Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

MATHEMATICS HSSC–I

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) $\forall a,b \in \mathbb{R},\ a=b \Rightarrow b=a$, this property is called_____

A. Transitive B. Symmetric C. Reflexive D. Additive

(ii) i^{22} = _____

A. i B. $-i$ C. –1 D. 1

(iii) If $A \subseteq B$, then $A \cup B$ =_____

A. A B. B C. ϕ D. X

(iv) If order of a matrix A is 2 x 3 and of matrix B is 3 x 3 the order of 'AB' is_____

A. 3 x 2 B. 2 x 2 C. 3 x 3 D. 2 x 3

(v) The discriminant for equal roots is_____

A. >0 B. <0 C. =0 D. Perfect square

(vi) If $a_{n-3} = 2n-5$, its nth term is _____

A. 2n+1 B. 2n+3 C. 2n –2 D. 2n – 8

(vii) If a, A, b are in A.P. then 2A=_____

A a – b B. $\frac{a+b}{2}$ C. a + b D. a x b

(viii) The number of terms in the expansion of $(a+x)^n$ _____

A. n + 1 B. n – 1 C. n D. 2n

(ix) $n! > n^2$ is true for integral value of n=_____

A. 1 B. 2 C. 3 D. 4

(x) If α, β, γ are the angles of a triangle than $\tan(\alpha+\beta)+\tan\gamma$ =_____

A. 0 B. 1 C. 2 D. None of these

(xi) $\frac{\cos 11^0 + \sin 11^0}{\cos 11^0 - \sin 11^0}$ =_____

A. $\tan 11^0$ B. $\cot 11^0$ C. $\tan 56^0$ D. $\cot 56^0$

(xii) Sine is a periodic function and its period is_____

A. π B. $\frac{\pi}{2}$ C. 2π D. None of these

(xiii) Geometric Means between –2 and 8 is_____

A. 2 B. 8 C. ± 4 D. None of these

(xiv) All trigonometric functions are positive in quadrant_____

A. I B. II C. III D. IV

(xv) In a triangle ABC, the measures of the three sides opposite to three angles are denoted by _____:

A. 1, 2, 3 B. A, B, C

C. α, β, γ D. a, b, c

(xvi) $r.r_1.r_2.r_3$ =_____

A. S B. s – a C. Δ D. Δ^2

(xvii) $\tan^{-1}(1)$ = _____

A. $\frac{-\pi}{4}$ B. $\frac{\pi}{2}$

C. $\frac{\pi}{4}$ D. π

(xviii) The graph of $y = \sin^{-1} x$ is along the _____

A. x-axis B. y-axis

C. Both A and B D. None of these

(xix) In the binomial expansion of $(a+b)^n$, n is called_____

A. Root B. Element

C. Index D. None of these

(xx) If $r = 1$, then ${}^nP_1$ =_____

A. n! B. n C. (n – 1) D. None of these

For Examiner's use only:

Total Marks: 20

Marks Obtained: _____

MATHEMATICS HSSC–I

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

NOTE: Attempt any ten parts from Section 'B' and any five questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 40)

Q. 2 Attempt any TEN parts. All parts carry equal marks. **(10 x 4 = 40)**

(i) Show that $(z-\bar{z})^2$ is a real number $\forall z \in C$.

(ii) Define Group. Also give one example.

(iii) Show that $\begin{vmatrix} 2 & 3 & 0 \\ 3 & 9 & 6 \\ 2 & 15 & 1 \end{vmatrix} = 9 \begin{vmatrix} 2 & 1 & 0 \\ 1 & 1 & 2 \\ 2 & 5 & 1 \end{vmatrix}$.

(iv) Find the condition that one root of $x^2 + px + q = 0$ is multiplicative inverse of the other.

(v) Find the values of 'a' and 'b' if '–2 ' and '2' are the roots of the polynomial $x^3 - 4x^2 + ab + b$

(vi) Resolve $\frac{1}{(1-ax)(1-bx)(1-cx)}$ into Partial Fractions.

(vii) If the H.M and A.M between two numbers are 4 and $\frac{9}{12}$ respectively, find the numbers.

(viii) Write $(n+2)(n+1)(n)$, in the factorial form.

(ix) If x is so small that its square and higher powers may be neglected, show that $\frac{1-x}{\sqrt{1+x}} \approx 1 - \frac{3}{2}x$

(x) If $\cot\theta = \frac{5}{2}$, and the terminal arm of the angle is in the 1st quadrant $0 < \theta < \frac{\pi}{2}$, find the value of $\frac{3\sin\theta + 4\cos\theta}{\cos\theta - \sin\theta}$.

