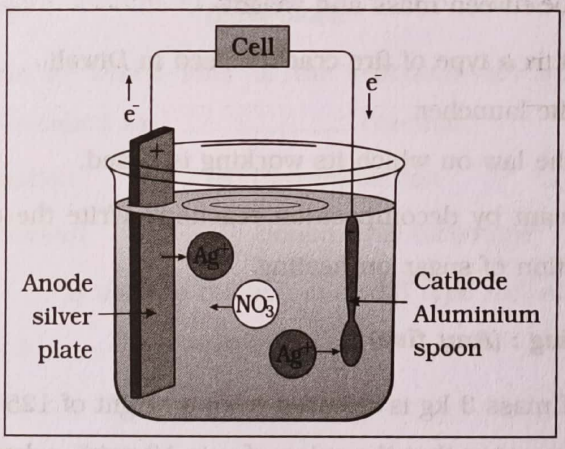
(vi) Name the following :

(a) The *two* metals which can be cut with knife.

(b) A sound is produced when certain metals are struck. Name this property of metals.

(c) The non-metallic substance which is a good conductor of electricity.

(vii) Answer the following questions with the help of the given diagram :



(a) Name the process shown in the diagram.

(b) How does this process take place?

(c) Give *two* examples in which this process is used.

(viii) Complete the following table :

	Type of the satellite	Function of the satellite	The names of the Indian satellite series and their launch vehicles
(a)	----------	Fix the location of any place on the earth's surface	----------
(b)	Weather satellite	----------	----------
(c)	----------	----------	IRS Launcher : PSLV

Q. 4. Answer the following questions : *(Any one)* **5**

(i) (a) Draw a neat labelled diagram of human eye.

(b) What is the minimum distance of distinct vision for a normal human eye?

(c) Name the capacity of the eye lens to change its focal length as per need.

(d) Name the defect of eye vision in which the focussing power of eye lens decreases with age.

(ii) Atomic number of chlorine is 17.

(a) Write the electronic configuration of chlorine.

(b) What is the number of electrons in the valence shell of chlorine?

(c) Write the molecular formula of chlorine.

(d) Name the type of bond in the formation of chlorine molecule.

(e) Draw the electron dot structure of a chlorine molecule.

Scan this QR Code for Activity Sheet format.

SCIENCE & TECHNOLOGY (PART – 2)

BOARD'S ACTIVITY SHEET (MARCH 2025)

(With Full Solution & Marking Scheme)

Time : 2 Hours] **[Total Marks : 40**

Note : *(i) All questions are compulsory.*

(ii) The numbers to the right of the questions indicate full marks.

(iii) In case of MCQs [Q. No. 1 (A)], only the first attempt will be evaluated and will be given credit.

(iv) Scientifically and technically correct, labelled diagrams should be drawn wherever necessary.

(v) Each new question should be started on the new page.

Q. 1. (A) Choose the *correct* option and write the correct alternative : **5**

(i) A molecule of glucose is completely oxidised in aerobic respiration and molecules of H_2O and ..... are produced along with energy.

(A) CO_2 (B) O_2

(C) $NaOH$ (D) HNO_3

(ii) Vinegar contains ..... acid.

(A) acetic (B) lactic

(C) tartaric (D) hydrochloric

(iii) Any nucleotide of the gene suddenly changes its position that causes a minor change which is nothing but the .....

(A) changes (B) mutation

(C) disability (D) translocation

(iv) In humans, sperm production occurs in the ..... organ.

(A) vas deferens (B) ejaculatory duct

(C) testes (D) urinogenital duct

(v) Solar photovoltaic cell converts the solar radiation energy directly into ..... energy.

(A) Chemical (B) Solar

(C) Mechanical (D) Electrical

Q. 1. (B) Answer the following questions : **5**

(i) Find the odd one out :

Fragmentation, Regeneration, Budding, Fertilization.

(ii) Write the correct correlation :

Diabetes : Insulin : : Cancer : ----------

(iii) State whether true or false :

Study of fossils is an important aspect of the study of evolution.

(iv) Give any *two* commercial uses of Biotechnology.

(v) Being a fish, I perform respiration with the help of lungs. Who am I?

