BOARD OF SCHOOL EDUCATION HARYANA
Practice Paper -XI
(2024-25)

Marking Scheme

MATHEMATICS

CODE: 835

⇨ Important Instructions: ● All answers provided in the Marking scheme are SUGGESTIVE
● Examiners are requested to accept all possible alternative correct answer(s).

	SECTION – A (1Mark × 20Q)	
Q. No.	**EXPECTED ANSWERS**	**Marks**
Question 1.	If X= {a, b, c, d, e} and Y= {d, e, f, g} then (X-Y) ∩ (X+Y) is	
Solution:	(B) {a, b, c}	**1**
Question 2	If A = {a, d}, B = {b, c, e}, C = {b, c, f}, then A × (B –C) is	
Solution:	(A) {(a, e), (d, e)}	**1**
Question 3	75° in radian measure is	
Solution:	(B) 5π/12	**1**
Question 4.	a + ib form of i^{-35} is :	
Solution:	(A) i	**1**
Question 5.	If $\frac{1}{8!}+\frac{1}{9!}=\frac{X}{10!}$ then value of x is:	
Solution:	(A) 100	**1**
Question 6.	The G.M. between 1 and 64 is :	
Solution:	(C) 8	**1**
Question 7.	The value of x for which the numbers -3/11, x, -11/3 are in G.P	
Solution:	(B) ±1	**1**
Question 8.	The derivative of sin (x + a) is:	
Solution:	(A) cos (x + a)	**1**

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Question 9.	If the variance of a data is 25, then its standard deviation is:	
Solution:	(B) 5	**1**
Question10.	If $P(A \cup B) = P(A \cap B)$ for any two events A and B, then	
Solution:	(C) $P(A) = P(B)$	**1**
Question11.	Find the number of terms in the expansion of $(3x + 9)^9$.	
Solution:	$9 + 1 = 10$	**1**
Question12.	Find the centre and radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0$.	
Solution:	Centre (-4 , -5) and Radius is 7	**1**
Question13.	Write the value of $\lim_{x \to a} \frac{x^n - a^n}{x - a}$.	
Solution:	$\lim_{x \to a} \frac{x^n - a^n}{x - a} = n.a^{n-1}$	**1**
Question14.	Find the mean deviation about the mean for the following data: 6, 7, 10, 12, 13, 4, 8, 12 .	
Solution:	Mean of the given data is $\bar{x} = \frac{6+7+10+12+13+4+8+12}{8} = 9$ Deviations from mean ($x_i - \bar{x}$) are -3, -2, 1, 3, 4, -5, -1, 3 Absolute deviations i.e. $\lvert x_i - \bar{x} \rvert$ are 3, 2, 1, 3, 4, 5, 1, 3 Mean Deviation $= \frac{\sum_{i=1}^{8} \lvert xi - \bar{x} \rvert}{n} = \frac{3+2+1+3+4+5+1+3}{8} = \frac{22}{8} = 2.75$	**1**
Question15.	Let U = {1, 2, 3, 4, 5, 6}, A = {2, 3} and B = {3, 4, 5}, then $(A \cup B)'$ = …………	
Solution:	$(A \cup B)' = \{2, 3, 4, 5\}' = \{1\}$	**1**
Question16.	cos (A - B) is equal to …………….. .	
Solution:	cos (A - B) = cosA. cosB + sinA. sinB	**1**
Question17.	If C(n, a) = C(n, b), then either a = b or n = a + b . (True/ False)	
Solution:	True	**1**
Question18.	A die is rolled. Let A be the event of getting a multiple of 2 and B be the event of getting a multiple of 3. Then A and B are mutually exclusive events. (True/ False)	

