

RUBRICS: HSSC 1st ANNUAL EXAMINATION 2023
SUBJECT: MATHEMATICS HSSC-I (Local)

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
2(i)	Showing that $z_1\bar{z}_2 + \bar{z}_1z_2$ is a real number.	Correctly finding the values of \bar{z}_1 AND \bar{z}_2 . (1)	Correctly finding the values of \bar{z}_1 OR \bar{z}_2 . (0.5)	Wrong answer (0)				
		Correctly finding the values of $z_1\bar{z}_2$ AND \bar{z}_1z_2 . (2)	Correctly finding the values of $z_1\bar{z}_2$ OR \bar{z}_1z_2 . (1)	Partially correct (0.5)	Wrong answer (0)			
		Correctly finding the value of $z_1\bar{z}_2 + \bar{z}_1z_2$. (1)	Partially correct (0.5)	Wrong answer (0)				
2(ii)	Constructing truth table of $(p \leftrightarrow q) \wedge (p \rightarrow q)$.	Correctly declaring the propositions p and q (1)	Partially correct (0.5)	Wrong answer (0)				
		Correctly declaring the conditionals $p \leftrightarrow q$, $p \rightarrow q$ and $(p \leftrightarrow q) \wedge (p \rightarrow q)$. (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)		
2(iii)	Solving for x .	Correctly expanding LHS AND RHS (2)	Correctly expanding LHS OR RHS (1)	Partially correct (0.5)	Wrong answer (0)			
		Correctly simplifying and writing in quadratic equation (1)	Partially correct (0.5)	Wrong answer (0)				
		Correctly finding two values of x (1)	Any one correct value of x (0.5)	Wrong answer (0)				

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2(iv)	Finding a quadratic equation whose roots are given.	Correctly finding sum AND product of roots from the given equation. (1)	Correctly finding sum OR product of roots from the given equation. (0.5)	Wrong answer (0)			
		Correctly finding sum AND product of the given roots. (2)	Correctly finding sum OR product of the given roots. (1)	Partially correct (0.5)	Wrong answer (0)		
		Correctly stating AND correctly finding the quadratic equation. (1)	Correctly stating OR correctly finding the quadratic equation. (0.5)	Wrong answer (0)			
2(v)	Verifying that $(1 + \omega) + (1 + \omega)^2 + (1 + \omega)^3 = 2\omega$.	Correctly applying $1 + \omega = -\omega^2$. (2)	Partially correct (1)	Wrong answer (0)			
		Correctly applying $\omega^3 = 1$. (1)	Partially correct (0.5)	Wrong answer (0)			
		Correctly applying $\omega = -1 - \omega^2$. (1)	Partially correct (0.5)	Wrong answer (0)			
2(vi)	Resolving the given expression into partial fractions	Correctly stating the identity (1)	Incorrectly stating the identity (0)				
		Correctly finding the three unknown coefficients. (3)	Any two correct aspects. (2)	Any one correct aspect. (1)	Partially correct (0.5)	Wrong answer (0)	
2(vii)	Finding sum to infinity the Geometric Sequence.	Correctly finding the values of a AND r from the given terms. (2)	Correctly finding the values of a OR r from the given terms. (1)	Partially correct (0.5)	Wrong answer (0)		
		Correctly finding two values of S_{∞} . (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)		

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2 (viii)	Inserting six A.Ms between the given numbers.	Correctly finding the common difference d . (1)	Partially correct (0.5)	Wrong answer (0)			
		Correctly finding the six A.Ms. (3)	Any four correct aspects (2)	Any two correct aspects (1)	Any one correct aspect (0.5)	Wrong answer (0)	
2(ix)	Proving that Sine is a periodic function, and its period is 2π .	Correctly proving that Sine is a periodic function. (2)	Partially correct (1)	Wrong answer (0)			
		Correctly proving that the period of Sine is 2π . (2)	Partially correct (1)	Wrong answer (0)			
2(x)	Finding $P(A \cup B)$.	Correctly writing the sample space. (0.5)	Wrong answer (0)				
		Correctly finding $P(A)$, $P(B)$, and $P(A \cap B)$. (3)	Any two correct aspects. (2)	Any one correct aspect. (1)	Partially correct (0.5)	Wrong answer (0)	
		Correctly finding $P(A \cup B)$. (0.5)	Wrong answer (0)				
2(xi)	Finding the value of k .	Correctly finding the general term. (2)	Partially correct (1)	Wrong answer (0)			
		Correctly finding the values of r AND k . (2)	Correctly finding the values of r OR k . (1)	Partially correct (0.5)	Wrong answer (0)		
2(xii)	Finding values of remaining trigonometric ratios.	Correctly identifying the quadrant. (1)	Wrong answer (0)				
		Correctly finding the remaining five trigonometric ratios. (3)	Any four correct aspects (2.5)	Any three correct aspects (2)	Any two correct aspects (1.5)	Any one correct aspect (1)	Wrong answer (0)

