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) A decimal which has only finite number of decimal places is called _____ decimal.

A. Terminating B. Non terminating
C. Recurring D. Non recurring

(ii) $\forall\ a, b, c \in \mathbb{R}, \quad a < b \wedge b < c \ \Rightarrow\ a < c$ this inequality property of real number is _____

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

(iii) Multiplicative inverse of non zero complex number $(a,\ b)$ is _____

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

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

(iv) For two numbers a and b, $G^2 =$ _____.

A. $A+H$ B. $A-H$
C. $A\times H$ D. $\frac{A}{H}$

(v) ${}^9P_2 =$ _____.

A. 91 B. 6
C. –6 D. 72

(vi) An equation of the form $ax+by=k$ is homogeneous linear equation when _____

A. $a=0,\ b=0,\ k=1$ B. $a=0,\ b=1,\ k=2$
C. $a\neq 0,\ b\neq 0,\ k=0$ D. $a\neq 0,\ b\neq 0,\ k\neq 0$

(vii) Number of roots containing non zero imaginary part of cube roots of unity are _____

A. One B. Two
C. Three D. Four

(viii) Partial fractions of $\frac{1}{x(x+1)}$ are _____

A. $\frac{1}{x}-\frac{1}{x+1}$ B. $\frac{1}{x}+\frac{1}{x+1}$

C. $\frac{1}{x}+\frac{2}{x+1}$ D. $\frac{1}{x}-\frac{2}{x+1}$

(ix) $\frac{1}{5}$ and $\frac{1}{8}$ are two terms of an H.P and their sum is $\frac{13}{40}$, then sum of the corresponding terms of A.P will be _____

A. $\frac{40}{13}$ B. $\frac{1}{13}$
C. 13 D. None of these

DO NOT WRITE ANYTHING HERE

(x) The inequality $n! > 2^n - 1$ is true for integral values of _____

A. $n = 1$ B. $n \geq 2$

C. $n \geq 3$ D. $n \geq 4$

(xi) Which of the following angles are coterminal?

A. $\left(\frac{\pi}{3}, \frac{5\pi}{3}\right)$ B. $\left(\frac{\pi}{3}, \frac{4\pi}{3}\right)$

C. $\left(\frac{\pi}{3}, \frac{17\pi}{3}\right)$ D. $\left(\frac{\pi}{3}, \frac{13\pi}{3}\right)$

(xii) If $r\cos\theta = 7$ and $r\sin\theta = 3$ then $r =$ _____.

A. 9 B. $-\sqrt{58}$

C. $+\sqrt{58}$ D. 49

(xiii) If π is the period of $\tan x$ then period of $\tan\frac{x}{3}$ is _____

A. 3π B. 2π

C. π D. $\frac{\pi}{2}$

(xiv) The circle passing through the vertices of a triangle is called a/an _____

A. In-circle B. Circum-circle

C. Ex-circle D. Semi-circle

(xv) For any equilateral triangle having sides of measures a, the value of s is _____

A. $\frac{3a}{2}$ B. $\frac{\sqrt{3a}}{2}$

C. $\frac{a}{\sqrt{3}}$ D. $\frac{3}{4a^2}$

(xvi) $\frac{\Delta}{s-a}$ is the value of _____

A. R B. r

C. r_1 D. r_2

(xvii) Factorial form of $(n+1)n$ is _____

A. $\frac{(n+1)!}{(n-2)!}$ B. $\frac{(n-1)!}{(n-2)!}$

C. $\frac{(n+1)!}{(n-1)!}$ D. $\frac{n!}{(n-1)!}$

(xviii) The matrix A is skew Hermition when $(\bar{A})^t =$ _____.

A. $-A$ B. A C. $\bar{A}$ D. A^t

(xix) $\tan^{-1}A - \tan^{-1}B =$ _____.

A. $\tan^{-1}\frac{A-B}{1+AB}$ B. $\tan^{-1}\frac{A-B}{1-AB}$

C. $\frac{\tan^{-1}A - \tan^{-1}B}{1+\tan^{-1}A\tan^{-1}B}$ D. $\frac{\tan^{-1}A - \tan^{-1}B}{1-\tan^{-1}A\tan^{-1}B}$

(xx) Number of elements in the power set of a set containing n elements is _____

A. $n \times n$ B. $2n$

C. $2^{n \times n}$ D. 2^n

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:- Sections 'B' and 'C' comprise pages 1–2 and questions therein are to be answered on the separately provided answer book. Answer any ten parts from Section 'B' and attempt any five questions from Section 'C'. 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) Separate into real and imaginary parts (write as a simple complex number):
$$\frac{2-7i}{4+5i}$$

(ii) If A and B are two sets then prove that $(A \cap B)' = A' \cup B'$

(iii) Without expansion verify that: $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$

(iv) Use synthetic division to find the values of p and q if $x+1$ and $x-2$ are the factors of the polynomial x^3+px^2+qx+6.

(v) Resolve into Partial Fraction $\frac{1}{(x^2+1)(x+1)}$

(vi) If a, b, c, d are in G.P, prove that $a-b$, $b-c$, $c-d$ are in G.P.

(vii) How many arrangements of the letters of the word "MATHEMATICS" can be made, by taken all together.

(viii) Find the term independent of x in the expansion of $\left(\sqrt{x}+\frac{1}{2x^2}\right)^{10}$

(ix) Find the values of the trigonometric functions of angle $\frac{-71}{6}\pi$

(x) Find the period of the function $3\cos\frac{x}{5}$

(xi) In any triangle ABC, with usual notations prove that $\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$

(xii) Express $12\sin\theta + 5\cos\theta$ in the form $r\sin(\theta+\phi)$ where terminal side of the angle θ and ϕ are in 1st quadrant.

(xiii) Without using tables and calculators, show that $2\tan^{-1}\frac{2}{3} = \sin^{-1}\frac{12}{13}$

(xiv) If the roots of $px^2 + qx + q = 0$ are α and β, then prove that

$$\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{q}{p}} = 0$$

SECTION – C (Marks 40)

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

Q. 3 Solve the system by reducing the augmented matrix to the echelon form:

$$\left.\begin{aligned} x_1 - 2x_2 - 2x_3 &= -1 \\ 2x_1 + 3x_2 + x_3 &= 1 \\ 5x_1 - 4x_2 - 3x_3 &= 1 \end{aligned}\right\}$$

Q. 4 Solve the equation $\left(x - \frac{1}{x}\right)^2 + 3\left(x + \frac{1}{x}\right) = 0$

Q. 5 The sum of an infinite geometric series is 9 and the sum of the squares of its terms is $\frac{81}{5}$. Find the series.

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

Q. 7 Drive the Fundamental law of trigonometry.

Q. 8 Prove that $r_1 r_2 + r_2 r_3 + r_3 r_1 = s^2$

Q. 9 Find the solution set of the equation $\cos 2x = \sin 3x$