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Solution:	False	**1**
Question19.	**Assertion (A):** If (x+1, y-2) = (3, 1), then x = 3 and y = 2. **Reason (R) :** Two ordered pairs are equal if their corresponding elements are equal.	
Solution:	(D) Assertion (A) is false and Reason (R) is true.	**1**
Question20.	**Assertion (A):** The point (-5, 2, 0) lies on the XY plane. **Reason(R):** The coordinates of a point P(x, y, z) in XY plane are (0, 0, z).	
Solution:	(C) Assertion (A) is true and Reason (R) is false.	**1**
	SECTION – B (2Marks × 5Q)	
Question21.	If A = {3,5,7,9, 11 }, B = {7, 9, 11, 13}, C = {11, 13, 15} and D = {15.17}; find (AUD) ∩ (BUC)	
Solution:	A U D = {3, 5, 7, 9, 11, 13 } B U C = {7, 9, 11, 13, 15 } ∴ (AUD) ∩ (BUC) = {7, 9, 11, 13 }	**1** **1**
Question22.	Find the multiplicative inverse of $4 - 3i$.	
Solution:	Multiplicative Inverse of 4 – 3i = $\frac{1}{4-3i}$ ⇨ M.I. $= \frac{1}{4-3i} \times \frac{4+3i}{4+3i}$ ⇨ $= \frac{4+3i}{(4)^2-(3i)^2}$ ⇨ $= \frac{4+3i}{16-9i^2}$ ⇨ $= \frac{4+3i}{16+9} = \frac{4}{25} + \frac{3i}{25}$	**1** **1**
OR Question22.	Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$	
Solution:	Given $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)} = \frac{6+9i-4i-6i^2}{2-i+4i-2i^2}$ ⇨ $= \frac{6+5i+6}{2+3i+2}$ ⇨ $= \frac{12+5i}{4+3i}$ ⇨ $= \frac{12+5i}{4+3i} \times \frac{4-3i}{4-3i}$	

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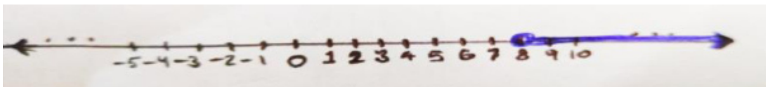
	$\Rightarrow = \frac{48-36i+20i-15i^2}{16-12i+12i-9i^2} = \frac{48-16i+15}{16+9} = \frac{63}{25} - \frac{16i}{25}$ $\therefore$ Conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)} = \frac{63}{25} + \frac{16i}{25}$	$1\frac{1}{2}$ $\frac{1}{2}$
Question23.	Solve the inequality $\frac{5-2x}{3} \leq \frac{x}{6} - 5$ and show the graph of the solution on number line.	
Solution:	We have $\frac{5-2x}{3} \leq \frac{x}{6} - 5$ $\Rightarrow \frac{5-2x}{3} \leq \frac{x-30}{6}$ Multiply on both side by 6, we have $\Rightarrow 2(5-2x) \leq x - 30$ $\Rightarrow 10 - 4x \leq x - 30$ $\Rightarrow -5x \leq -40$ $\Rightarrow 5x \geq 40$ $\Rightarrow x \geq 8$ Graph of the solution on number line 	$1\frac{1}{2}$ $\frac{1}{2}$
Question24.	Find the 12th term of a G.P. whose 8th term is 192 and the common ratio is 2.	
Solution:	We have, $a_8 = 192$ $\quad r = 2$ $\Rightarrow ar^7 = 192$ $\Rightarrow a(2)^7 = 192$ $\Rightarrow a = \frac{192}{128} = \frac{3}{2}$ $\therefore a_{12} = a.r^{11} = \frac{3}{2}.(2)^{11}$ $a_{12} = 3.(2)^{10} = 3.(1024) = 3072$	$\frac{1}{2}$ $\frac{1}{2}$ 1
Question25.	Find the coordinates of the focus, axis, the equation of directrix and the length of the latus rectum of the parabola $y^2 = 12x$.	
Solution:	Equation of parabola is $y^2 = 12x$ Comparing with $y^2 = 4ax$, we have $4a = 12 \Rightarrow a = 3$	

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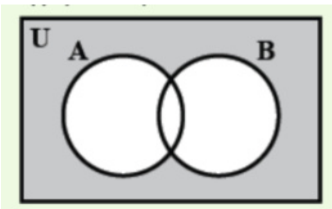
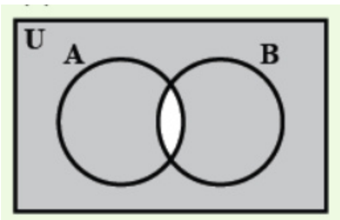
	The coefficient of x is +ve so it is a right handed parabola. This parabola is symmetrical about x-axis as it involves y^2 Thus the focus is (3, 0) Equation of directrix x = -3 Length of latus rectum is 4a = 4 × 3 = 12	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
OR Question25.	Find the equation of the ellipse, whose length of the major axis is 20 and foci are $(0, \pm 5)$.	
Solution:	Since the foci are on y-axis, the major axis is along the y-axis. So equation of ellipse is of the form $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ Given that a = semi major axis =20/2 = 10 And the relation $c^2 = a^2 - b^2$, where c = 5 from foci $(0, \pm 5)$ gives $5^2 = 10^2 - b^2$ i.e. $b^2 = 75$ Therefore, the equation of the ellipse is $\frac{x^2}{75} + \frac{y^2}{100} = 1$	1 1
	SECTION – C (3Marks × 6Q)	
Question26.	Draw appropriate Venn Diagram for (A ∪ B)’ and A’ ∪ B’.	
Solution:	Venn Diagram of (A ∪ B)’  Venn Diagram of A’ ∪ B’  	$1\frac{1}{2}$ $1\frac{1}{2}$

