**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 thatfor 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 thatn 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 expandingn 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. | Expandingand 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) |  |  |