**RUBRICS: HSSC 1st ANNUAL EXAMINATION 2022**

**SUBJECT: MATHEMATICS HSSC-I (Local) 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)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Converting the given expression to. | Correctly simplifying the numerator  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly rationalizing the denominator  (1) | Wrong answer  (0) |  |  |  |  |
| Writing the answer in the form  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
|  | Determining whether the given statement is a tautology, contingency or an absurdity. | Correctly declaring the propositions and  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly declaring the conditionals and  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly identifying the contingency  (1) | Wrong answer  (0) |  |  |  |  |
|  | Stating domain and range of the given relation | Correctly finding the Cartesian product  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the relation R  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly stating the domain and range  (2) | Any one correct aspect (1) | Partially correct (0.5) | Wrong answer  (0) |  |  |
|  | Completing the given table under the binary operation for a semi-group | Correctly applying the associative property and finding the correct value of  (2) | Correctly applying the associative property and finding the incorrect value of  (1) | Both incorrect aspects  (0) |  |  |  |
| Correctly applying the associative property and finding the correct value of b  (2) | Correctly applying the associative property and finding the incorrect value of b  (1) | Both incorrect aspects  (0) |  |  |  |
|  | Finding matrix A of order | Correctly stating matrix A of order  (1) | Wrong answer  (0) |  |  |  |  |
| Correctly simplifying the LHS  (1) | Partially correct (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding all the six elements of matrix A  (2) | Correctly finding any five/four elements of matrix A  (1.5) | Correctly finding any three/two elements of matrix A  (1) | Correctly finding any one element of matrix A  (0.5) | Wrong answer  (0) |  |
|  | Showing that | Correctly finding the values of and Adj A  (1) | Any one correct option (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
|  | Finding the value of | Correctly finding the values of and  (1) | Any one correct option (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
|  | Resolving the given expression into partial fractions | Correctly stating the identity  (1) | Incorrectly stating the identity  (0) |  |  |  |  |
| Correctly finding the three unknown coefficients.  (3) | Correctly finding any two of the unknown coefficients.  (2) | Correctly finding any one of the unknown coefficient.  (1) | Wrong answer  (0) |  |  |
| ) | Showing that  for the given series | Correctly stating the values of and  of the given series  (1) | Partially correct (0.5) | Wrong answer  (0) |  |  |  |
| Correctly applying the formula and finding the sum of the given series.  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly expressing explicitly in terms of  (1) | Partially correct (0.5) | Wrong answer  (0) |  |  |  |
| ) | Finding the values of and from the given data | Correctly stating the relation between nCr and nPr  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |  |
|  | Finding the probabilities of the green and red balls | Correctly finding the probability that the drawn ball is green  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly finding the probability that the drawn ball is red  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
|  | Expanding & simplifying | Correctly expanding and simplifying  (1.5) | Correctly expanding without simplifying  (1) | Wrong answer  (0) |  |  |  |
| Correctly expanding and simplifying  (1.5) | Correctly expanding without simplifying  (1) | Wrong answer  (0) |  |  |  |
| Correctly simplifying the expression  (1) | Partially correct (0.5) | Wrong answer  (0) |  |  |  |
|  | Finding the remaining Trigonometric functions when | Correctly finding the values of ,, , and  (4) | Correctly finding any four aspects  (3) | Correctly finding any three aspects  (2) | Correctly finding any two aspects  (1) | Correctly finding any one aspect  (0.5) | All incorrect aspects  (0) |
|  | Showing that | Correctly expanding the numerator and denominator of either side  (2) | Correctly expanding the numerator or denominator of either side  (1) | Wrong answer  (0) |  |  |  |
| Correctly simplifying the numerator and denominator of either side  (2) | Correctly simplifying the numerator or denominator of either side  (1) | Wrong answer  (0) |  |  |  |
|  | Finding measure of the smallest angle of the triangle whose side measures are given | Correctly identifying the smallest angle  (1) | Wrong answer  (0) |  |  |  |  |