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Question27.	Find the domain and Range of the function $\sqrt{9-x^2}$.	
Solution:	Here $y = \sqrt{9-x^2}$ y will have real values if $9 - x^2 \geq 0$ $\Rightarrow x^2 - 9 \leq 0$ $\Rightarrow (x-3)(x+3) \leq 0$ $\Rightarrow -3 \leq x \leq 3 \quad \Rightarrow x \in [-3, 3]$ Domain = [-3, 3] Also, $y^2 = 9 - x^2$ $\Rightarrow x^2 = 9 - y^2$ $\Rightarrow x = \pm\sqrt{9-y^2}$ Clearly x is defined when $9 - y^2 \geq 0$ i.e., when $y^2 - 9 \leq 0$ $\Rightarrow (y-3)(y+3) \leq 0$ $\Rightarrow -3 \leq y \leq 3 \quad \Rightarrow y \in [-3, 3]$ But $y = \sqrt{9-x^2} \geq 0$ for all $x \in [-3, 3]$ i.e., y attains only non-negative values. $\therefore y \in [0, 3]$ for all $x \in [-3, 3]$ $\therefore$ Range = [0, 3].	$1\frac{1}{2}$ $1\frac{1}{2}$
Question28.	Expand: $\left(\frac{2}{x} - \frac{x}{2}\right)^5$; $x \neq 0$	
Solution:	$\left(\frac{2}{x} - \frac{x}{2}\right)^5 = {}^5C_0 \left(\frac{2}{x}\right)^5 \left(\frac{-x}{2}\right)^0 + {}^5C_1 \left(\frac{2}{x}\right)^4 \left(\frac{-x}{2}\right)^1 + {}^5C_2 \left(\frac{2}{x}\right)^3 \left(\frac{-x}{2}\right)^2 + {}^5C_3 \left(\frac{2}{x}\right)^2 \left(\frac{-x}{2}\right)^3 + {}^5C_4 \left(\frac{2}{x}\right)^1 \left(\frac{-x}{2}\right)^4 + {}^5C_5 \left(\frac{2}{x}\right)^0 \left(\frac{-x}{2}\right)^5$ $= \frac{32}{x^5} + 5.\left(\frac{16}{x^4}\right)\left(\frac{-x}{2}\right) + 10\left(\frac{8}{x^3}\right)\left(\frac{x^2}{4}\right) + 10\left(\frac{4}{x^2}\right)\left(\frac{-x^3}{8}\right) + 5\left(\frac{2}{x}\right)\left(\frac{x^4}{16}\right) - \frac{x^5}{32}$ $= \frac{32}{x^5} - \frac{40}{x^3} + \frac{20}{x} - 5x + \frac{5x^3}{8} - \frac{x^5}{32}$	$1\frac{1}{2}$ $1\frac{1}{2}$
OR Question28.	Compute $(98)^5$.	
Solution:	$(98)^5 = (100 - 2)^5$ $= {}^5C_0 (100)^5(2)^0 + {}^5C_1 (100)^4(2)^1 + {}^5C_2 (100)^3(2)^2 + {}^5C_3(100)^2(2)^3 + {}^5C_4 (100)^1(2)^4 + {}^5C_5(100)^0(2)^5$ = 10000000000 + 1000000000 + 40000000 + 800000 +8000 + 32 = 11040808032	**2** **1**