Q. 2. (A) Give scientific reasons : *(Any two)* **4**

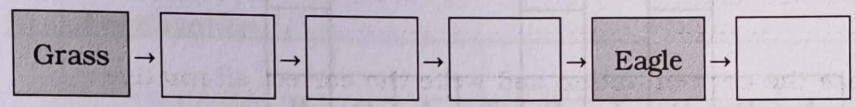
(i) Sometimes, higher plants and animals too perform anaerobic respiration.

(ii) It is not right to consider the mother responsible, for giving birth to a girl child.

(iii) The energy generated from nuclear fuels is not environment friendly.

Q. 2. (B) Answer the following questions : *(Any three)* **6**

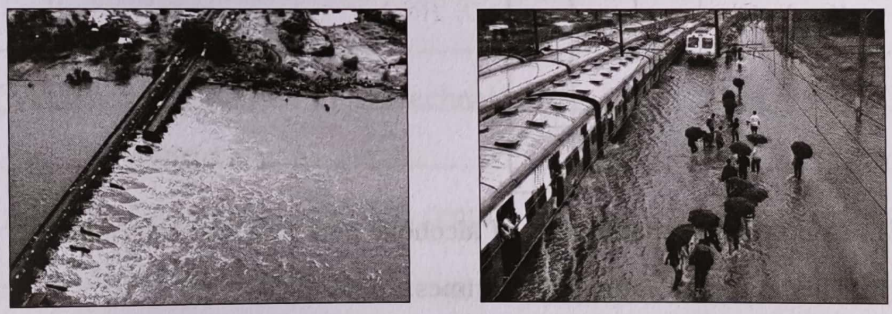
(i) Complete the following food chain :



(ii) Distinguish between the following :

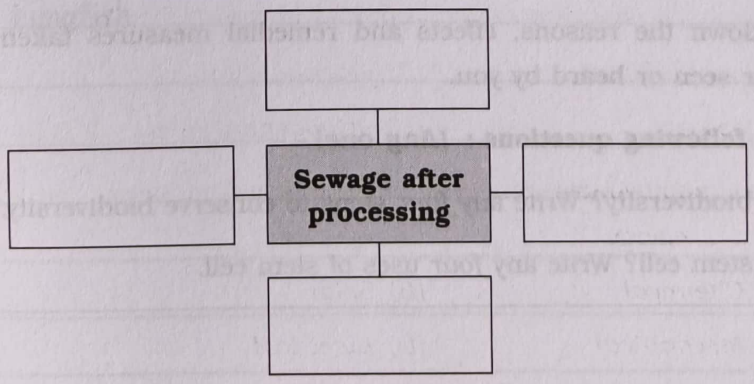
Class Pisces and Class Reptiles

(iii) Observe the following picture and write any *two* effects of this disaster :



(iv) Write any *four* methods to reduce stress.

(v) Complete the following conceptual picture :



Q. 3. Answer the following questions : *(Any five)* **15**

(i) Define heredity. Explain the mechanism of hereditary changes.

(ii) Write any *four* stages of mitosis and explain any *two* of them.

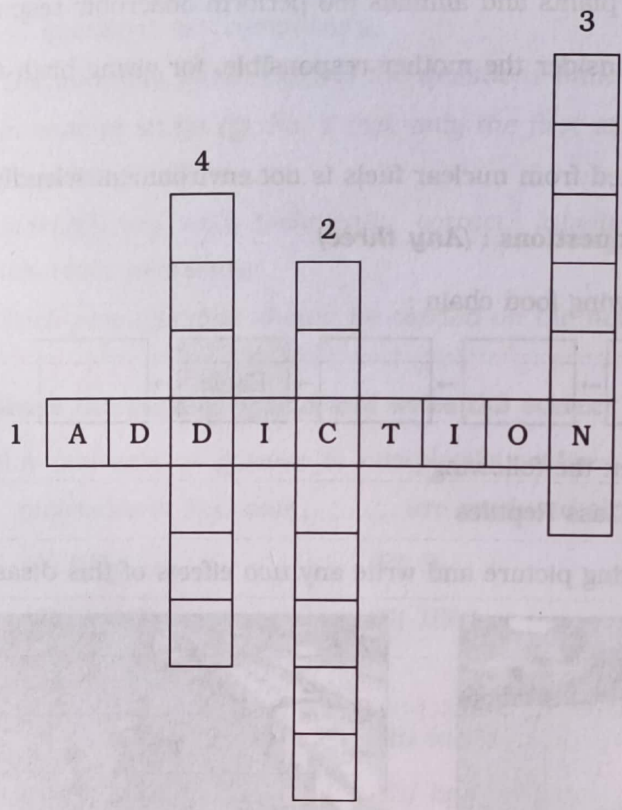
(iii) Explain with examples types of asexual reproduction in unicellular organism.

