RUBRICS: HSSC1stANNUAL EXAMINATION 2022
SUBJECT: MATHEMATICS HSSC-I (HA)   FINAL   DATED 04-07-22 TIME 2:45 PM

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2(i)	Rationalizing the expression to $a + bi$	Correctly rationalizing the denominator (1)	Wrong answer (0)					
		Correctly Simplifying the denominator (2)	Partially simplifying (0.5)	Wrong answer (0)				
		Correctly writing the answer in the form $a + bi$ (1)	Wrong answer (0)					
2(ii)	Verifying the De Morgan's Laws	Correctly finding the values of A', B', $A \cup B$, $(AUB)'$, $A \cap B$, $(A \cap B)'$, (3)	Correctly finding any of the five correct aspects (2.5)	Correctly finding any of the four correct aspects (2)	Correctly finding any of the three correct aspects (1.5)	Correctly finding any of the two correct aspects (1)	Correctly finding any one correct aspect (0.5)	Wrong answer (0)
		Correctly verifying $(A \cup B)' = A' \cap B'$ and $(AUB)' = A' \cup B'$ (1)	Correctly verifying any one of the aspects. (0.5)	Wrong answer (0)				
2(iii)	Constructing the truth table for $p \leftrightarrow q$	Correctly declaring the propositions p and q (1)	Either correctly declaring the proposition p or q (0.5)	Declaring both aspects incorrect (0)				
		Correctly declaring the conditionals $p \to q$ and $q \to p$ (2)	Either correctly declaring the conditionals $p \to q$ or $q \to p$ (1)	Declaring both aspects incorrect (0)				
		Correctly declaring the bi-conditional $p \leftrightarrow q$ (1)	Wrong answer (0)					
2(iv)	Finding the matrix $\left(\overline{A}\right)^t A$	Correctly finding the matrices $\overline{A}$ and $\left(\overline{A}\right)^t$ (2)	Correctly finding the matrix $\overline{A}$ and incorrectly $\left(\overline{A}\right)^t$ (1)	Both aspects incorrect (0)				

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		Correctly finding the matrix $\left(\overline{A}\right)^t A$ (2)	Partially correct (1)	Wrong answer (0)				
2(v)	Showing the result without expansion	Correctly applying the Row/Column operation and simplifying (2)	Correctly applying the Row/Column operation without simplifying (1)	Wrong answer (0)				
		Correctly applying the determinant property to show the result (2)	Correctly applying the determinant property without showing the result (1)	Wrong answer (0)				
2(vi)	Finding the value of k from the given polynomial	Correctly finding the remainder (2)	Partially correct (1)	Wrong answer (0)				
		Correctly finding the value of k by setting remainder 4 (2)	Finding the incorrect value of k by setting remainder 4 (1)	Wrong answer (0)				
2(vii)	Finding the consecutive numbers	Correctly stating the consecutive numbers and applying the given condition (2)	Correctly stating the consecutive numbers and incorrectly applying the condition (1)	Both incorrect aspects (0)				
		Correctly finding the two pairs of consecutive numbers (2)	Correctly finding any one pair of consecutive numbers (1)	Both incorrect aspects (0)				
2 (viii)	Finding the values of a and b	Correctly writing the AP and finding the value of d. (2)	Correctly writing the AP and finding the incorrect value of d. (1)	Both incorrect aspects (0)				
		Correctly finding the values of a,b (2)	Either correctly finding the value of a or b (1)	Wrong answer (0)				
2(ix)	Finding the 9th term of the harmonic sequence	Correctly stating the corresponding AP (1)	Wrong answer (0)					
		Correctly finding the values	Either correctly finding the	Wrong answer				

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		of a and d. (1)	value of a or d. (0.5)	(0)				
		Correctly finding the 9th term in AP and in HP (2)	Finding the correct 9th term in AP and incorrect 9th term in HP (1)	Both incorrect aspects (0)				
$2(x)$	Finding the values of n, r from the given data.	Correctly stating the relation between ^nC_r and ^nP_r (1)	Wrong relation (0)					
		Correctly finding the value of n (2)	Partially correct (1)	Wrong answer (0)				
		Correctly finding the value of r (1)	Partially correct (1)	Wrong answer (0)				
$2(xi)$	Showing the given approximated relation true	Correctly expanding $\sqrt{1+x}$ and $(1-x)^{-3}$ (2)	Either correctly expanding $\sqrt{1+x}$ or $(1-x)^{-3}$ (1)	Both incorrect aspects (0)				
		Correctly simplifying LHS to equate RHS (2)	Incomplete simplification of LHS that equates RHS (1)	Wrong answer (0)				
$2(xii)$	Showing area of circular sector as $\frac{1}{2}r^2\theta$	Correctly showing proportion between area and central angle of the sector and circle. (2)	Partially correct (1)	Wrong answer (0)				
		Correctly showing the required area of the sector (2)	Partially correct (1)	Wrong answer (0)				
$2(xiii)$	Finding the values of $cos\theta$ and $cosec\theta$	Correctly stating the quadrant of the angle arm. (1)	Wrong answer (0)					
		Correctly finding the values of $csc\theta$ and $cos\theta$ (3)	Correctly finding the value of $csc\theta$ or $cos\theta$ (2)	Partially correct (1)	Wrong answer (0)			
$2(xiv)$	Showing the given statement	Correctly simplifying the LHS numerator (1)	Partially correct (1)	Wrong answer (0)				