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Question29.	Find the sum of the sequence 7, 77, 777, 7777, …….. to n terms.	
Solution:	This is not a GP., however, we can relate it to a GP. by writing the terms as S_n = 7+77+777 + 7777 + ... to n terms $= \frac{7}{9}$ [9 + 99 + 999 + 9999 +... to n term] $= \frac{7}{9}$ [$(10^1 - 1) + (10^2 - 1) + (10^3 - 1) + (10^4 - 1)$ +...n terms] $= \frac{7}{9}$ [$(10+10^2+10^3+$...n terms) - (1+1+1+...n terms)] It is a G.P. where a = 10 and r = 10 > 1 $\therefore\ S_n = \frac{a(r^n - 1)}{r - 1}$ $= \frac{7}{9}\left[\frac{10(10^n - 1)}{10 - 1} - n\right] = \frac{7}{9}\left[\frac{10(10^n - 1)}{9} - n\right]$	**1** **1** **1**
OR Question 29	The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms.	
Solution:	Let three terms in G.P. are $\frac{a}{r}$, a , ar $\therefore\ \frac{a}{r} \times a \times ar = 1 \Rightarrow a^3 = 1 \Rightarrow a = 1$ $\therefore$ three terms now are $\frac{1}{r}$, 1 , r A.T.Q. $\frac{1}{r} + 1 + r = \frac{39}{10}$ => $\frac{1+r+r^2}{r} = \frac{39}{10}$ => $10r + 10r + 10r^2 = 39r$ => $10r^2 - 29r + 10 = 0$ => $10r^2 - 25r - 4r + 10 = 0$ => $(10r - 2)(r - 5) = 0$ => $r = \frac{1}{5}$ or 5 $\therefore$ if common ratio $r = \frac{1}{5}$, term are 5, 1, $\frac{1}{5}$ if common ratio r = 5 , terms are $\frac{1}{5}$, 1, 5	**1** $\mathbf{\frac{1}{2}}$ $\mathbf{1\frac{1}{2}}$

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Question30.	Find the equation of the set of the points which are equidistant from the points (1, 2, 3) and (3, 2, -1)	
Solution:	Let P(x, y, z) be any point which is equidistant from the points A(1, 2, 3) and B(3, 2, -1). $\therefore$ PA = PB ⇨ $PA^2 = PB^2$ ⇨ $(x - 1)^2 + (y - 2)^2 + (z - 3)^2 = (x - 3)^2 + (y - 2)^2 + (z + 1)^2$ ⇨ $x^2 + 1 - 2x + y^2 + 4 - 4y + z^2 + 9 - 6z = x^2 + 9 - 6x + y^2 + 4 - 4y + z^2 + 1 + 2z$ ⇨ $-2x - 6z = -6x + 2z$ ⇨ $4x - 8z = 0$ ⇨ $x - 2z = 0$	**1** **2**
Question31.	In an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing atleast one of them is 0.95. What is the probability of passing both?	
Solution:	Let P(A) be the probability of passing the first exam => P(A) = 0.8 Let P(B) be the probability of passing the first exam => P(B) = 0.7 $\therefore$ Probabilty of passing atleast one of them = $P(A \cup B) = 0.95$ $\therefore$ Probabilty of passing both = $P(A \cap B)$ We know, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $0.95 = 0.8 + 0.7 - P(A \cap B)$ $P(A \cap B) = 1.5 - 0.95 = 0.55$ $\therefore$ Probabilty of passing both = $P(A \cap B) = 0.55$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ **1**