(iv) Which fuel is used in thermal power plant? Write any *two* problems associated with this type of power generation.

(v) Write *three* characteristics of phylum-Mollusca.

(vi) What are the constituents of acid rain? What are its *two* effects on earth's surface?

(vii) Solve the following crossword :



(1) Continuous consumption of alcoholic and tobacco materials.

(2) This app may cause cyber crimes.

(3) A remedy to resolve stress.

(4) Requirement for stress free life.

(viii) Write down the reasons, effects and remedial measures taken for any *one* disaster seen or heard by you.

Q. 4. Answer the following questions : *(Any one)* **5**

(i) What is biodiversity? Write any *four* steps to conserve biodiversity.

(ii) What is stem cell? Write any *four* uses of stem cell.

प्र. क्र. Q. No.

1 (A)

(i) (A) (1 mark)

(ii) (D) (1 mark)

(iii) (C) (1 mark)

(iv) (D) (1 mark)

(v) (A) (1 mark)

1 (B)

(i) True (1 mark)

(ii) Magnet (1 mark)

(iii) Stars twinkles due to changing refractive index of atmospheric gases. (1 mark)

(iv) Simple microscope – used for watch repair (1 mark)

(v) The behaviour of water between its temperature from 0°C to 4°C is called Anomalous behaviour of water. (1 mark)

प्र. क्र.
Q. No. **2 (A)**

Note : *In this question, students are required to write answers of any 2 questions out of 3. However, answers to all 3 questions are given here for the guidance of the students.*

(i) (1) In a period while going from left to right, atomic radius goes on decreasing and the atomic number increases one by one, that means positive charge on the nucleus increases by one unit at a time. ***(1 mark)***

(2) However, the additional electron is added to the same outermost shell. Due to the increased nuclear charge, the electrons are pulled towards the nucleus to a greater extent, as a result the size of atom decreases, i.e. atomic radius decreases. ***(1 mark)***

(ii) (1) Copper and aluminium are good conductors of electricity. ***(1 mark)***

(2) Copper and aluminium have very low resistivity. Hence, when an electric current flows through a wire of copper or aluminium, heat produced is comparatively low. Therefore, for electric power transmission, copper or aluminium wire is used. ***(1 mark)***

(iii) (1) On combustion in sufficient air, ethanol gives carbon dioxide and water as the only products. ***(1 mark)***

(2) In this way, ethanol is a clean fuel. Therefore, in some countries it is used as an additive to increase the efficiency of petrol. ***(1 mark)***

प्र. क्र. Q. No. **2 (B)**

Note : *In this question, students are required to write answers to any 3 questions out of 5. However, answers to all 5 questions are given here for the guidance of the students.*

(i) (1) Principle of heat exchange is used to measure the specific heat capacity of a substance. **(1 mark)**

(2) According to the Principle of heat exchange, the heat energy lost by the hot object is equal to the heat energy gained by the cold object. **(1 mark)**

(ii) (1) Fix a layer of some substance on the metal surface so that the contact of the metal with moisture and oxygen in the air is prevented and no reaction would occur between them. **(1 mark)**

(2) To prevent corrosion of metals, apply a layer of paint, oil, grease or varnish on their surface. For example, corrosion of iron can be prevented by this method. **(1 mark)**

(iii)

Mass	Weight
(1) The mass of a body is the amount of matter present in it.	(1) The weight of a body is the force with which the earth attracts it.
(2) It has magnitude, but not direction.	(2) It has both magnitude and direction.
(3) It does not change from place to place.	(3) It changes from place to place.
(4) It can never be zero.	(4) It is zero at the centre of the earth.
(5) Its SI unit is kilogram.	(5) Its SI unit is newton.