| Applying the correct formula to find the angle  (1) | Wrong answer  (0) |  |  |  |  |
| Correctly finding the angle  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
|  | Showing that | Correctly applying the formula and finding the simplified inverse cosine function.  (2) | Partially correct  (1) | Applying the wrong formula  (0) |  |  |  |
| Correctly finding the corresponding inverse sine function.  (2) | Partially correct  (1) | Finding the wrong simplified sine function  (0) |  |  |  |
|  | Finding the real and imaginary parts of the given expression by converting it to form. | Correctly converting the numerator in Polar form with correct values of.  (2) | Correctly converting the numerator in Polar form with incorrect value of. (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |
| Correctly converting the denominator in Polar form with correct values of.  (2) | Correctly converting the denominator in Polar form with incorrect value of . (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |
| Correctly applying the De-Moivre’s theorem  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly simplifying to separate the real and Imaginary parts.  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| 4 | Finding the value of when the given system of homogenous linear equations has a non-trivial solution and the solution after placing the value of | Correctly stating the determinant of the system zero.  (1) | Wrong attempt  (0) |  |  |  |  |
| Correctly expanding the determinant  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly finding the value of.  (2) | Partially correct  (1) | Wrong answer  (0) |  |  |  |
| Correctly solving the system with the correct values of and  (3) | Correctly solving the system with any two of the correct values.  (2) | Correctly solving the system with any one of the correct values.  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |
| 5(a) | Resolving the given expression into partial fractions. | Correctly stating the identity  (1) | Wrong answer  (0) |  |  |  |  |
| Correctly finding the three unknown coefficients.  (3) | Correctly finding any two unknown coefficients.  (2) | Correctly finding any one unknown coefficient.  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |
| 5(b) | Proving that  n C k + n C k-1 = n+1 C k | Correctly expanding n C k + n C k-1 and taking the multiplicative factor common.  (2) | Correctly expanding  n C k + n C k-1.  (1) | Partially correct  (0.5) | Wrong answer  (0) |  |  |
| Correctly simplifying and proving LHS=RHS  (2) | Correctly simplifying and not proving LHS=RHS  (1) | Partially correct  (0.5) | Both incorrect aspects  (0) |  |  |
| 6. | Expanding  and evaluating | Correctly expanding the given expression up to 4th term by using the binomial series.  (4) | Correctly expanding up to 3rd term.  (3) | Correctly expanding up to 2nd term.  (2) | Correctly expanding up to 1st term.  (1) | No correct term.  (0) |  |
| Correctly substituting in the binomial series.  (2) | Partially correct (1) | Wrong answer  (0) |  |  |  |
| Correctly simplifying and approximating the result.  (2) | Correctly simplifying with incorrect approximation.  (1) | Both incorrect aspects.  (0) |  |  |  |
| 7 | Finding the values of and from the given data | Correctly finding the values of  and  (2) | Correctly finding the value of  or  (1) | Partially correct (0.5) | Wrong answer  (0) |  |  |
| Correctly applying the formula and finding the value of  .  (3) | Correctly applying the formula with incorrect value of  .  (1.5) | Partially correct (1) | Wrong answer  (0) |  |  |
| Correctly applying the formula and finding the value of  (3) | Correctly applying the formula with incorrect value of  (1.5) | Partially correct (1) | Wrong answer  (0) |  |  |
| 8 (a) | Showing that | Correctly stating and correctly applying the half angle identity.  (2) | Partially correct (1) | Wrong answer  (0) |  |  |  |
| Correctly applying the half angle and Hero’s formulae and correctly simplifying to prove.  (2) | Correctly applying the half angle and Hero’s formulae with partially correct simplification.  (1) | Correctly applying the half angle or the Hero’s formulae.  (0.5) | Wrong answer  (0) |  |  |
| 8 (b) | Finding the general solution of the given trigonometric equation | Correctly converting the given equation to quadratic form.  (1) | Partially correct conversion to quadratic form.  (0.5) | Wrong answer  (0) |  |  |  |
| Correctly finding the three roots.  (1.5) | Correctly finding the two roots.  (1) | Correctly finding the one root.  (0.5) | Wrong answer  (0) |  |  |
| Correctly identifying the extraneous root and finding the general solution.  (1.5) | Correctly finding the general solution without identifying the extraneous root.  (1) | Finding the partially correct general solution without identifying the extraneous root.  (0.5) | Wrong answer  (0) |  |  |