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	SECTION – D (5Marks × 4Q)	
Question32.	(i) Prove that: $\frac{(\cos 7x + \cos 5x)}{(\sin 7x - \sin 5x)} = \cot x$ (ii) Prove that: $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\cos x.\cos 2x.\sin 4x$	
Solution: (i) **Solution:(ii)**	$\frac{(\cos 7x + \cos 5x)}{(\sin 7x - \sin 5x)} = \cot x$ L.H.S. = $\frac{(\cos 7x + \cos 5x)}{(\sin 7x - \sin 5x)}$ Using $\cos C + \cos D = 2\cos\left(\frac{C+D}{2}\right).\cos\left(\frac{C-D}{2}\right)$ and $\sin C - \sin D = 2\cos\left(\frac{C+D}{2}\right).\sin\left(\frac{C-D}{2}\right)$, we have ⇨ $= \frac{2\cos\left(\frac{7x+5x}{2}\right)\cos\left(\frac{7x-5x}{2}\right)}{2\cos\left(\frac{7x+5x}{2}\right)\sin\left(\frac{7x-5x}{2}\right)}$ ⇨ $= \frac{2.\cos 6x.\cos x}{2.\cos 6x.\sin x} = \frac{\cos x}{\sin x} = \cot x$ ⇨ L.H.S. = R. H.S. L.H.S. = $\sin x + \sin 3x + \sin 5x + \sin 7x$ => $= (\sin 7x + \sin x) + (\sin 5x + \sin 3x)$ [rearranging] Using $\sin C + \sin D = 2\sin\left(\frac{C+D}{2}\right).\cos\left(\frac{C-D}{2}\right)$ We have, $= [\ 2\sin\left(\frac{7x+x}{2}\right).\cos\left(\frac{7x-x}{2}\right)\ ] + [\ 2\sin\left(\frac{5x+3x}{2}\right).\cos\left(\frac{5x-3x}{2}\right)\ ]$ $= 2\sin 4x.\cos 3x + 2\sin 4x.\cos x$ $= 2\sin 4x\ (\cos 3x + \cos x)$ Using $\cos C + \cos D = 2\cos\left(\frac{C+D}{2}\right).\cos\left(\frac{C-D}{2}\right)$ We have, $= 2\sin 4x\ [\ 2\cos\left(\frac{3x+x}{2}\right).\cos\left(\frac{3x-x}{2}\right)\ ]$ $= 2\sin 4x\ [\ 2\cos 2x.\cos x\ ]$ $= 4\sin 4x.\cos 2x.\cos x$ = R.H.S.	 1 1 $\frac{1}{2}$ $1\frac{1}{2}$ 1

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Question33.	Find the equation of the right bisector of the line segment joining the points (3, 4) and (-1, 2).	
Solution:	Let the given points be A (3, 4) and B (-1, 2). Let M be the midpoint of AB. $\therefore$ Coordinates of M = $\left(\frac{3-1}{2}, \frac{4+2}{2}\right)$ = (1, 3) And, slope of AB = $\frac{2-4}{-1-3} = \frac{1}{2}$ Let m be the slope of the right bisector of the line joining the points (3, 4) and (-1, 2). $\therefore$ m × Slope of AB = - 1 $m \times \frac{1}{2} = -1$ ⇨ m = - 2 So, the equation of the line that passes through M (1, 3) and has slope -2 is y - 3 = - 2(x - 1) ⇨ 2x + y - 5 = 0 Hence, the equation of the right bisector of the line segment joining the points (3, 4) and (-1, 2) is **2x + y - 5 = 0**	**1** **1** **1** $\frac{1}{2}$ $1\frac{1}{2}$
OR Question33.	Find the equation of the line passing through (-3, 5) and perpendicular to the line through the points (2, 5) and (-3, 6).	
Solution:	Slope of the line passing through the points A(2. 5) and B(-3, 6) $m_1 = \frac{y_2 - y_1}{x_2 - x_1}$ $m_1 = \frac{6-5}{-3-2} = \frac{1}{-5}$ $m_1 = -\frac{1}{5}$	$\frac{1}{2}$

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	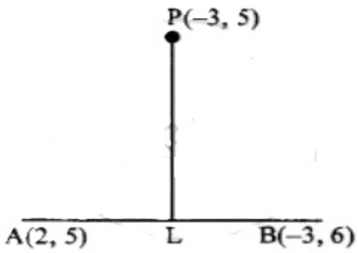 P(-3,5) A(2, 5) B(-3,6) If PL is perpendicular to AB from the point P(-3, 5), then consider its slope as m_2 . Lines PL and AB are mutually perpendicular if, Slope of PL x Slope of AB = -1 => $m_1 \times m_2 = -1$ In other words, $m_2 \times (-\frac{1}{5}) = -1$ ∴ $m_2 = 5$ The slope of PL is 5 and it passes through P(-3, 5), then the equation of PL is, $(y - y_1) = m_2 (x - x_1)$ or $(y - 5) = 5 (x + 3)$ $y - 5 = 5x + 15$ $5x - y + 20 = 0$	1 1 1 $1\frac{1}{2}$
Question34.	Find the derivative of tan x from first principle.	
Solution:	Let f(x) = tanx , the $\frac{d(f(x))}{dx} = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \to 0} \frac{\tan(x+h) - \tan(x)}{h}$ $= \lim_{h \to 0} \frac{1}{h}\left[\frac{\sin(x+h)}{\cos(x+h)} - \frac{\sin(x)}{\cos(x)}\right]$ $= \lim_{h \to 0} \frac{1}{h}\left[\frac{\sin(x+h)\cos(x) - \cos(x+h)\sin(x)}{\cos(x+h)\cos(x)}\right]$ $= \lim_{h \to 0} \frac{1}{h}\left[\frac{\sin(x+h-x)}{\cos(x+h)\cos(x)}\right]$ [Using formula for sin(A - B)]	1 2

