Version No.			
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MATHEMATICS HSSC–I

SECTION – A (Marks 20)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed.

Do not use lead pencil.

حصہ اول لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگران مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پُر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	If a function $f: A \to B$ is such that Range $f \neq B$ then f is called an:	Into function	One-one function	Onto function	Bijective function	○	○	○	○
2.	The simplified form of $(-1)^{\frac{23}{2}}$	-1	1	i	$-i$	○	○	○	○
3.	Which of the following represents the contra positive of $p \to q$?	$\sim p \to \sim q$	$\sim q \to \sim p$	$\sim p \to q$	$\sim q \to p$	○	○	○	○
4.	If $detA = 5$, what is the value of $det(15A)$? (where order of A is 2×2)	75	225	375	1125	○	○	○	○
5.	For what value of k if $\begin{vmatrix} k-3 & -1 \\ -7 & k+3 \end{vmatrix} = 0$?	±1	±2	±3	±4	○	○	○	○
6.	If the roots of the equation $px^2+qx+r=0$ are multiplicative inverse of each other then which condition holds?	$p=r$	$p=q$	$q=r$	$pq=r$	○	○	○	○
7.	Let $f(x)$ be a polynomial of degree three such that $f(0)=f(1)=f(2)=0$ then $f(x)=?$	x^3+3x^2+2x	x^3-3x^2+2x	x^3-3x^2-2x	x^3+3x^2-2x	○	○	○	○
8.	If $\frac{3}{(x-1)(x+2)} = \frac{A}{(x-1)} + \frac{B}{(x+2)}$ then what are the values of A and B?	$A=1, B=-1$	$A=1, B=1$	$A=1, B=2$	$A=1, B=-2$	○	○	○	○
9.	If A.M and G.M between a and b are equal then $(a-b)^2$ is equal to:	$2ab$	0	$\sqrt{ab}$	$4ab$	○	○	○	○
10.	What is the sum of infinite Geometric series $2, \sqrt{2}, 1, \ldots \infty$	$4-\sqrt{2}$	$4+\sqrt{2}$	$4+2\sqrt{2}$	$4-2\sqrt{2}$	○	○	○	○
11.	In how many ways can 7 persons be seated at a round table?	60	120	720	5040	○	○	○	○

	Question	A	B	C	D	A	B	C	D
12.	The sum of the odd coefficients in the expansion of $(1+x)^7$ is:	16	32	64	128	○	○	○	○
13.	The first three terms in the expansion $(1-x)^{\frac{1}{2}}$ are:	$1+\frac{x}{2}-\frac{x^2}{8}+\ldots$	$1-\frac{1}{2}x-\frac{x^2}{8}+\ldots$	$1-\frac{1}{2}x+\frac{3}{8}x^2+\ldots$	$1-\frac{1}{2}x-\frac{3}{8}x^2+\ldots$	○	○	○	○
14.	If $\tan\theta=\frac{1}{\sqrt{3}}$ and θ lies in 3rd quadrant. What is the value of $\sin\theta$?	$\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	○	○	○	○
15.	$\sin\left(\theta+\frac{\pi}{6}\right)+\cos\left(\theta+\frac{\pi}{3}\right)=$	$\cos\theta$	$\sin\theta$	$\sec\theta$	$\cot\theta$	○	○	○	○
16.	The range of the function $y=\cot x$ is:	$-1\le y\le 1$	$y\le -1$ or $y\ge 1$	R	$R-\{n\pi, n\in Z\}$	○	○	○	○
17.	The circum-centre of a circle is the point of intersection of:	Medians	Altitudes	Angle bisectors	Right bisectors	○	○	○	○
18.	The value of $\sin\left(\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)$ is equal to:	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	○	○	○	○
19.	The solution of $\cot\theta=\frac{1}{\sqrt{3}}$ is equal to: $\theta\in[0,2\pi]$	$\frac{\pi}{3},\frac{4\pi}{3}$	$\frac{\pi}{3},\frac{2\pi}{3}$	$\frac{\pi}{6},\frac{5\pi}{6}$	$\frac{\pi}{6},\frac{11\pi}{6}$	○	○	○	○
20.	$\cos\left(2\sin^{-1}x\right)$ is equal to:	$1+2x^2$	$1-2x^2$	$2x^2-1$	$1-x^2$	○	○	○	○