(Any two points : 1 mark each; total 2 marks)

(iv) (a) The launcher is a rocket. **(1 mark)**

(b) The working of the rocket is based on Newton's third law of motion. **(1 mark)**

प्र. क्र.
Q. No. **2 (B)**

(v) The chemical reaction in which two or more products are formed from a single reactant is called a decomposition reaction. ***(1 mark)***

When sugar is heated, it decomposes to form carbon (black substance) and water.

$$C_{12}H_{22}O_{11} \xrightarrow{\Delta} 12C + 11H_2O(g)$$

Sugar — Carbon ***(1 mark)***

प्र. क्र. Q. No. **3**

***Note :** In this question, students are required to solve any 5 questions out of 8. However, answers to all 8 questions are given here for the guidance of the students.*

(i) Data : $m = 3$ kg, $s = h = 125$ m, $a = g = 10$ m/s^2, $u = 0$ m/s, $t = ?$ and $v = ?$

(a) According to Newton's second equation of motion,

$s = ut + \frac{1}{2}at^2$ **(½ mark)**

$\therefore 125 = 0 \times t + \frac{1}{2} \times 10 \times t^2$ **(½ mark)**

$\therefore 125 = 5t^2$

$\therefore t^2 = \frac{125}{5} = 25$ **(½ mark)**

$\therefore t = 5$ s **(½ mark)**

The ball takes 5 s to reach the ground.

(b) According to Newton's first equation of motion,

$v = u + at$ **(½ mark)**

$\therefore v = 0 + 10 \times 5 = 50$ m/s **(½ mark)**

The velocity of the ball on reaching the ground is 50 m/s.

(ii) (a) The most electronegative atom is fluorine (F_2) **(1 mark)**

(b) The atom having smallest atomic mass is Hydrogen (H_2) **(1 mark)**

(c) The noble gas with the smallest atomic radius is Helium (He). **(1 mark)**

(iii) (a) When copper is reacted with conc. nitric acid, copper nitrate and reddish brown nitrogen dioxide are formed. **(1 mark)**

(b) $Cu(s) + 4HNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + 2NO_2(g) + 2H_2O(l)$

Copper; (conc.); Copper nitrate; Nitrogen dioxide **(1 mark)**

(c) Reactants : Copper, conc. nitric acid **(½ mark)**

Products : Copper nitrate, nitrogen dioxide and water. **(½ mark)**

प्र. क्र.
Q. No. 3

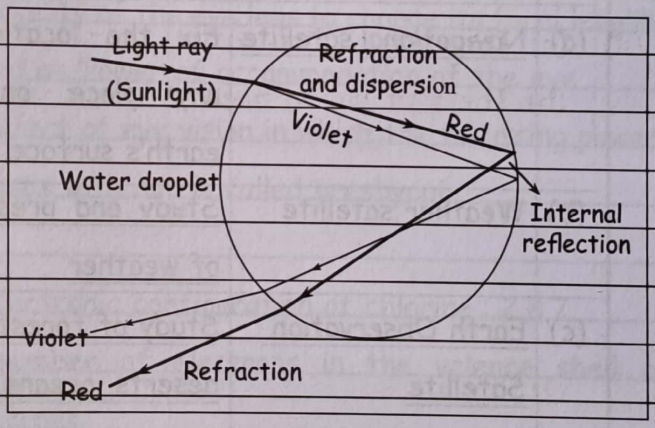
(iv) (a) The given diagram is named as Fleming's right hand rule. ***(½ mark)***

Statement : Stretch the thumb, the index finger and the middle finger of the right hand in such a way that they are perpendicular to each other. In this position, the thumb indicates the direction of the motion of the conductor, the index finger shows the direction of the magnetic field and the middle finger shows the direction of the induced current. ***(1 mark)***

(b) The given diagram is named as Fleming's left hand rule. ***(½ mark)***

Statement : The left hand thumb, index finger and the middle finger are stretched so as to be perpendicular to each other. If the index finger is in the direction of the magnetic field, and the middle finger points in the direction of the current, then the direction of the thumb is the direction of the force on the conductor. ***(1 mark)***

(v) (a)