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)
2(xiii)	Verifying that $\cos 4x \cos x - \sin 6x \sin 3x = \cos 7x \cos 2x$	Correctly converting the products $\cos 4x \cos x$ AND $\sin 6x \sin 3x$ into sums. (3)	Correctly converting the products $\cos 4x \cos x$ OR $\sin 6x \sin 3x$ into sums. (1.5)	Partially correct (1)	Wrong answer (0)		
		Correctly converting $\cos 9x + \cos 5x$ as product. (1)	Partially correct (0.5)	Wrong answer (0)			
2(xiv)	Finding values of b, α and γ .	Correctly stating the law of cosines AND law of sines (1)	Correctly stating the law of cosines OR law of sines (0.5)	Wrong answer (0)			
		Correctly finding the values of b, α and γ . (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)	
2(xv)	Showing that $2 \tan^{-1} \left(\frac{1}{2}\right) + \tan^{-1} \left(\frac{1}{7}\right) = \tan^{-1} \left(\frac{31}{17}\right)$	Correctly converting $2 \tan^{-1} \left(\frac{1}{2}\right)$ to $\tan^{-1} \left(\frac{4}{3}\right)$ (2)	Partially correct (1)	Wrong answer (0)			
		Correctly converting $\tan^{-1} \left(\frac{4}{3}\right) + \tan^{-1} \left(\frac{1}{7}\right)$ to $\tan^{-1} \left(\frac{31}{17}\right)$. (2)	Partially correct (1)	Wrong answer (0)			
2(xvi)	Solving the given trigonometric equation.	Correctly converting sum into product AND correctly factorizing. (2)	Correctly converting sum into product OR correctly factorizing. (1)	Partially correct (0.5)	Wrong answer (0)		
		Correctly finding the solution set. (2)	Partially correct (1)	Wrong answer (0)			

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3.	Solving system of linear equations by Cramer's Rule.	Correctly writing the system of equations in matrix form AND correctly finding the determinant of the coefficient matrix. (2)	Correctly writing the system of equations in matrix form OR correctly finding the determinant of the coefficient matrix. (1)	Partially correct (0.5)	Wrong answer (0)		
		Correctly finding the values of $ A_x $, $ A_y $, and $ A_z $. (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)	
		Correctly finding the values of x , y , and z . (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)	
4.	Finding three consecutive numbers in A.P.	Correctly stating A.P. AND G.P. of the required numbers. (2)	Correctly stating A.P. OR G.P. of the required numbers. (1)	Partially correct (0.5)	Wrong answer (0)		
		Correctly finding the values of a AND d . (4)	Correctly finding the values of a OR d . (2)	Partially correct (1)	Wrong answer (0)		
		Correctly finding the three required numbers. (2)	Any two correct aspects (1)	Any one correct aspect (0.5)	Wrong answer (0)		
5.	Proving that $y^2 + 2y - 1 = 0$ from the given series.	Correctly adding 1 to both sides of the equation AND correctly stating the binomial expansion. (2)	Correctly adding 1 to both sides of the equation OR correctly stating the binomial expansion. (1)	Partially correct (0.5)	Wrong answer (0)		
		Correctly finding values of x AND n . (4)	Correctly finding values of x OR n . (2)	Partially correct (1)	Wrong answer (0)		
		Correctly stating $(1 + x)^n = 1 + y$ AND correctly proving the required equation. (2)	Correctly stating $(1 + x)^n = 1 + y$ OR correctly proving the required equation. (1)	Partially correct (0.5)	Wrong answer (0)		

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6.	Proving that $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$ Note: Awarding zero marks for using calculator.	Correctly writing the value of $\cos 30^\circ$ and correctly converting the cosine product into sum. (3)	Writing the incorrect value of $\cos 30^\circ$ and correctly converting the cosine product into sum. (2)	Correctly writing the value of $\cos 30^\circ$ and incorrect conversion of the cosine product into sum. (1)	Partially correct (0.5)	Wrong answer (0)	
		Correctly writing the value of $(\cos 60^\circ / \cos 120^\circ)$ and correctly converting the cosine product into sum. (3)	Writing the incorrect value of $(\cos 60^\circ / \cos 120^\circ)$ and correctly converting the cosine product into sum. (2)	Correctly writing the value of $(\cos 60^\circ / \cos 120^\circ)$ and incorrect conversion of the cosine product into sum. (1)	Partially correct (0.5)	Wrong answer (0)	
		Correctly writing the value of $\cos 30^\circ$ AND correctly proving for RHS. (2)	Correctly writing the value of $\cos 30^\circ$ OR correctly proving for RHS. (1)	Partially correct (0.5)	Wrong answer (0)		
7.	Solving the given system of equations.	Correctly factorizing the homogeneous equation AND correctly finding two linear equations. (4)	Correctly factorizing the homogeneous equation OR correctly finding two linear equations. (2)	Partially correct (1)	Wrong answer (0)		
		Correctly finding the solution set of four ordered pairs. (4)	Any three correct aspects (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)

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8.	Solving ΔABC .	(a) Correctly stating the law of sines. (1)	Partially correct (0.5)	Wrong answer (0)			
		Correctly finding the values of γ , a , and c . (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)	
		(b) Correctly stating the law of cosines and law of sines. (1)	Partially correct (0.5)	Wrong answer (0)			
		Correctly finding the values of a , β , and γ . (3)	Any two correct aspects (2)	Any one correct aspect (1)	Partially correct (0.5)	Wrong answer (0)	

Note: All the markers must know the solutions of all the question items of the question paper before starting marking.