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	$= \lim_{h \to 0} \frac{1}{h}\left[\frac{\sin(h)}{\cos(x+h)\cos(x)}\right]$ $= \lim_{h \to 0} \frac{\sin(h)}{h} \times \lim_{h \to 0}\left[\frac{1}{\cos(x+h)\cos(x)}\right]$ $= 1 \cdot \left[\frac{1}{\cos^2 x}\right]$ $= \sec^2 x$	**2**
OR Question34.	Suppose $f(x)= \begin{cases} a+bx, & x<1 \\ 4 & x=1 \\ b-ax, & x>1 \end{cases}$ and if $\lim_{x\to 1} f(x) = f(1)$ what are possible values of a and b?	
Solution:	Here, limit exist at $x \to 1$ i.e., LHL = RHL = f(1) = 4 ...(1) LHL at $x \to 1$ $= \lim_{x\to 1-} f(x)$ $= \lim_{h\to 0} f(1-h)$ $= \lim_{h\to 0}[a + b(1-h)]$ $= a + b\ (1-0)$ $= a + b$ ...(2) RHL at $x\to 1$ $= \lim_{x\to 1+} f(x)$ $= \lim_{h\to 0} f(1+h)$ $= \lim_{h\to 0}[b - a(1+h)]$ $= b - a\ (1+0)$ $= b - a$ …(3)	$1\frac{1}{2}$ $1\frac{1}{2}$

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	From (1) and (2) a + b = 4 From (1) and (3) b - a = 4 Adding both a + b + b - a = 4 + 4 2b = 8 b = 4 Also, a + b = 4 a + 4 = 4 a = 0	1 1
Question35.	Calculate mean, variance and standard deviation for the following distribution. <table><tr><td>Classes</td><td>30- 40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td><td>80-90</td><td>90-100</td></tr><tr><td>Frequency</td><td>3</td><td>7</td><td>12</td><td>15</td><td>8</td><td>3</td><td>2</td></tr></table>	
Solution:	From the given data, we construct the following table. <table><tr><th>Class</th><th>Frequency f_i</th><th>Midpoint x_i</th><th>$f_i x_i$</th><th>$(x_i - \bar{x})^2$</th><th>$f_i(x_i - \bar{x})^2$</th></tr><tr><td>30 – 40</td><td>3</td><td>35</td><td>105</td><td>729</td><td>2187</td></tr><tr><td>40 – 50</td><td>7</td><td>45</td><td>315</td><td>289</td><td>2023</td></tr><tr><td>50 – 60</td><td>12</td><td>55</td><td>660</td><td>49</td><td>588</td></tr><tr><td>60 – 70</td><td>15</td><td>65</td><td>975</td><td>9</td><td>135</td></tr><tr><td>70 – 80</td><td>8</td><td>75</td><td>600</td><td>169</td><td>1352</td></tr><tr><td>80 – 90</td><td>3</td><td>85</td><td>255</td><td>529</td><td>1587</td></tr><tr><td>90 – 100</td><td>2</td><td>95</td><td>190</td><td>1089</td><td>2178</td></tr><tr><td></td><td>50</td><td></td><td>3100</td><td></td><td>10050</td></tr></table>	$3\frac{1}{2}$

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	Thus $\quad$ Mean $\bar{x} = \frac{1}{N}\sum_{i=1}^{i=7} f_i x_i$ $= \frac{3100}{50} = 62$ Variance (σ^2) $= \frac{1}{N}\sum_{i=1}^{i=7} f_i\,(x_i - \bar{x})^2$ $= \frac{10050}{50} = 201$ and $\quad$ Standard deviation(σ) $= \sqrt{201} = 14.18$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
	SECTION – E (4Marks × 3Q)	
Question36.	To demonstrate the compound angle formulae in trigonometry, Mahesh and Siraj selected two angles 'A' and 'B' such that A, B $\in (0, \frac{\pi}{2})$ and $\sin A = \frac{3}{5}$, $\cos B = \frac{9}{41}$. *Based on the above information, answer the following questions.* (i) Find the value of sin B + cos A . (2) (ii) Find the value of cos (A + B). (2)	
Solution:	Given, $\quad \sin A = \frac{3}{5}$ and $\cos B = \frac{9}{41}$ we know, $\quad \cos A = \sqrt{1 - \sin^2 A}$ So, $\quad \cos A = \sqrt{1 - \left(\frac{3}{5}\right)^2} = \sqrt{\frac{16}{25}} = \frac{4}{5}$ Also $\quad \sin B = \sqrt{1 - \cos^2 B}$ So, $\quad \sin B = \sqrt{1 - \left(\frac{9}{41}\right)^2} = \sqrt{\frac{1681-81}{1681}} = \sqrt{\frac{1600}{1681}} = \frac{40}{41}$ So, $\quad \sin B = \frac{40}{41}$ Thus $\quad \sin B + \cos A = \frac{40}{41} + \frac{4}{5}$ $\Rightarrow \sin B + \cos A = \frac{200+164}{205}$	1