Formation of a rainbow (Schematic diagram)

(Diagram : 1 mark)

(b) Natural processes involved in formation of rainbow are refraction, dispersion, internal reflection. ***(Any two process : ½ mark each)***

(c) A small droplet of water acts as a prism. ***(1 mark)***

प्र. क्र. Q. No. 3

(vi) (a) Metals which can be cut with a knife are-Lithium, Sodium, Potassium. **(Any two points : ½ mark each)**

(b) A sound is produced when certain metals are struck. This property of metals is called as sonority. **(1 mark)**

(c) The non-metallic substance which is a good conductor of electricity is graphite. **(1 mark)**

(vii) (a) The process shown in the diagram is electroplating. **(1 mark)**

(b) In this process, a less reactive metal is coated on a more reactive metal by electrolysis. **(1 mark)**

(c) Silver plated spoons, gold plated ornaments are the examples in which this process is used. **(1 mark)**

(viii)

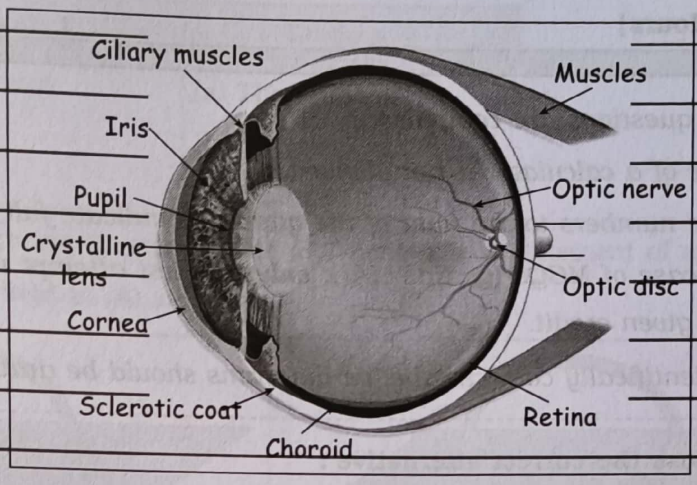
	Type of the satellite	Function of the satellite	The names of the Indian satellite series and their launch vehicles
(a)	Navigational satellite	Fix the location of any place on the earth's surface	IRNSS Launcher : PSLV
(b)	Weather satellite	Study and prediction of weather	INSAT and GSAT Launcher : GSLV
(c)	Earth Observation Satellite	Study of forests, deserts, oceans, polar ice on the earth's surface, exploration and management of natural resources, observation and guidance in case of natural calamities like flood and earthquake.	IRS Launcher : PSLV

(½ mark each point)

प्र. क्र.
Q. No. **4**

Note : *Students are required to solve any one question out of two. However, here both questions have been solved for the guidance of the students.*

(i) (a)



Construction of the human eye

(Correct drawing : 1 mark; Any two correct labels : ½ mark each)

(b) The minimum distance of distinct vision for a normal human eye is 25 cm. ***(1 mark)***

(c) The capacity of the eye lens to change its focal length as per need is called as 'Power of accommodation of the eye'. ***(1 mark)***

(d) The defect of eye vision in which the focussing power of eye lens decreases with age is called presbyopia. ***(1 mark)***

(ii) (a) The electronic configuration of chlorine : 2,8,7. ***(1 mark)***

(b) The number of electrons in the valence shell of chlorine : 7 electrons. ***(1 mark)***

(c) The molecular formula of chlorine : Cl_2. ***(1 mark)***

(d) The type of bond in the formation of chlorine molecule : Covalent bond. ***(1 mark)***

(e) The electron dot structure of a chlorine molecule :

$$:\ddot{Cl}:\ddot{Cl}: \longrightarrow :\ddot{Cl}:\ddot{Cl}: \longrightarrow Cl-Cl$$ ***(1 mark)***

प्र. क्र.
Q. No.