(xi) Prove that tan is a periodic function of π

(xii) If the measures of the sides of a triangle ABC are 13, 14, 15, find 'r'

(xiii) Prove that $\tan^{-1}(-x) = -\tan^{-1}x$

(xiv) The sum of a positive number and its reciprocal is $\frac{26}{5}$. Find the number.

SECTION – C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks. **(5 x 8 = 40)**

Q. 3 Simplify $\left(-\frac{1}{2} - \frac{\sqrt{3}}{2}i\right)^3$

Q. 4 Use matrices to solve $\left.\begin{aligned} x + y &= 2 \\ 2x - z &= 1 \\ 2y - 3z &= -1 \end{aligned}\right\}$

Q. 5 If ω is a root of $x^2 + x + 1 = 0$, show that its other root is ω^2 and prove that $\omega^3 = 1$

Q. 6 Solve the system of equations $3x + 4y = 25$, ; $\frac{3}{x} + \frac{4}{y} = 2$

Q. 7 If $2y = \frac{1}{2^2} + \frac{1.3}{2!}\cdot\frac{1}{2^4} + \frac{1.3.5}{3!}\cdot\frac{1}{2^6} + \ldots\ldots$ then prove that $4y^2 + 4y - 1 = 0$.

Q. 8 Find the solution set of $\sin 2x + \sin x = 0$

Q. 9 Reduce $\cos^4\theta$ to an expression involving only function of multiples of θ, raised to the first power.

Roll No. | | | | | | | Answer Sheet No._____

Sig. of Candidate._____ Sig. of Invigilator._____

MATHEMATICS HSSC–I

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE: Section–A is compulsory and comprises pages 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) $i^{20} =$_____

A. 3 B. 2 C. 1 D. 0

(ii) An empty set has_____ elements (s).

A. No B. At least one C. More than two D. None of these

(iii) The product of the roots of the equation $ax^2 + bx + c = 0$ is_____

A. $\frac{b}{c}$ B. $\frac{b}{a}$ C. $\frac{c}{a}$ D. $\frac{-c}{a}$

(iv) A matrix in which each element is zero is called _____matrix.

A. Identity B. Scalar C. Null D. Singular

(v) Partial Fraction of $\frac{1}{x^2-1}$ is of type_____

A. $\frac{A}{x+1}+\frac{B}{x-1}$ B. $\frac{A}{x-1}+\frac{B}{(x-1)^2}$

C. $\frac{A}{x+1}+\frac{B}{(x+1)^2}$ D. $\frac{A}{x-1}+\frac{B}{x^2-1}$

(vi) Next term of the sequence 1, 3, 7, 15,.....is_____

A. 23 B. 27 C. 31 D. 33

(vii) If S_2, S_3, S_5 are the sums of 2n, 3n, 5n terms of an A.P, then S_5 =_____

A $5(S_3 - S_2)$ B. $5S_3 - S_2$

C. $5(S_3 + S_2)$ D. None of these

(viii) If $r = n$ then ${}^nP_n$ =_____

A. $(n+1)!$ B. $(n-1)!$ C. $n!$ D. None of these

(ix) The sum of even and odd co-efficient of a binomial expansion is_____

A. Equal B. Not equal

C. Double of the other D. None of these

(x) $\frac{2\pi}{3}$ radians=_____

A. 120^0 B. 270^0 C. 190^0 D. 145^0

(xi) The angle associated with angles of measure θ to a right angle or its multiple is called _____

A. Acute angle B. Quadrantal angle

C. Allied angle D. None of these

.....

(xii) The solution of the equation $\cot\theta = \frac{1}{\sqrt{3}}$ is_____

A. $\frac{\pi}{2}$ and $\frac{2\pi}{3}$ B. $\frac{\pi}{4}$ and $\frac{\pi}{3}$ C. $\frac{\pi}{6}$ and $\frac{\pi}{3}$ D. $\frac{\pi}{3}$ and $\frac{4\pi}{3}$

(xiii) If $\sin\theta = 0$ than θ=_____

A. 0 B. $n\pi$, $n \in z$ C. $\frac{n\pi}{2}$, $n \in z$ D. None of these

(xiv) $\frac{b^2+c^2-a^2}{2bc}$=_____

A. $\cos\alpha$ B. $\cos\beta$ C. $\cos\gamma$ D. $\sin\alpha$

(xv) ${}^nC_1 + {}^nC_3 + {}^nC_5 + \ldots\ldots\ldots {}^nC_{n-1}$ =_____:

A. 2^n B. 2^{n+1} C. 2^{n-1} D. None of these

(xvi) $\sin(-\beta)$ =_____

A. $\sin\beta$ B. $-\sin\beta$ C. $\cos\beta$ D. $\cos(-\beta)$

(xvii) If $\sin x = \frac{1}{2}$, the reference angle is _____

A. $\frac{\pi}{6}$ B. $\frac{\pi}{3}$ C. $\frac{\pi}{4}$ D. $\frac{\pi}{2}$

(xviii) The in-radius 'r' of a triangle is given by _____.

A. $s\Delta$ B. $\frac{\Delta}{s}$ C. $\frac{s}{\Delta}$ D. None of these

(xix) An 8 m high tree has the shadow 8 m in length. The angle of elevation of the sun at that moment is_____

A. 45^0 B. 60^0 C. 15^0 D. None of these

(xx) The multiplicative inverse of complex number (x, y) is_____

A. $\left(\frac{x}{x^2+y^2}, \frac{y}{x^2+y^2}\right)$ B. $\left(\frac{x}{x^2+y^2}, \frac{-y}{x^2+y^2}\right)$

C. $\left(\frac{-x}{x^2+y^2}, \frac{y}{x^2+y^2}\right)$ D. $\left(\frac{-x}{x^2+y^2}, \frac{-y}{x^2+y^2}\right)$

For Examiner's use only:

Total Marks:	20
Marks Obtained:	

MATHEMATICS HSSC–I

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

NOTE: Attempt any ten parts from Section 'B' and any five questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 40)

Q. 2 Attempt any TEN parts. All parts carry equal marks. **(10 x 4 = 40)**

(i) Express $1+i\sqrt{3}$ in a polar form.

(ii) Factorize $9a^2+16b^2$.

(iii) Consider the set S=$\{1,-1,i,-i\}$. Set up its multiplication table.

(iv) If A=$\begin{bmatrix} i & 0 \\ 1 & -i \end{bmatrix}$, show that $A^4 = I_2$.

(v) Without expansion verify that $\begin{vmatrix} 1 & 2 & 3x \\ 2 & 3 & 6x \\ 3 & 5 & 9x \end{vmatrix} = 0$

(vi) Show that $x^3 - y^3 = (x-y)(x-\omega y)(x-\omega^2 y)$.

(vii) If α, β are the roots of the quadratic equation $ax^2+bx+c=0,\ a \neq 0$ find the sum of the roots.

(viii) Resolve $\frac{7x+25}{(x+3)(x+4)}$ into Partial Fractions.

(ix) If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P, show that $b = \frac{2ac}{a+c}$

(x) If ${}^nC_8 = {}^nC_{12}$, find n.

(xi) What is the general term in the expansion of $\left(\frac{a}{2}-\frac{2}{a}\right)^6$

(xii) Prove that $\cos^4\theta - \sin^4\theta = \cos^2\theta - \sin^2\theta$

(xiii) If α, β, γ are the angles of a triangle ABC, prove that $\cos\left(\frac{\alpha+\beta}{2}\right) = \sin\left(\frac{\gamma}{2}\right)$

(xiv) Show that $r = (s-a)\tan\frac{\alpha}{2}$

SECTION – C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks. **(5 x 8 = 40)**

Q. 3 Simplify by expressing in the form $a+bi$ $\frac{3}{\sqrt{6}-\sqrt{-12}}$

Q. 4 Find the value of x if $\begin{vmatrix} 3 & 1 & x \\ -1 & 3 & 4 \\ x & 1 & 0 \end{vmatrix} = -30$

Q. 5 Solve the equation $\sqrt{3x+4} = 2+\sqrt{2x-4}$

Q. 6 Resolve $\frac{4x}{(x+1)^2(x-1)}$ into partial fractions.

Q. 7 The sum of S_9 and S_7 is 203 and $S_9 - S_7 = 49, S_7$ and S_9 being the sums of the first 7 and 9 terms of an A.P, respectively. Determine the series.

Q. 8 Use binomial theorem to show that $1+\frac{1}{4}+\frac{1.3}{4.8}+\frac{1.3.5}{4.8.12}+\ldots = \sqrt{2}$.

Q. 9 Find the solution set of $\sqrt{3}\tan x - \sec x - 1 = 0$