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	⇨ $\sin B + \cos A = \frac{364}{205}$	1
	ii) $\cos(A + B) = \cos A \times \cos B - \sin A \times \sin B$ $= (\frac{3}{5})(\frac{9}{41}) - (\frac{4}{5})(\frac{40}{41})$ $= \frac{27}{205} - \frac{160}{205}$ $= -\frac{27-133}{205}$ $= -\frac{133}{205}$	$\frac{1}{2}$ 1 $\frac{1}{2}$
Question37.	The assembly incharge of a school wants to generate signals for calling classes for the assembly. He has got 5 coloured flags viz., Yellow, Red, Orange, Green and Blue to make signals. *Based on the above information answer the following questions:* (i) How many different signals can be generated by using all 5 flags? (1) (ii) To call the middle section for the assembly, he has to generate different signals by using 2 flags only. How many such arrangements are possible? ($1\frac{1}{2}$) (iii)To call the senior section for the assembly, he has to generate different signals by using 4 flags only. How many such arrangements are possible? ($1\frac{1}{2}$)	
Solution: (i)	Total number of different flags given = 5 Number of ways to generate a signal of 5 flags together = ${}^5P_5$ $= \frac{5!}{(5-5)!}$ $= 5! = 120$ways	1

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(ii)	To call the middle section for the assembly, a signal of only two flags is to be generated. Number of ways to generate a signal of 2 flags together = $^5P_2$ $= \frac{5!}{(5-2)!}$ $= \frac{5!}{3!}$ $= \frac{5.4.3!}{3!} = 5.4 = 20 \text{ways}$	$1\frac{1}{2}$
(iii)	To call the senior section for the assembly, a signal of only four flags is to be generated. Number of ways to generate a signal of 4 flags together = $^5P_4$ $= \frac{5!}{(5-4)!}$ $= \frac{5!}{1!}$ $= \frac{5.4.3!}{1!} = 5! = 120 \text{ways}$	$1\frac{1}{2}$
Question 38.	Due to heavy storm, an electric wire got broken and fell on the ground and is bent taking a shape of a mathematical figure as shown below. *Based on the above information, answer the following questions.* (i) Name of the shape in which wire is bent. (a) circle (b) parabola (c) ellipse (d) hyperbola (ii)The equation of the shape so formed is: (a) $\frac{x^2}{9} + \frac{y^2}{4} = 1$ (b) $\frac{x^2}{4} + \frac{y^2}{9} = 1$ (c) $\frac{x^2}{9} - \frac{y^2}{4} = 1$ (d) none of these (iii) The eccentricity of the shape so formed is: (a) $\frac{2}{3}$ (b) $\frac{\sqrt{x}}{\sqrt{3}}$ (c) $\frac{\sqrt{5}}{3}$ (d) $\frac{\sqrt{5}}{4}$ (iv) The length of the latus rectum of the shape so formed is: (a) 9 (b) $\frac{8}{3}$ (c) -4 (d) none of these.	

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Solution: (i)	(c) ellipse	**1**
(ii)	(a) $\frac{x^2}{9}+\frac{y^2}{4}=1$	**1**
(iii)	(c) Here a = 3 and b = 2 Eccentricity $e=\frac{\sqrt{a^2-b^2}}{a}$ $\Rightarrow$ $e=\frac{\sqrt{3^2-2^2}}{3}=\frac{\sqrt{5}}{3}$	**1**
(iv)	(b) The length of the latus rectum $=\frac{2b^2}{a}$ $=\frac{2(2)^2}{3}=\frac{8}{3}$	**1**

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