1 (A)

Note : *All the sub-questions in Q. 1 (A) and Q. 1 (B) are compulsory. For MCQ, write only alphabet of the answer.*

(i) (A) *(1 mark)*

(ii) (A) *(1 mark)*

(iii) (B) *(1 mark)*

(iv) (C) *(1 mark)*

(v) (D) *(1 mark)*

1 (B)

(i) Fertilization *(1 mark)*

(ii) Interleukin *(1 mark)*

(iii) True *(1 mark)*

(iv) Commercial uses of Biotechnology :

(1) Hybrid seeds

(2) Genetically modified crops

(3) Biofertilizers

(Any two uses : ½ mark each)

(v) Lungfish. *(1 mark)*

प्र. क्र.
Q. No. **2 (A)**

Note : *In this question, students are required to answer any 2 questions out of 3 sub-questions. However, answers to all the scientific reasons are given here for the guidance of the students.*

(i) (1) When there is deficiency of oxygen in the surrounding, the aerobic respiration is not possible. In such case, to survive, higher plants switch over to anaerobic respiration.

(2) In some animal tissues in case of oxygen deficiency cells perform anaerobic respiration.

(2 correct points : 1 mark each)

(ii) (1) In males, XY sex chromosomes are present and in females, XX sex chromosomes are present.

(2) At the time of fertilization, if X-chromosome comes from male, the child will be a girl and if Y-chromosome comes from male, the child will be a boy.

Therefore, it is not right to consider the mother responsible, for giving birth to a girl child.

(2 correct points : 1 mark each)

(iii) (1) Radioactive and harmful radiations are emitted after fission of nuclei occurs.

(2) There is a problem of disposal of nuclear waste.

(3) Very fatal accidents can happen in nuclear power plant which emits very harmful radiations.

Hence, the energy generated from nuclear fuels is not environment friendly.

(Any 2 correct points : 1 mark each)

प्र. क्र.
Q. No. **2 (B)**

Note : *In this question, students are required to answer any 3 questions out of 5 sub-questions. However, answers to all 5 questions are given here for the guidance of the students.*

(i) Grass → Grasshopper → Frog → Snake → Eagle → Decomposer

(4 correct components : ½ mark each)

(ii)

Class Pisces	Class Reptiles
1. These are aquatic animals living in marine and fresh water.	1. These are mainly terrestrial animal.
2. Respiration occurs with the help of gills.	2. Respiration occurs with the help of lungs.

(2 correct points of differentiation : 1 mark each)

(iii) The disaster shown in the pictures is overflowing due to heavy rain.

Effects of this disaster are as follows :

(1) Due to overflowing, bridges and roads are affected.

(2) It causes loss of human life and property.

(2 correct effects : 1 mark each)

(iv) Methods to reduce stress are as follows :

(1) Photography (2) Reading (3) Cooking (4) Drawing

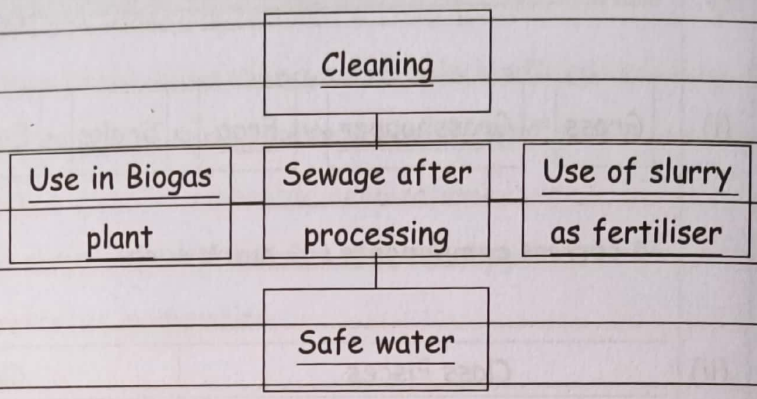
(5) Sculpturing (6) Rangoli (7) Laughter club

(8) Outdoor games, etc.

(Any 4 correct methods : ½ mark each)

प्र. क्र.
Q. No. 2 (B)

(v)



(Each block ½ mark)

प्र. क्र.
Q. No. 3

Note : *In this question, students are required to answer any 5 questions out of 8 sub-questions. However, answers to all the questions are given here for the guidance of the students.*

(i) (1) Heredity : Heredity is the process by which the biological characters from parental generation are transmitted to the next generation through genes.

(2) The mechanism of hereditary changes :

(i) Sudden change in the parental DNA can cause mutation. This results into changes in the hereditary characters. Some mutations may be minor but some may be considerable.