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MATHEMATICS HSSC–I

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

NOTE: Attempt any twelve parts from Section 'B' and any four questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 48)

Q. 2 Attempt any TWELVE parts. All parts carry equal marks. **(12 x 4 = 48)**

(i) If $Z_1 = 2+i$, $Z_2 = 3+2i$ and $Z_3 = 2+3i$ then express $\frac{\overline{Z_1}\,\overline{Z_3}}{Z_2}$ in the form of $a+bi$.

(ii) Show that the set $\{1, \omega, \omega^2\}$ (where $\omega^3 = 1$) is an abelian group with respect to ordinary multiplication.

(iii) Construct the Truth table to show $\sim(p \to q) \leftrightarrow (p \wedge \sim q)$ is a Tautology.

(iv) Use synthetic Division to find the values of 'S' and 'T' if $(x-1)$ and $(x+2)$ are the factors of the polynomial. $x^3 - Sx^2 + Tx + 6$.

(v) Resolve $\frac{x^2+15}{(x^2+2x+5)(x-2)}$ into partial fractions.

(vi) Solve the equation for X for $3X + 2A = B$ if $A = \begin{bmatrix} 2 & 3 & -2 \\ -1 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 4 \\ 3 & 2 & 2 \end{bmatrix}$

(vii) If $A = \begin{bmatrix} 1 \\ 1+i \\ i \end{bmatrix}$ find $A(\overline{A})^t$.

(viii) If $a = 1 - x + x^2 - x^3 + \ldots$ where $|x| < 1$, $b = 1 + x + x^2 + x^3 + \ldots$ where $|x| < 1$ then show that $2ab = a + b$

(ix) Find the number of 5 digit numbers that can be formed from the digits 1,3,4,5,7 (when no digits repeated)
(a) The digits 3 and 7 are next to each other
(b) The digits 3 and 7 are not next to each other

(x) Expand $(8-3x)^{\frac{-1}{3}}$ upto four terms.

(xi) If $\tan\theta = \frac{2}{\sqrt{7}}$ and terminal arm angle is not in 3rd quadrant. Find the value of $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta}$.

(xii) Prove that $\frac{\cos 14° + \sin 14°}{\cos 14° - \sin 14°} = \tan 59°$.

(xiii) Prove that $\sin\theta$ is a periodic function and its period is 2π.

(xiv) Show that $r_1 = 4R\sin\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$.

(xv) Prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$

(xvi) Find the solution set of the trigonometric equation $\sin 7x - \sin x = \sin 3x$

SECTION – C (Marks 32)

Note: Attempt any FOUR questions. All questions carry equal marks. **(4 x 8 = 32)**

Q. 3 Solve the system of linear equations by using their augmented matrix to reduced Echelon form
$2x + 5y - z = 5$; $3x + 4y + 2z = 11$; $x + 2y - 2z = -3$

Q. 4 If α and β are the roots of $2x^2 + 3x - 5 = 0$, then form the quadratic equation whose roots are $\frac{3-\alpha}{3+\alpha}, \frac{3-\beta}{3+\beta}$.

Q. 5 For $p = \frac{1}{2}\left(\frac{4}{9}\right) + \frac{1.3}{2^2.2!}\left(\frac{4}{9}\right)^2 + \frac{1.3.5}{2^3 3!}\left(\frac{4}{9}\right)^3 + \ldots$ Show that $5p^2 + 10p - 4 = 0$

Q. 6 If the numbers $\frac{1}{2}, \frac{4}{21}, \frac{1}{36}$ are subtracted from three consecutive term of a G.P, the resulting numbers are in H.P. Find the numbers if their product is $\frac{1}{27}$.

Q. 7 Prove that $\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{\pi}{3}\sin\frac{4\pi}{9} = \frac{3}{16}$

Q. 8 **(a)** Show that $\frac{1}{2rR} = \frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}$

(b) The area of triangle is 121.34 if $\alpha = 32°15'$, $\beta = 65°37'$, then find c and angle γ.