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	true.	(1.5)						
		Correctly simplifying the LHS denominator (1.5)	Partially correct (1)	Wrong answer (0)				
		Correctly simplifying to equate the RHS (1)	Partially correct (0.5)	Wrong answer (0)				
	Proving the given statement correct.	Correctly applying the formula to the RHS numerator to convert it in the product form and simplifying (1.5)	Correctly applying the formula to the RHS numerator to convert it in the product form without simplifying. (1)	Partially correct (0.5)	Both incorrect aspects (0)			
		Correctly applying the formula to RHS denominator to convert it in the product form and simplifying. (1.5)	Correctly applying the formula to RHS denominator to convert it in the product form without simplifying. (1)	Partially correct (0.5)	Both incorrect aspects (0)			
		Correctly showing the given statement true. (1)	Wrong answer (0)					
2(xvi)	Showing the given statement true.	Correctly applying the formula to find the difference of two inverse tangent functions. (1)	Applying the wrong formula (0)					
		Correctly finding the simplified inverse tangent function. (2)	Partially correct (1)	Finding the wrong simplified tangent function (0)				
		Correctly showing the given statement true. (1)	Wrong answer (0)					
3	Solving the system of linear equations by	Correctly resolving the given system to its augmented matrix.	Wrong answer (0)					

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	reducing the augmented matrix to echelon form.	(0.5)						
		Correctly reducing the augmented matrix to echelon form. (4)	Reducing the augmented matrix to echelon form by applying any three correct Row/Column operations (3)	Reducing the augmented matrix to echelon form by applying any two correct Row/Column operations (2)	Reducing the augmented matrix to echelon form by applying any one correct Row/Column operation (1)	Applying all incorrect Row/Column operations. (0)		
		Correctly converting back the augmented matrix to system of linear equations (0.5)	Wrong answer (0)					
		Correctly finding the values of x_1, x_2 and x_3 (3)	Correctly finding any two of the aspects (2)	Correctly finding any one of the aspects (1)	Finding all incorrect aspects (0)			
4	Solving the system of equations (linear & quadratic)	Correctly setting y or x explicitly in terms of x or y from the linear equation. (1)	Wrong answer (0)					
		Correctly stating the quadratic equation in one variable x or y. (1)	Wrong answer (0)					
		Correctly finding the two values of x or y. (3)	Correctly finding any one value of x or y. (2)	Partially correct (1)	Wrong answer (0)			
		Correctly finding the corresponding two values of y or x. (3)	Correctly finding any one corresponding value of y or x. (2)	Partially correct (1)	Wrong answer (0)			
5a.	Resolving the expression into partial fractions	Correctly converting the improper fraction to its equivalent proper fraction. (0.5)	Wrong answer (0)					

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		Correctly stating the identity. (0.5)	Incorrectly stating the identity (0)					
		Correctly finding the three unknown coefficients. (3)	Correctly finding ant two unknown coefficients. (2)	Correctly finding any one unknown coefficient. (1)	Wrong answer (0)			
5b.	Finding the sum of the given arithmetic series	Correctly writing the series in reverse order (1)	Wrong answer (0)					
		Correctly adding the two series. (1)	Partially correct (0.5)					
		Correctly finding the sum S_n (2)	Partially correct (1)	Wrong answer (0)				
6	Summing the series up to n-terms	Correctly finding the nth terms of the series. (2)	Partially correct (1)	Wrong answer (0)				
		Correctly finding the kth terms of the series and correctly applying the sigma notations up to k terms. (2)	Correctly finding the kth terms of the series and incorrectly applying the sigma notations. (1)	Incorrectly finding the kth terms and correctly applying the sigma notations. (1)	Both aspects incorrect (0)			
		Correctly substituting the values of $\sum_{k=1}^{n} k, \sum_{k=1}^{n} k^2$ (2)	Any one correct aspect (1)	Wrong answer (0)				
		Correctly simplifying for S_n (2)	Partially correct (1)	Wrong answer (0)				
7	Proving the given statement correct	Correctly making the series binomial by adding 1 to both sides of the given equation (1)	Wrong answer (0)					

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		Comparing the new binomial series with the standard one. (1)	Wrong answer (0)					
		Correctly finding the values of x and n. (4)	Correctly finding the values of x or n. (2)	Partially correct (1)	Wrong answer (0)			
		Correctly substituting the values of x and n in $1 + 2y = (1 + x)^n$ (1)	Partially correct (0.5)	Wrong answer (0)				
		Correctly proving the required statement (1)	Partially correct (0.5)	Wrong answer (0)				
8	Proving the given statement correct	Correctly placing the value of $sin30°$ on LHS (1)	Wrong answer (0)					
		Correctly converting the product to its equivalent difference form on LHS and simplifying. (4)	Correctly applying the formula to convert the product to its equivalent difference form on LHS and simplifying. (3)	Correctly converting the product to its equivalent difference form on LHS without simplifying. (2)	Partially correct (1)	Wrong answer (0)		
		Correctly placing the value of $cos120°$ on LHS (1)	Wrong answer (0)					
		Correctly simplifying LHS to equate RHS (2)	Partially correct (1)	Wrong answer (0)				