(ii) At the time of meiosis, the crossing over takes place between homologous chromosomes. This creates new recombination of the genetic information. Therefore, the haploid gametes produced carry hereditary characters that are different from those of the parents.

(Correct definition : 1 mark; 2 correct points of mechanism : 1 mark each)

(ii) Four stages of mitosis are as follows :

(1) Prophase (2) Metaphase (3) Anaphase (4) Telophase

Explanation :

(1) Prophase : During prophase, condensation of chromosomes starts. The thin and thread like chromosomes start thickening. They are seen with their pair of sister chromatids. In animal cells the centrioles are seen to duplicate and move to opposite poles of the cell. Nuclear membrane and nucleolus disappear.

(2) Metaphase : Chromosomes complete their condensation and each one is seen with its sister chromatids. The chromosomes are seen in equatorial plane of the cell. The spindle fibres are formed from polar region, where centrioles are present and they attach themselves to the centromere of each chromosome. Nuclear membrane now disappears completely.

प्र. क्र. Q. No. 3

(3) Anaphase : The centromeres of the chromosomes now divide forming two daughter chromosomes. The spindle fibres pull apart the chromosomes from equatorial region to the opposite poles. Chromosomes moving to the poles appear like bunch of bananas. One set of chromosomes reach each pole by the end of the anaphase.

(4) Telophase : Telophase is reverse of events that occurred in prophase. The thickened chromosomes decondense. They again assume the thin and thread like appearance. Nuclear membrane and nucleolus appear again. The spindle fibres are completely lost. The cell looks as if it has two nuclei in one cytoplasm.

(4 stages of mitosis : 1 mark; Explanation of any two stages : 1 mark each)

(iii) There are different methods of asexual reproduction in different unicellular animals.

(1) Binary fission : The process in which the parent cell divides to form two similar daughter cells is called binary fission. Prokaryotes (bacteria), Profists (Amoeba, Paramoecium, Euglena) and eukaryotic cell-organelle like mitochondria and chloroplasts perform binary fission.

(2) Multiple fission : During unfavourable conditions when there is lack of food, multiple fission is shown by amoeba. Amoeba forms protective covering around plasma membrane and becomes encysted. Inside the cyst, amoeba undergoes repeated nuclear division, which is followed by cytoplasmic divisions. Many amoebulae are formed which remain dormant inside the cyst. When favourable conditions reappear, they come out by breaking the cyst.

(3) Budding in yeast : Yeast is unicellular fungus that perform budding. The parent cell produces two daughter nuclei by mitotic division.

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Q. No. 3

This results in a small bulge (bud) on the surface of parent cell. One daughter nucleus enters the bud. After sufficient growth, it separates from the parent cell and starts to live independently as a daughter yeast cell.

(3 types of asexual reproduction with examples : 1 mark each)

(iv) (1) The fuel used in the thermal power plant is coal. Coal contains chemical energy. Upon burning it releases heat energy. This heat is used for generation of electricity in the thermal power plants.

(2) Problems associated with power generations by thermal power plant :

(a) Air pollution : Due to burning of coal, there is emission of carbon dioxide, carbon monoxide, sulphur dioxide and nitrogen dioxide gases. These are harmful and toxic to health.

(b) Soot particles emitted during combustion can cause severe respiratory problems such as asthma.

(c) The coal reserves in the world are limited. They will be finished in next few hundred years and will not be replenished later. The scarcity of coal would result in energy crisis.

(Correct fuel : 1 mark; Any two problems : 1 mark each)

(v) Characteristics of phylum-Mollusca :

(1) Body of these animals is soft and slimy.

(2) These animals are aquatic or terrestrial.

(3) These animals are unisexual.

(4) This is second largest phylum in animal kingdom.

(Any three characteristics : 1 mark each)

प्र. क्र.
Q. No. 3

(vi) (1) Constituents of acid rain are sulfur dioxide (SO_2) and nitrogen dioxide (NO_2).

(2) Effects of acid rain :

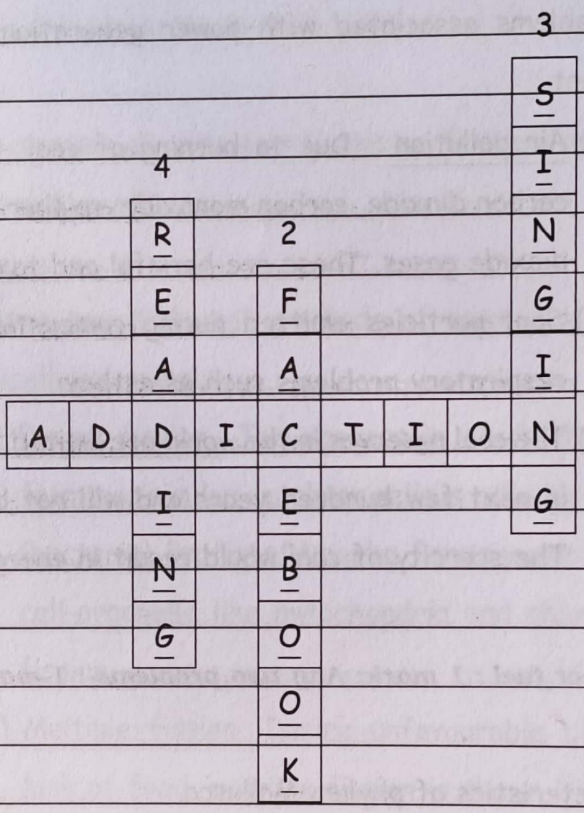
(i) Erosion of metal statues and bridges occurs due to acid rain.

(ii) Erosion of historical monuments occurs due to acid rain.

(iii) It also causes soil pollution.

(Two correct constituents : ½ mark each; Any two correct effects : 1 mark each)

(vii)



(Three correct words. 1 mark each)

(viii) Disaster : Flood

(1) Reasons for floods : Floods are often caused by heavy rainfall, rapid snow melt or tsunami in coastal areas.

प्र. क्र.
Q. No. 3

(2) Effects of flood :

(a) Loss of human life and property occurs.

(b) The fields get waterlogged.

(c) Spreads waterborne diseases.

(3) Remedial measures :

(a) In preventive measures, planting trees to prevent soil erosion, construction of dams to control, river water flow can be done.

(b) In post-flood measures, providing relief by giving food, medical help to victims of flood, repairing roads, bridges, preventing the spread of diseases through clean drinking water and hygiene awareness can be done.

(Correct example of disaster : 1 mark; Any 1 effect : 1 mark and Any 1 Remedial measure : 1 mark)

***(Note :** Students are expected to write the answer based on their own experience.)*

प्र. क्र.
Q. No. 4

Note : *In this question, students are required to answer any 1 question out of 2 sub-questions. However, answers to both questions are given here for the guidance of the students.*

(i) Biodiversity : It is the richness of living organisms in nature due to presence of varieties of organisms, ecosystems and genetic variation within a species.

Steps to conserve biodiversity :

(1) Protection of the rare species of organisms.

(2) Creating habitats for the animals and plants by establishing National Parks and Sanctuaries.

(3) Declaration of bioreserves, the areas which are protected through conservation.

(4) Conservation of all plants and animals.

(5) Strict observance of the acts and rules.

(6) Use of traditional knowledge and maintaining record of traditional knowledge.

(Correct definition : 1 mark; Any 4 correct steps to conserve biodiversity : 1 mark each)

(ii) Stem cells : The special cells having pluripotency and ability to divide and differentiate into new cells are called Stem cells. They are present in multicellular living beings.

Uses of stem cells :

(1) Stem cells are used for regenerative therapy.

(2) In case of diseased conditions like diabetes, myocardial infarction, Alzheimer's disease, Parkinson's disease, etc. Stem cells can be used to replace the damaged or functionless cells.

(3) In conditions such as anaemia, thalassaemia, leukaemia, etc. there is always the need of newer blood cells. Here, stem cells can be used to restore the number of blood cells.

प्र. क्र.
Q. No. 4

(4) In techniques of organ transplantation, stem cells can be used and they can help in the transplantation of new organs such as kidney and liver. The defective organs can be replaced by those that are produced with the help of stem cells and transplanted.

(Correct definition : 1 mark; Any 4 uses of stem cells : 1 mark each)